The Gravity Model for One Country and One Class of Goods

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Abstract

Purpose: The aim of this paper is to investigate the impact of the economic, trade policy and political factors, along with the traditional factors, like economic size and distance on the electronics trade flows of Romania before and after the EU integration. **Design / Methodology / Approach:** An augmented gravity model was used, including traditional variables as GDP, distance between countries, EU membership and common border, as well as nontraditional ones, as trade openness, political stability, inflation. A balanced panel approach was used and EViews 10 was used for regression. **Findings:** For Romanian trading partners, the findings are in line with the previous studies, but some atypical results were found for Romanian variables. **Practical implications**: A deeper understanding of the dynamics of the Romanian electronic trade flows should be considered by the Romanian trade deciders and the impact of the trade openness and of the political stability should be taken into account. **Originality / Value**: Combining the traditional and nontraditional factors, including economical, political and trade policy ones, electronics trade flows determinants lead to some atypical findings for Romania. **Limitations**: Further research should be performed to study separately the Romanian electronics' exports, re-exports, as well as electronics' parts as components.

Keywords: Gravity Model, Romanian Trade Flows, Electronic Products.

JEL Classification: F14: Empirical Studies of Trade

C33: Panel Data Models; Spatio-temporal Models

Introduction

Romanian trade flows with electronics in 2001-2018 period - brief overview

Electronics are among the most important Romanian exports, as well as imports in 2001 - 2018 period. The value of the exported electronics was 14 times greater in 2018 than in 2001, while the import value was 9 times greater, yet except for year 2016, when exports surpassed imports, Romania remained a net importer of electronics. Germany was the main trading partner, in the top 10 electronics' importers there were mainly EU countries and the electronics' imports came also from EU countries, with the exception of China.

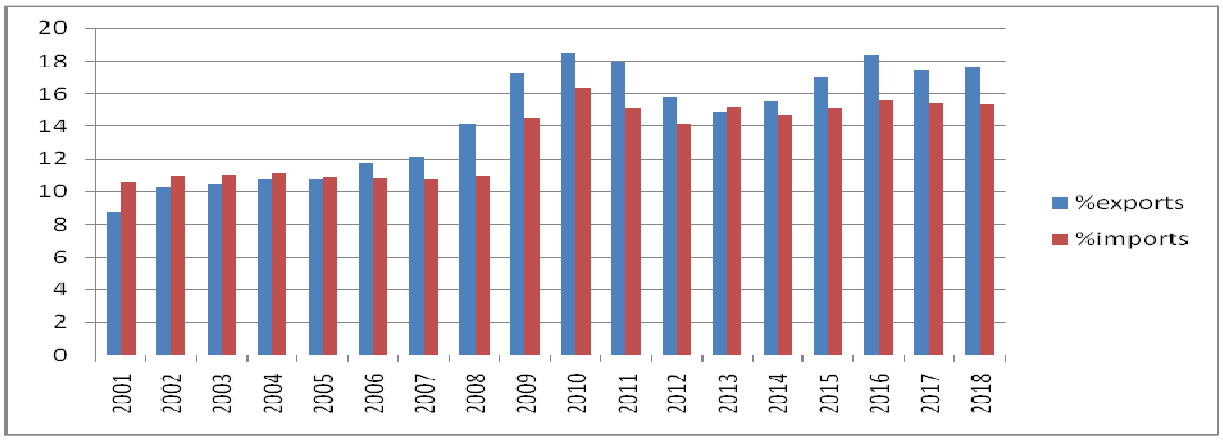

Fig. 1:The share of electronics in all exported and imported goods

Source: Author's figure based on data from https://www.trademap.org/tradestat/Product_SelCountry_TS.aspx?nvpm

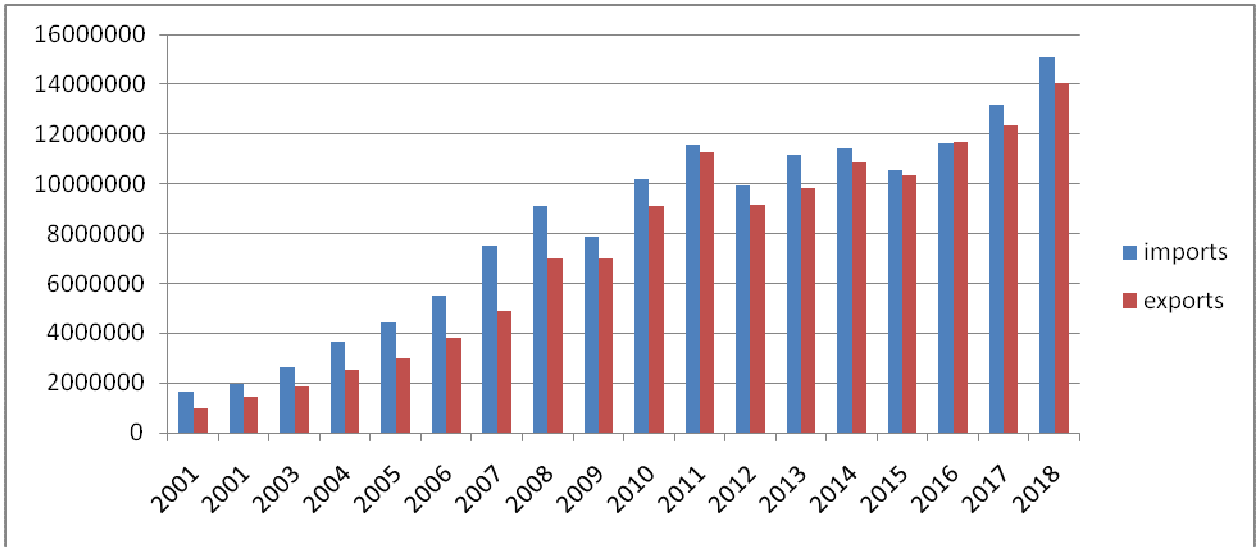

Fig. 2: The value of electronics imports and exports in US dollars in the period 2001-2018

Source: Author's figure based on data from https://www.trademap.org/tradestat/Product_SelCountry_TS.aspx?nvpm

Literature Review

The gravity model was developed independently by Tinberger (1962) and by Poyhonen (1963), although a gravity theory was before developed by Adam Smith, refering to a proportional relationship between economic size and distance (Elmslie, 2018). Over more than 50 years, the gravity model became the most successful model for international trade and it is often labeled as the workhorse of the research in this field. The initial gravity model is based on Newton's gravity law: the force between two particles is directly proportional with their mass and inversely proportional with the square of the distance between them. The translation for Newton's law of universal attraction goes like this: the trade flows between two countries is positively influenced by their economic size and negatively influenced by the distance between them. What means the economic size? Could be GDP, GNI (formally GNP), GDP per capita,

population, income, GDP per capita. What does distance mean? In the first place, it was simply the geographical distance between the capitals of the two countries, but later it became a proxy for trade costs, transport costs, taxes and tariffs, transaction costs, communication costs, cultural distance, country familiarity.

For more than a decade, the gravity model was just a successful empirical model with no solid theoretical base. It was in 1979 when Anderson developed a solid theoretical foundation for the gravity model based on Armington's assumption ("Goods are differentiated by their country of origin") and introduced the term *economic distance*. Bergstrand added price variables in 1985. The Helpman and Krugman model was developed in 1985 to explain mainly the intra-industry international trade. Bergstrand (1985, 1989) considered a Heckscher-Ohlin model, including monopolistic competition with differentiated products to develop the theory of gravity. If Helpman, Krugman and Bergstand were critics to Heckscher and Ohlin, in 1998, Deardorff was critical with respect to the critics of Helpman, Krugman and Bergstand and reevaluated the Heckscher-Ohlin model. According to this model, countries closed to each other will tend to trade more, while countries which are far away will trade even less than the predicted trade. Evenett and Keller (2002) tested both models and concluded that both models are a theoretical base for the gravity model, but the Heckscher-Ohlin model should be preferred from an empirical point of view. All models have an explanatory power of at least 80%.

Regarding the relationship between the gravity equation and the models which generated the equation:

- The gravity equations fit in with the Heckscher-Ohlin model of inter-industry, as well as with the Helpman – Krugman - Markusen model of intra industry trade (Berstrand, 1989).

- The gravity equation is a reduced form from a partial equilibrium subsystem (Bergstrand, 1985).

- The gravity equation could be generated by a model with incomplete specialization and trade costs (Haveman and Hummels, 2004).

- The estimates from the gravity equation could be different when heterogeneity is considered (Tzouvelekas, 2007).

The debate on the best model is not over yet: if all random components of the model are homoskedastic, the Helpman-Melitz-Rubinstein model works better (Santos Silva and Tenreyro, 2009).

The Pros of the gravity model:

- Has a better overall performance compared to radiation models (Masucci et al, 2013).
- It's perfectly applicable to a single country case (Sohn, 2005).
- Was used for over 50 years to analyze the impact of the globalization factors on the bilateral trade (Bergstrand and Egger, 2009).
- The augmented gravity model including Linder hypothesis is better suited for tourism flows than the traditional gravity model (Tamaş, 2019).
- Explains the financial transactions in the same manner as the trade with goods (Portes and Rey, 2005).
- Could be applied to International Trade Network (Fagiolo, 2010).
- The trade with homogeneous goods is better described by the gravity model (Feenstra, Markusen & Rose, 2001).
- The gravity model could be used to study the traffic flows between cities (Jung, Wang & Stanley, 2008).

- The more technologically complex and intense are the industries, the larger is the gravity strenghth (Keller and Yeaple, 2009).
- The inter cities' communications are explained by the gravity model (Krings et al, 2009).

The Cons of the gravity model:

- Performs poorly for bilateral trade with parts and components (Baldwin & Taglioni, 2010).
- The traditional gravity model estimates are not reliable in analyzing the East-West trade potential (Breuss and Egger, 1999).
- The results of the gravity model for the potential trade are highly sensitive on the country heterogeneity (De Benedictis and Vicarelli, 2005).
- The use of the gravity model for the trade policies is severely limited (De Benedictis and Vicarelli, 2009).

The major problems of the gravity model are related to the heteroskedasticity in the trade data and the existence of the zero flows (Gómez-Herrera, 2013). The zero trade may occur if the trade volume or value is too small or if the firms of the exporting country are not competitive enough for the customers in the importing country (Anderson, 2011). Zero values are very common in trade data and omitting them could lead to omitting important information (Shepherd, 2008). Zero values should not be neglected because of the information they may contain (De Benedictis and Taglioni, 2011). Treating zero trade flows properly is important from both a statistical and an economical perspective (Haq, Meilke and Cranfield, 2010). Among all the solutions to deal with the zeroes (omitting the zeroes, various Tobit estimations, truncated regression, substitutions for zeroes), omitting the zeroes from the sample leads to the most acceptable results (Linders and de Groot, 2006).

Methodological issues:

- The linear approximation method can have lower average absolute comparative static errors (Baier and Berstrand, 2009).
- The simple least squares estimates outperform the generalized method of moments for dynamic panels (Bun and Klaassen, 2002).
- The fixed effects estimator is similar to a dynamic OLS (Fidrmuc, 2009).
- The Standard Poisson model, seen as an alternative to log normality assumption, is vulnerable to excess zero flows and over dispersion (Burger, van Oort and Linders, 2009).
- The Poisson Pseudo-Maximum Likelihood estimator solves the heteroscedasticity bias problem only when this is the only problem and fails to do so when heteroscedasticity bias is combined with frequent zeroes (Martin and Pham, 2008).

- For small samples, the performances of the Poisson Pseudo-Maximum Likelihood estimator and of the Feasible Generalized Least Squares estimator are similar (Martinez Zarzoso, 2013) (Westerlund and Wilhelmsson, 2009).

- The Poisson Pseudo-Maximum Likelihood estimator leads to significant differences compared to traditional estimators (Santos Silva and Tenreyro, 2006).

- The Poisson Pseudo-Maximum Likelihood estimator is still robust for large proportions of zeroes (Santos Silva and Tenreyro, 2011).

- The nonparametric cross section estimates are more stable than the OLS cross section estimates (Baier and Bergstrand, 2009).

- The Anderson-Van Wincoop's multilateral trade resistance factor, which works with cross section data, could be adaptive to panel data, as well as using time variant country dummies (Baldwin and Taglioni, 2006).
- The omission of interactions might lead to biased estimates (Baltagi, Egger and Pfaffermayr, 2003).
- Panel estimations should be considered instead of cross section estimations (Egger, 1999) and fixed effects should be preferred to random effects (De Benedictis and Taglioni, 2011).
- A proper gravity equation should include time invariant bilateral interactions (Egger and Pfaffermayr, 2003).
- The gravity equations perform better in explaining the trade among the industrial nations (Evenett and Keller, 2002).
- Spatial autocorrelation and heterogeneity are affected by the bias introduced by logarithmic scale in the gravity equation (Porojan, 2001).
- The log linearity of the gravity equation could be replaced by Box Cox transformations (Sanso, Rogelio and Sanz, 1993).

Among all the trade determinants, the income or the GDP plays a special role. Income growth explains 67% of the trade flows (Baier and Bergstrand, 2001). Income differences, exchange rates and infrastructure are among the most important determinants of bilateral trade flows (Martínez-Zarzoso and Nowak-Lehman, 2003). GDP per capita and common membership positively influence the wine trade flows (Tamaș, 2017). Income, population, production capacity and distance are the determinants of the meat trade (Karemera et al. 2015). There is a positive robust correlation between the investment share and the ratio of international trade to GDP (Levine and Renelt, 1992). The trade openness of a country is inversely proportional with the size of the country (Siliverstovs and Schumacher, 2008). The trade volumes depend on the trading partners and are smaller for pairs of less developed countries compared to pairs of developed and less developed countries (Helpman, Melitz and Rubinstein, 2008). Usually, GDP coefficients are between 0.5 and 1.5.

Distance is an important determinant of trade flows. The negative effect of the distance on the trade flows remains high since the middle of the century (Head, 2008). The absolute value of the distance increased over the time (Brun et al, 2005). The distance impact is larger when OLS is used (Siliverstovs and Schumacher, 2008). The existing measure for the distance between two countries overestimates the distance effect on the trade flows (Keith and Mayer, 2002). The geographical distance is more important for services trade than it is for goods trade (Kimura and Lee, 2004). Distance has a larger effect on the number of exporting firms than on export sales (Lawless, 2010). Internal distance has an impact 10 times larger than remoteness (Melitz, 2007).

Distance is an imperfect proxy for the trade costs and its effects differ among trading goods (De Benedictis and Taglioni, 2011). Distance combined with common language, common culture and country familiarity plays an important role in the gravity model (Deardoff, 1998). The negative impact of the distance on the trade flows could be explained not only by the transport costs, but also by the unfamiliarity of the countries (Grossman, 1996). Usually, distance coefficients are between -0.6 and -1.6.

But, in special cases, distance could have a smaller effect on the trade flows. Exports and imports among the countries from the Gulf Cooperation Council do not depend on the distance because of the development of the transport facilities and the characteristics of the region (Filippini and Molini, 2003). The geographical distance and the cultural distance do not have a significant influence on the Erasmus students flows (Tamaș, 2017). The distance has no statistical effect for non taste dependent products, like software, while for taste dependent products, like movies, it has similar effect as for goods (Blum and Goldfarb, 2006).

More and more, the distance is associated with the trade costs. Transport costs reductions explain 8% of the trade flows, while tariff rate reductions explain 25% of them (Baier and Bergstrand, 2001). The trade costs depend on the size of the country (Baier and Berstrand, 2009). Trade costs vary among countries, developing countries have trade costs 7 times larger than developed countries (Anderson and van Wincoop, 2004). Surprisingly, most country pairs reduce their trade after a multilateral fall in trade costs (Behar and Nelson, 2014). The impact of the trade barriers is reduced by the elasticity of the substitution (Chaney, 2008). A fall in the trade costs increases the trade volumes and the number of firms of the exporting country which enter the trade (Anderson, 2011). Trade costs could be used for the gravity, but also the gravity model could be used to analyze the impact of the infrastructure investments on the trade costs (Egger, 2002).

In relationship with the distance effect is sharing a common border effect. It is not clearly why the common border matters as long as distance (Head, 2003). The gravity model produces consistent estimates regarding the average border effect on the trade flows (Feenstra, 2002). The border effect is sensitive regarding the size and the sign of the chosen method (Magerman, Studnicka and Van Hove, 2016). National borders reduce the trade among industrialized countries by 30% (Anderson and van Wincoop, 2003). Border effects remain large even when the tariffs are very small (Head and Mayer, 2013). Countries closed to each other have fewer opportunities to develop export opportunities (Stavytskyy et al, 2019). The most easily transportable industries have no border effect (Keith and Mayer, 2002).

The membership in the same trade agreement has a positive impact on trade flows. The common membership is one of the most used dummies in the gravity model.

The results show that both the EEC and EFTA have experienced a cumulative growth in gross trade creation (GTC), with the GTC of the EEC being substantially greater than the GTC of EFTA (Aitken, 1973). The probability of two countries already having a trade agreement to have another trade agreement with another country is 50 times larger than the probability that any of the first two countries to have another agreement with the third one (Baier and Bergstrand, 2004). The gravity model tends to overestimate the effect of the integration on the trade volumes (Cheng and Wall, 1999). There is no additional trade between Turkey and EU following the Association Act from 1963 and the customs union from 1996 (Antonucci and Manzocchi, 2006). Trade flows are influenced by amity or enmity between countries (Pollins, 1989).

Free Trade Agreements (FTAs) effect: FTA increase trade flows 4 times. A FTA could double the trade flows between two countries in 10 years (Baier and Bergstrand, 2007). FTAs effects on trade flows are not clear, because not all the studies find trade creation or trade diversion (Henderson and Millimet, 2008). The effects of the FTAs for the less developed countries trade flows (Cambodia, Laos, Myanmar and Vietnam) are negative (Roberts, 2004).

Preferential Trade Agreements (PTAs) effect: foster the trade among the countries in the PTA (Cardamone, 2007).

Regional Trade Agreements (RTAs) effect: increase the trade among their members on the expense of the non members (Carrere, 2006). RTAs have a positive impact on the bilateral trade (Cipollina and Salvatici, 2010). The RTAs have a larger positive effect on the trade flows for developed countries compared to developing countries (Horsewood, 2009). Membership in the same RTA have a positive effect on goods trade, as well as on services trade (Kimura and Lee, 2004). Regional integration may increase the trade flows, but sometimes it leads to a decline (Elliott, 2007).

Similarity seems to have a positive influence on the trade flows. Similarities between countries regarding GDP per capita and population positively influence the trade flows (Miron, Cojocariu and Tamaș, 2019). Similar cultural attributes lead to trade flows increasing (Söderström, 2008). Trade among countries with similar income per capita is more intense (Hallak, 2010).

Gravity model best fits for countries with similar preferences for traded goods and similar trade costs (Anderson, 1979). The similarities between two countries regarding the capital – labor relationship have an impact on the intra-industry bilateral trade (Bergstrand, 1990). If two countries with similar GDP have a bilateral trade and one of them reaches a higher GDP, the first goods which this country will eliminate from the trade would be the actual goods exported by the other country (Linder, 1961). The Linder hypothesis gains strength since 1990 due to globalization (Choi, 2002). The Linder effect on bilateral Foreign Direct Investments is larger in industries with greater quality differentiation (Fajgelbaum, Grossman & Helpman, 2011).

Tourists' flows are determined by similarities in preference between the origin and the destination country and the climate distance (Lorde, Li and Airey, 2015). Linguistic similarities between the country of origin and the host country have a positive impact on Erasmus students' flows (Tamaș, 2017). Although Greece and Portugal have similar characteristics, their exports differ because of Greece unique geographically position in EU (Papazoglou, 2007).

Other variables were considered over the time, like migration (Migrants stimulate exports, but have no impact on imports (Hatzigeorgiou and Lodefalk, 2015)) or exchange rate (Increasing exchange rate volatility or other things equally is detrimental to trade (Abrams, 1980)). Euro has a positive impact on overall trade flows (Baldwin and Di Nino, 2006). Increasing exchange rate variability affects bilateral trade flows (Thursby and Thursby, 1987).

Research Hypothesis

1. The economic size (measured by GDP) of Romania and the partner countries positively influences the electronics trade flows.

2. The distance (between the countries, as well as within the countries) negatively impacts the electronics trade flows.

3. EU membership positively influences the electronics trade flows.

4. Economic factors, like partners' inflation, negatively impact the trade flows of a net electronics importer.

5. Trade policy factors, like trade openess (measured as the percent of trade in the GDP) of the partner countries positively influence the electronics trade flows.

6. Political factors, like stability, positively impact the electronics trade flows.

7. Replacing two variables (the SDINT and the DISTINT), would significantly impact the results.

Data Description and Methodology

The gravity equation:

$LNTRADE_t = c_0 + c_1LnGDP_t + c_2LnGDPR_t + c_3LnDIST + c_4LnSDINT + c_5LnINFLATION_t + c_5LnINFLATIONR_t + c_6 LnTRADEOPEN_t + c_7LnTRADEOPENR_t + c_8LnSTABILITY_t + c_9LnSTABILITYR_t + c_{10}EU + c_{11}COMBOR + \varepsilon_k$

$Trade_t$ is the dependent variable, it represents the total values of the electronic bilateral trade between Romania and a partner country in year t, where t takes values from 2001 to 2018.

GDP_t is the GDP of a partner country in year t and GDPR is the GDP of Romania in year t. They both are expected to have coefficients with positive signs and values between 0.2 to 1 (Head, 2003). The data is from *https://data.worldbank.org › .*

DIST is the distance between the capital cities of Romania and the partner countries. It is expected to have coefficient with negative sign and values from -0.6 to -1.6 for dist. The data is from *www.chemical-ecology.net* for DIST variable and from *www.cepii.fr › pdf_pub* for internal distance. SDINT is the sum of the internal distance of Romania and the partner country. It is expected to have coefficient with negative sign and values smaller than those of DIST (Melitz, 2007). DISTINT is the internal distance of the partner country, the data are from *www.cepii.fr › pdf_pub*, the coefficient is expected to have negative signs and smaller values as DIST.

$INFLATION_t$ and $INFLATIONR_t$ are respectively the inflation rates of the partner country and of Romania in year t. A positive sign of the coefficient should have a positive impact on the exports, therefore a positive impact on the trade flows if the country is a net exporter (Stockman, 1981).

$TROPEN_t$ and $TROPENR_t$ are respectively the trade openness of the partner country and of Romania in year t. It is expected to have coefficient with positive sign if the country is a net exporter (Anderson and Neary, 2005). The data is from *https://data.worldbank.org › .*

$STABILITY_t$ and $STABILITYR_t$ are respectively the indexes for political stability for partner country and for Romania in year t. It is expected to have coefficient with positive sign. The data is from https://www.theglobaleconomy.com › rankings .

EU is a dichotomic variable, taking the value 1 if both Romania and the partner countries are EU members and 0 otherwise. The coefficient should have positive signs and values larger than 1 (Abrams, 1980).

COMBOR is a dichotomic variable, taking the value 1 if both Romania and the partner countries share a common border and 0 otherwise. The coefficient should have positive signs and values around 1 (Head, 2003).

An unbalanced panel approach was used to address the heteroskedasticity issue (Breuss and Egger, 1999). Also, a dynamic panel model was considered for better results (Bun and Klaassen, 2002). The zero flows were omitted in the sample, as often leading to most acceptable results (Linders and de Groot, 2006). The EViews soft version 8 was used.

Results and Discussions

Table 1: The results for the panel regression

Panel options/ Variable	Cross-section weights	Period weights	Cross-section weights	Period weights
C	-4.23	-2.91	-6.58	-3.71
LNGDP	1.44*	1.50*	1.39*	1.46*
LNGDPR	-0.8	-0.77**	-0.78	-0.80**
LNDIST	-0.81*	-0.89*	-0.84*	-0.93*
LNSDINT	-0.7*	-0.75*	-	-
LNDISTINT	-	-	-0.18*	-0.20*
LNINFLATION	-1.60*	-1.65*	-1.62*	-1.65*
LNINFLATIONR	1.16**	1.12*	1.13*	1.09*
LNSTABILITY	2.08**	2.10*	2.07**	2.06*
LNSTABILITYR	1.22	0.15	1.21	-0.02
LNTROPEN	0.91*	0.96*	0.96*	1.05*
LNTROPENR	-0.51	-0.73***	-0.50	-0.78***
EU	1.77*	1.51*	1.85*	1.60*
COMBOR	2.45*	2.53*	2.48*	2.54*
R-squared	0.71	0.87	0.71	0.86

*Legend statistically significant at 1% *, at 5% **, at 10%****

Source: Author's table based on the outputs

Some of the variables are not statistically significant: STABILITYR and C in either versions, GDPR and TROPENR in the first one.

The coefficients for GDP are between 1.39 and 1.5 for the whole period and prove that Romanian trade flows follow a GDP pattern, relaying on the trading partners' economic size and the electronics exports are mainly quantity based and low prices based.

The results for the distance between countries are in line with the previous studies, between -0.93 and -0.81. For internal distance, if both Romania and the partner countries are taken into account, the coefficients are from -0.75 to -0.7, but when taking into account only the internal distance for trading partner, the values are from -0.2 to -0.18.

The trading partners' inflation negatively impacts the trade flows because it diminishes the buying power of the Romanian trading partners. But the Romanian inflation positively influences mainly the exports, which are based on low prices, making the prices even more affordable.

Political stability of the trading partners strongly and positively influences the trade flows, even more than the trade openness does. On the long time, Romanian trade openness negatively influences the trade flows, maybe because of the low competitiveness of the products.

As expected, EU membership has a powerful and positive influence, the values are from 1.51 to 1.85.

The common border has a positive influence, the values are overestimated by the model 5 times in average, which sustains the findings of Keith and Mayer (2002).

Table 2: The results for the panel regression before and after the EU integration

Panel options/ Variable	2001-2007				2007-2018			
	Cross-section weights		Period weights		Cross-section weights		Period weights	
C	-31.36	-39.38	-18.42	-8.01	-14.48	-15.95	-25.28*	-26.40*
LNGDP	1.69*	1.63*	1.73*	1.66*	1.34*	1.30*	1.36*	1.31*
LNGDPR	-0.15	0.12	-0.27	-0.81	-0.73	-0.71	0.0004	0.008
LNDIST	-0.73*	-0.81*	-0.85*	-0.91*	-0.81*	-0.82*	-0.78*	-0.79*
LNSDINT	-1.74*	-	-1.51*	-	-0.26***	-	-0.42*	-
LNDISTINT	-	-0.71*	-	-0.61*	-	-0.0009	-	-0.08**
LNINFLATION	-2.06*	-2.43*	-1.77*	-1.58*	-1.11**	-1.13**	-0.89*	-0.79*
LNINFLATIONR	0.49	0.59	1.47*	1.72**	-2.12***	-2.14***	-0.74***	-0.66
LNSTABILITY	2.89***	3.62**	2.31***	1.54	1.13	1.13	0.88	0.73
LNSTABILITYR	0.69	0.54	-0.14	-0.98	6.40***	6.41***	2.03	1.73
LNTROPEN	0.82*	0.69*	0.87*	0.75*	0.95*	1.04*	0.91*	0.97*
LNTROPENR	2.80	1.96	-0.66	-0.39	2.85**	2.86**	1.03**	0.97**
EU	-	-	-	-	1.89*	1.92*	1.78*	1.90*
COMBOR	1.54*	1.68	1.45*	1.62	2.81*	2.79*	3.30*	3.32*
R-squared	0.67	0.66	0.98	0.97	0.73	0.73	0.94	0.95

*Legend statistically significant at 1% *, at 5% **, at 10%****

Source: Author's table based on the outputs

Same variable were tested for two periods: the one before 2007, which is the year of Romanian integration in the EU and the period 2007-2018, since when Romania is an EU member.

In the before EU period, some of the variables are not statistically significant: GDPR, STABILITYR, TROPENR and C in either versions and INFLATIONR for the first one. In the EU membership, the not statistically significant variables are: GDPR, STABILITYR in either version and DISTINT and C in the first one.

GDP explanatory power decreases from 1.7 before EU integration to 1.3 after integration. The role of the distance between trading countries remains pretty much the same in the two considered periods, but the coefficients for internal distances sharply increase after EU integration.

The Romanian political stability and trade openness were not statistically significant before EU integration, but became significant afterwards, while the trading partners' stability was significant before and not significant after EU integration.

The trade openness of the partner countries becomes even more important after EU integration and so the common border.

Two revised gravity equations are considered removing the not statistically significant variables.

$LNTRADE_t = c_0 + c_1LnGDP_t + c_2LnDIST + c_3LnSDINT + c_4LnINFLATION_t + c_5LnINFLATIONR_t + c_6 LnTRADEOPEN_t + c_7LnSTABILITY_t + + c_8EU + c_9COMBOR + \varepsilon_k$

$LNTRADE_t = c_0 + c_1LnGDP_t + c_2LnDIST + c_3LnDISTINT + c_4LnINFLATION_t + c_5LnINFLATIONR_t + c_6 LnTRADEOPEN_t + c_7LnSTABILITY_t + c_8EU + c_9COMBOR + \varepsilon_k$

Table 3: The results for the panel second regression

Panel options/ Variable	Cross-section weights	Period weights	Cross-section weights	Period weights
C	-23.08*	-23.13*	-24.89*	-25.003*
LNGDP	1.43*	1.50*	1.39*	1.45*
LNDIST	-0.81*	-0.89*	-0.85*	-0.93*
LNSDINT	-0.70*	-0.76*	-	-
LNDISTINT	-	-	-0.18*	-0.20*
LNINFLATION	-1.62*	-1.68*	-1.63*	-1.67*
LNINFLATIONR	0.58*	0.45*	0.56*	0.37*
LNSTABILITY	2.09**	2.12*	2.08**	2.08*
LNTROPEN	0.91*	0.95*	0.96*	1.04*
EU	1.76*	1.49*	1.84*	1.59*
COMBOR	2.45*	2.51*	2.47*	2.51*
R-squared	0.71	0.87	0.71	0.86

*Legend statistically significant at 1% *, at 5% **, at 10%****

Source: Author's table based on the outputs

For the period before the Romanian integration in EU, these revised equations were considered:

$LNTRADE_t = c_0 + c_1LnGDP_t + c_2LnDIST + c_3LnSDINT + c_4LnINFLATION_t + c_5LnINFLATIONR_t + c_6 LnTRADEOPEN_t + c_7LnSTABILITY_t + + c_8EU + c_9COMBOR + \varepsilon_k$

$LNTRADE_t = c_0 + c_1LnGDP_t + c_2LnDIST + c_3LnDISTINT + c_4LnINFLATION_t + c_5LnINFLATIONR_t + c_6 LnTRADEOPEN_t + c_7LnSTABILITY_t + c_8EU + c_9COMBOR + \varepsilon_k$

Table 4: The results for the panel regression before and after the EU integration

Panel options/ Variable	2001-2007				2007-2018			
	Cross-section weights		Period weights		Cross-section weights		Period weights	
C	19.63*	-22.13*	-17.39*	-18.87*	-34.37*	-35.35*	-20.91*	-21.87*
LNGDP	1.49*	1.41	1.50*	1.43*	1.33*	1.30*	1.36*	1.31*
LNDIST	-1.15*	-1.20*	-1.21*	-1.26*	-0.81*	-0.82*	-0.79*	-0.80
LNSDINT	-0.69*	-	-0.78*	-	-0.26***	-	-0.40*	-
LNDISTINT	-	-	-	-0.15*	-	-	-	-0.07**
LNINFLATION	-1.84*	-1.91*	-1.60*	-1.87*	-0.57*	-0.58*	-1.19*	-1.44*
LNINFLATIONR	-	-	-0.44**	-0.43**	-2.64**	-2.66**	-	-

LNSTABILITY	1.95**	1.98***	2.10*	2.21*	-	-	1.48**	1.95*
LNTROPEN	1.24*	1.50	1.26*	1.29*	0.94*	-	0.94*	1.009
LNSTABILITYR	-	-	-	-	7.22**	7.22**	-	-
LNTROPENR	-	-	-	-	3.09*	3.12*	-	-
EU	-	-	-	-	1.89*	1.93*	1.76*	1.87*
COMBOR	2.68*	2.61*	2.59*	2.69*	2.82*	2.79*	3.31*	3.34*
R-squared	0.67	0.66	0.86	0.94	0.73	0.73	0.97	0.98

*Legend statistically significant at 1% *, at 5% **, at 10%****

Source: Author's table based on the outputs

Conclusions

The economic size of the partner countries positively influences the electronic trade flows. The coefficient for the Romanian GDP is negative, which is atypically, therefore the first hypothesis is partially sustained. But how could be this negative coefficient explained? The deficit at the internal production, correlated with the internal demand, leads to relatively small Romanian exports and Romanian economic growth is not significantly influenced by exports. By contrast, the imports had a sharp growth, which leads to a constant growth of the deficit of the trade balance. On the other side, the Romanian exports are based on low value, especially because of low wages compared to trading partners, so if the Romanian GDP would significantly grow, so would the wages and therefore the unit value for the exports, which would negatively influence the volume of the exports.

The second hypothesis is supported. In line with the previous studies, the distance between countries or the internal one has a negative impact on the electronics trade flows. The closed values for the sum of the internal distances and the distance between countries could be explained by the fact that a considerable share of the trade flows are with trading partners from Europe. The common border has a powerfull positive impact on the electronics trade flows.

The membership in the same trade agreement and subquently the EU membership has a positive impact on the electronics flows, so the third hypothesis is supported.

The trading partners inflation negatively impacts the trade flows of a net electronics importer such is Romania, so the fourth hypothesis is sustained. As for the Romanian inflation, once more atypical results were found, namely negative, as well as positive coefficients. The consumer price index, which expresses the inflation, is based on a serie of statistic asimmetries because of mantaining on the administrated prices, for instance on energy or natural gas. All these make the dynamics of the exports and the dynamics of the inflation uncorrelated.

Trade policy factors, like trade openess, as well as political factors, like stability, positively impact the electronics trade flows, therefore the last two hypothesis are fully supported.

References

- Abrams, R. K. (1980, March) 'International Trade Flows under Flexible Exchange Rates', *Economic Review*, Federal Reserve Bank of Kansas City, 3–10.
- Aitken, N. D. (1973) 'The Effect of the EEC and EFTA on European Trade: A Temporal Cross-Section Analysis', *American Economic Review*, 63, 881–892.
- Anderson, I. E. (1979) 'A theoretical foundation of the gravity equation', *American Economic Review*, 69 (1), 106-116.

- Anderson, J. E. (2011, September) 'The Gravity model', *Annual Review of Economics*, 3, 133-160.
- Anderson, J. E. and Neary, J. P. (2005) Measuring the Restrictiveness of International Trade Policy, MIT Press.
- Anderson, J. E. and van Wincoop, E. (2004) 'Trade costs', *Journal of Economic Literature*, 42, 691-751, DOI: 10.1257/0022051042177649.
- Anderson, J. E. and van Wincoop, E. (2003) 'Gravity with gravitas: a solution to the border puzzle', *American Economic Review*, 93 (1), 171-192, DOI: 10.1257/000282803321455214.
- Antonucci, D. and Manzocchi, S. (2006) 'Does Turkey have a special trade relation with the EU? A gravity model approach', *Economic Systems*, 30 (2), 157-169, DOI: 10.1016/j.ecosys.2005.10.003.
- Baier, S. L. and Bergsrtand, J. H. (2007) 'Do free trade agreements actually increase members' international trade?', *Journal of International Economics*, 71 (1), 72-95.
- Baier, S. L. and Bergstrand, J. H. (2001) 'The growth of world trade: tariffs, transport costs and income similarity', *Journal of International Economics*, 53, 1-27, DOI: 10.1016/S0022-1996(00)00060-X.
- Baier, S. L. and Bergstrand, J. H. (2009) 'Bonus vetus OLS: a simple method for approximating international trede-cost effects using the gravity equation', *Journal of International Economics*, 77 (1), 77-85, DOI: 10.1016/j.jinteco.2008.10.004.
- Baier, S. L. and Bergstrand, J. H. (2004) 'Economic determinants of free trade agreements', *Journal of International Economics*, 64 (1), 29-63.
- Baier, S. L. and Bergstrand, J. H. (2009, February) 'Estimating the effects of free trade agreements on international trade flows using matching econometrics', *Journal of International Economics*, 77 (1), 63-76, DOI: 10.1016/j.jinteco.2008.09.006.
- Baldwin, R. and Taglioni, D. (2006) 'Gravity for dummies and dummies for gravity equations', *NBER Working Paper N° 12516*, (DOI): 10.3386/w12516.
- Baldwin, R. and Taglioni, D. (2011, January) 'Gravity chains: Estimating bilateral trade flows when parts and components trade is important', *National Bureau of Economic Research (NBER).* [Online], [Retrieved January 11, 2020], https://www.nber.org/papers/w16672.pdf .
- Baldwin, R. and Di Nino, V. (2006) 'Euros and Zeros: The Common Currency Effect on Trade in New Goods', *NBER Working Paper* No. W12673.
- Baltagi, B. H., Egger, P. and Pfaffermayr, M. (2003) 'A generalized design for bilateral trade flow models', *Economics Letters*, 80 (3), 391-397.
- Behar, A. and Nelson, B. D. (2014, July) 'Trade Flows, Multilateral Resistance, and Firm Heterogeneity', *The Review of Economics and Statistics*, MIT Press, 96 (3), 538-549.
- Bergrstrand, J. H. and Egger, P. (2009) Gravity Equations and Economic Frictions in the World Economy, Palgrave Handbook of International Trade, Bernhofen, D., Falvey, R., Greenaway, D. and Krieckemeier, U. (eds.), Palgrave-Macmillan Press, forthcoming.
- Bergstrand, J. H. (1990) 'The Hecksher-Ohlin-Samuelson model, the linder hypothesis, and the determinants of bilateral intra-industry trade', *The Economic Journal*, 100 (4), 1216-1229.
- Bergstrand, J. H. (1985) 'The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence', *Review of Economic and Statistics*, 67, 474–481.
- Bergstrand, J. H. (1989, February) 'The Generalized Gravity Equation, Monopolistic Competition, and the Factor-Proportions Theory in International Trade', *Review of Economics and Statistics*, 71 (1), 143-153.
- Blum, B. S. and Goldfarb, A. (2006) 'Does the internet defy the law of gravity?', *Journal of International Economics*, 70 (2), 384-405.
- Breuss, F. and Egger, P. (1999) 'How reliable are the estimations of east-west trade potentials based on cross-section gravity analyses?', *Empirica*, 26 (2), 81-94.
- Brun, J.-F., Carrère, C., Guillaumont, P. and de Melo, J. (2005) 'Has distance died? Evidence from a panel gravity model', *The World Bank Economic Review*, 19, 99-120.
- Bun, M. and Klaassen, F. (2002) 'The importance of dynamics in panel gravity models of trade', *Tinbergen Institute Discussion Paper*, No. 02–108/2.

- Burger, M. J., van Oort, F. G. and Linders, G. M. (2009) 'On the specification of the gravity model of trade: zeros, excess zeros and zero-inflated estimation', *Spatial Economic Analysis*, 4 (2), 167-190, https://doi.org/10.1080/17421770902834327.
- Cardamone, P. (2007) 'A survey of the assessments of the effectiveness of Preferential Trade Agreements using gravity models', *International Economics*, 60 (4), 421-473.
- Carrere, C. (2006) 'Revisiting the effects of regional trade agreements on trade flows with proper specification of the gravity model', *European Economic Review*, 50 (2), 223-247.
- Chaney, T. (2008) 'Distorted gravity: the Intensive and extensive margins of International trade', *American Economic Review*, 98, 1701-1721, DOI: 10.1257/aer.98.4.1707.
- Cheng, I.-H. and Wall, H. J. (1999, February) 'Controlling for Heterogeneity in Gravity Models of Trade', Working Paper, Federal Reserve Bank of St. Louis.
- Choi, C. (2002) 'Linder hypothesis revisited', *Applied Economics Letters,* 9 (9), 601–605, DOI: 10.1080/13504850110111234.
- Cipollina, M. and Salvatici, L. (2010) 'Reciprocal trade agreements in gravity models: A Meta-Analysis', *Review of International Economics*, 18, 63-80, https://doi.org/10.1111/j.1467-9396.2009.00877.x .
- Deardoff, A. (1998) Determinants of bilateral trade: does gravity work in a neoclassical world?, The regionalization of the world economy, Frankel, J. A. (ed.), Chicago, IL: University of Chicago Press.
- De Benedictis, L. and Taglioni, D. (2011) The Gravity Model in International Trade, The Trade Impact of European Union Preferential Policies: an analysis through gravity models, De Benedictis, L. and Salvataci, L. (eds.), Springer. Disdier AC.
- De Benedictis, L. and Vicarelli, C. (2005) 'Trade potentials in gravity panel data models', *Topics in Economic Analysis & Policy*, 5 (1), 1-31, DOI: 10.2139/ssrn.506562.
- De Benedictis, L. and Vicarelli, C. (2009) Dummies for gravity and gravity for policies: mission impossible?, Mimeo.
- Egger, P. and Pfaffermayr, M. (2003) 'The proper panel econometrics specification of the gravity equation: a three-way model with bilateral interaction effects', *Empirical Economics*, 28 (3), 571-580.
- Egger, P. (2002) 'An econometric view on the estimation of gravity models and the calculation of trade potentials', *World Economics Journal*, 25 (2), 297-312, https://doi.org/10.1111/1467-9701.00432 .
- Elliott, D.R., (2007) 'Caribbean regionalism and the expectation of increased trade: insights from a time-series gravity model', *The Journal of International Trade & Economic Development*, 16 (1), 117-136, https://doi.org/10.1080/09638190601165830 .
- Elmslie, B. (2018) 'Retrospectives: Adam Smith's Discovery of Trade Gravity', *Journal of Economic Perspectives,* 32 (2), 209-222, DOI: 10.1257/jep.32.2.209.
- Evenett, S. J. and Keller, W. (2002) 'On theories explaining the success of the gravity equation', *Journal of Political Economy*, 110 (2), 281-316, DOI: 10.1086/338746.
- Fagiolo, G. (2010) 'The international-trade network: gravity equations and topological properties', *The Journal of Economic Interaction and Coordination*, 5, 1–25.
- Fajgelbaum, P. D., Grossman, G. M. and Helpman, E. (2011) 'A Linder Hypothesis for Foreign Direct Investment', *NBER Working Papers 17550*, National Bureau of Economic Research, Inc.
- Feenstra, R. C., Markusen, J. R. and Rose, A. K. (2001) 'Using the gravity equation to differentiate among alternative theories of trade', *Canadian Journal of Economics*, 34 (2), 430-447,
- https://doi.org/10.1111/0008-4085.00082 .
- Feenstra, R. C. (2002) 'Border Effects and the Gravity Equation: Consistent Methods for Estimation', *Scottish Journal of Political Economy,* 49 (5), 491-506, https://doi.org/10.1111/1467-9485.00244 .
- Fidrmuc, J. (2009) 'Gravity models in integrated panels', *Empirical Economics*, 37, 435-446.
- Filippini, C. and Molini, V. (2003) 'The determinants of East Asian trade flows: a gravity equation approach', *Journal of Asian Economics*, 14 (5), 695-711, DOI: 10.1016/j.asieco.2003.10.001.

- Gómez-Herrera, E. (2013) 'Comparing alternative methods to estimate gravity models of bilateral trade', *Empirical Economics*, 44 (3), 1087–1111.
- Grossman, G. (1996) Comments on Alan V. Deardorff. Determinants of bilateral trade: Does gravity work in a neoclassical world, The Regionalization of the World Economy, Frankel, J. A. (Ed.), University of Chicago for NBER, Chicago.
- Hallak, J. C. (2010, August) 'A Product-Quality View of the Linder Hypothesis', *The Review of Economics and Statistics,* MIT Press, 92 (3), 453-466.
- Haq, Z., Meilke, K. and Cranfield, J. (2010) 'Does the Gravity Model Suffer from Selection Bias?', *Canadian Agricultural Trade Policy Research Network Working Paper no 90884*, DOI: 10.22004/ag.econ.90884.
- Hatzigeorgiou, A. and Lodefalk, M. (2015, December) 'Trade, Migration and Integration – Evidence and Policy Implications', *The World Economy*, Wiley Blackwell, 38 (12), 2013-2048.
- Haveman, J. and Hummels, D. (2004) 'Alternate Hypotheses and the Volume of Trade: The Gravity Equation and the Extent of Specialization', *Canadian Journal of Economics*, 37, 199-218, https://doi.org/10.1111/j.0008-4085.2004.011_1.x .
- Head, K. (2008) 'The puzzling persistence of the distance effect on bilateral trade', *The Review of Economics and Statistics*, 90 (1), 37-48.
- Head, K. (2003) Gravity for beginners, Canada: University of British Columbia.
- Head, K. and Mayer, T. (2013) 'Gravity Equations: Workhorse, Toolkit, and Cookbook', *Sciences Po Economics Discussion Papers, 2013-02*, Sciences Po, Department of Economics.
- Helpman, E. and Krugman, P.R. (1985) Market Structure and Foreign Trade, Cambridge, Mass., MIT Press.
- Helpman, E., Melitz, M. and Rubinstein, Y. (2008) 'Estimating trade flows: trading partners and trading volumes', *The Quaterly Journal of Economics*, 123 (2), 441-487, https://doi.org/10.1162/qjec.2008.123.2.441 .
- Henderson, D. J. and Millimet, D. L. (2008) 'Is gravity linear?', *Journal of Applied Economics*, 23 (2), 137-172, https://doi.org/10.1002/jae.974 .
- Horsewood, N. (2009) 'Are regional trading agreements beneficial? Static and dynamic panel gravity models', *The North American Journal of Economics and Finance*, 20 (1), 46-65.
- Jung, W.-S., Wang, F. and Stanley, H. E. (2008) 'Gravity model in the Korean highway', *Europhysics Letters,* 81 (4), 1-13.
- Karemera, D., Koo, W., Smalls, G. and Whiteside, L. (2015) 'Trade Creation and Diversion Effects and Exchange Rate Volatility in the Global Meat Trade', ***Journal of Economic Integration***, 30 (2), 240-268, DOI: **10.11130/jei.2015.30.2.240** .
- Keith, H. and Mayer, T. (2002) 'Illusory Border Effects: Distance Mismeasurements Inflates Estimates of Home Bias in Trade', *Working Papers 2002-01*, CEPII research centre, Paris.
- Keller, W. and Yeaple, S. R. (2009) 'Gravity in the Weightless Economy', *NBER Working Paper No. 15509*.
- Kimura, F. and Lee, H.-H. (2004, September 9-11) 'The Gravity Equation in International Trade in Services', *European Trade Study Group Conference, University of Nottingham.* [Online], [Retrieved January 9, 2020], http://cc.kangwon.ac.kr/~hhlee/paper/Kimura-Lee-040831.pdf .
- Krings, G., Calabrese, F., Ratti, C. and Blondel, V. D. (2009) 'Urban gravity: a model for inter-city telecommunication flows', *Journal of Statistical Mechanics,* https://iopscience.iop.org/article/10.1088/1742-5468/2009/07/L07003/pdf.
- Lawless, M. (2010) 'Deconstructing gravity: trade costs and extensive and intensive margins', *Canadian Journal of Economics*, 43 (4), 1149-1172, https://doi.org/10.1111/j.1540-5982.2010.01609.x .

- Levine, R. and Renelt, D. (1992) 'A Sensitivity Analysis of Cross-Country Growth Regressions', *American Economic Review*, 82 (4), 942-963.
- Linder, S. B. (1961) An Essay on Trade and Transformation, New York: John Wiley and Sons.

• Linders, G. J. and de Groot, H. L. F. (2006) 'Estimation of the Gravity Equation in the Presence of Zero Flows', *Tinbergen Institute Discussion Paper No. 06-072/3*.
• Lorde, T., Li, G. and Airey, D. (2015) 'Modeling Caribbean tourism demand: an augmented gravity approach', *Journal of Travel Research*, 1-11, https://doi.org/10.1177/0047287515592852.
• Magerman, G., Studnicka, Z. and Van Hove, J. (2016) 'Distance and Border Effects in
• International Trade: A Comparison of Estimation Methods', *Economics E-Journal*, 10 (18), 1-31, http://dx.doi.org/10.5018/economics-ejournal.ja.2016-18 .
• Martin, W. and Pham, S. C. (2008) 'Estimating the Gravity Equation when Zero Trade Flows Are Frequent', World Bank.
• Martinez-Zarzoso, I. (2013), "The log of Gravity Revisited", *Applied Economics*, 45 (3), 311-327.
• Martínez-Zarzoso, I. and Nowak-Lehman, F. (2003) 'Augmented Gravity Model: An Empirical Application to Mercosur-European Union Trade Flows', *Journal of Applied Economics*, 6, 291-316.
• Masucci, A. P., Serras, J., Johansson, A. and Batty, M. (2013) 'Gravity versus radiation models: On the importance of scale and heterogeneity in commuting flows', *Physical Review E.,* 88 (2): 022812, https://doi.org/10.1103/PhysRevE.88.022812 .
• Melitz, J. (2007) 'North, South and distance in the gravity model', *European Economic Review*, 51 (4), 971-991, DOI: 10.1016/j.euroecorev.2006.07.001.
• Miron, D., Cojocariu, R. C. and Tamaș, A. (2019) 'Using Gravity Model to Analyze Romanian Trade Flows between 2001 and 2015', *Economic Computation and Economic Cybernetics Studies and Research*, 53 (2), 5-22, DOI: 10.24818/18423264/53.2.19.01.
• Papazoglou, C. (2007) 'Greece's potential trade flows: a gravity model approach', *International Advances in Economic Research*, 13 (4), 403-414, DOI: 10.1007/s11294-007-9107-x.
• Pollins, B. M. (1989) 'Conflict, Cooperation, and Commerce: The Effect of International Political Interactions on Bilateral Trade Flows', *American Journal of Political Science*, 33 (3), 737-761, DOI: 10.2307/2111070.
• Porojan, A. (2001) 'Trade flows and spatial effects: the gravity model revisited', *Open Economies Review*, 12, 265-280.
• Portes, R. and Rey, H. (2005) 'The determinants of cross-border equity flows', *Journal of International Economics*, 65 (2), 269-296, doi:10.1016/j.jinteco.2004.05.002.
• Pöyhönen, P. (1963) 'A Tentative Model for the Volume of Trade Between Countries', *Weltwirtchaftliches Archiv,* 90, 93-100.
• Roberts, B. A. (2004) 'A gravity study of the proposed China-Asean free trade area', *The International*
• *Trade Journal*, 18 (4), 335-353, https://doi.org/10.1080/08853900490518208 .
• Sanso, M., Rogelio, C. and Sanz, F. (1993) 'Bilateral Trade Flows, the Gravity Equation, and Functional Form', *The Review of Economics and Statistics*, 75, 266–275.
• Santos Silva, J. M. C. and Tenreyro, S. (2006) 'The log of gravity', *The Review of Economics and Statistics*, 88 (4), 641-658.
• Santos Silva, J. M. C. and Tenreyro, S. (2009) 'Trading Partners and Trading Volumes: Implementing the Helpman-Melitz-Rubinstein Model Empirically', *CEP Discussion Paper No 935*.
• Santos Silva, J. M C. and Tenreyro, S. (2011) 'Further Simulation Evidence on the Performance of the Poisson-PML Estimator', *Economics Letters*, 112 (2), 220–222.
• Shepherd, B. (2008) 'Behind the Border- Gravity Modelling', *Asia-Pacific Research and Training Network on Trade (ARTNeT),* Capacity Building Workshop (December 14-19, 2008), Bangkok, Thailand.
• Siliverstovs, B. and Schumacher, D. (2008) 'Estimating gravity equations: to log or not to log?', *Empirical Economics*, 36 (3), 645-669, DOI 10.1007/s00181-008-0217-y.

• Söderström, J. (2008) Cultural Distance An Assessment of Cultural Effects on Trade Flows, Master Thesis.
• Sohn, C.-H. (2005) 'Does the gravity model explain South Korea's trade flows?', *The Japanese Economic Review*, 56 (4), 417-430, DOI: 10.1111/j.1468-5876.2005.00338.x.

- Stavytskyy, A., Kharlamova, G., Giedraitis, V. and Sengul, E. C. (2019) 'Gravity model analysis of globalization process in transition economies', *Journal of International Studies*, 12 (2), 322-341, doi: 10.14254/2071-8330.2019/12-2/21.
- Stockman, A. C. (1981) 'Anticipated inflation and the capital stock in a cash in-advance economy', *Journal of Monetary Economics*, 8 (3), 387-393.
- Tamaş, A. (2019) 'An Augmented Gravity Model Using Linder Variable to Study UK Tourism Flows' Proceedings of the 33st. International Business Information Management Association Conference (IBIMA): *Education Excellence and Innovation Management through Vision 2020*, ISBN: 978-0-9998551-2-6, 10-11 April 2019, Granada, Spain, 215-226.
- Tamaş, A. (2017) 'Romanian Erasmus Students' Flows - Gravity Model Approach', *Journal of Eastern Europe Research in Business and Economics*, 2017 (2017), 1-11, DOI: 10.5171/2017.253964.
- Tamaş, A. (2017) 'The Design of the Romanian Wine Imports and Exports Using the Gravity Model Approach', *International Journal of Business and Management*, V (2), 64-77, DOI: 10.20472/BM.2017.5.2.005.
- Timbergen, J. (1962) Shaping the World Economy: Suggestions for an International Economic Policy, New York: The Twentieth Century Fund, https://doi.org/10.2307/1236502 .
- Thursby, J. G. and Thursby, M. C. (1987) 'Bilateral Trade Flows, the Linder Hypothesis, and Exchange Risk', *Review of Economics and Statistics*, 69 (3), 488-495, DOI: 10.2307/1925537.
- Tzouvelekas V. (2007) 'Accounting for pairwise heterogeneity in bilateral trade flows: a stochastic varying coefficient gravity model', *Applied Economics Letters*, 14 (12), 927-930, DOI: 10.1080/13504850600705919.
- Westerlund, J. and Wilhelmsson, F. (2009) 'Estimating the Gravity Model without Gravity using Panel Data', *Applied Economics*, 41, 1-9, DOI: 10.1080/00036840802599784.

- www.cepii.fr › pdf_pub

- www.chemical-ecology.net

- https://data.worldbank.org ›

https://www.theglobaleconomy.com › rankings

Entrepreneurial Behaviors on Millennial Generations: Evidence from Small Medium Enterprises (SMES)

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Abstract

Millennial generations have their own culture because of the different values with the previous generation. Characteristics of the millennial generation and cultural values shown include making technology as a lifestyle. The purpose of this study is to measure empirical linkages between the individual, cultural values and entrepreneurial characteristics on the entrepreneurial behavior in the context of SMEs' of run by millennial generations. This study used survey methods that explains the relationship between variables through hypothesis testing The number of respondents was 151 respondent from SMEs' in Banjarmasin Indonesia and Structural Equation Modelling were employed. The test result proves that there is a strong correlation between exogenous variables and endogen variables, that individual characteristic has a significant effect to entrepreneurial behaviors, and also cultural value, and entrepreneurial characteristic have a significant effect on entrepreneurial behaviors.

Keywords: Characteristics, Cultural Values, Entrepreneurial, Behavior, Millennial,

Introduction

The high potential of natural resources guarantee a growth of the national economy, but is heavily dependent on potential quality of human resources possessed especially the ability in the field of entrepreneurship.

Entrepreneurship is the engines of economic growth. According to Iyer, RM, 2018, entrepreneurs bring enormous positive contributions to a country's economic growth and social development. Entrepreneurs play the role of innovators who can fully explore the complete potentialities of the countries available resources of labor, technology and capital.

The trend in the growth of entrepreneurial behavior is due to economic pressures, so that a person is forced to create his own employment (Bosma et al., 2011). Furthermore, Mazzarol *et al* ., (1999); Shane *et al.* , (2008); *Segal et al* ., (2005) also explained that other factors cause the growth of entrepreneurial behavior, namely unemployment, the frustration of previous work, and the necessities of a decent life. Fugate *et al.* (2005) also stated that micro business is one of the entrepreneurial techniques to promote a self-sufficient economy that enables micro-entrepreneurs to create their jobs and earn their own income.

The success of a businessman, including millennial generation entrepreneurs in carrying out business activities, cannot be separated from the internal characteristics they have.

In Indonesian Millennial Generation Profile, it has been drawn that millennial generation has a unique character based on region and socio-economic conditions. One of the main characteristics of the millennial generation is marked by increased use and familiarity with communication, media and digital technology. Being raised by technological advancements, millennial have creative, informative, passionate and productive traits. Compared to previous generations, they are more friends with technology. This generation is the generation that involves technology in all aspects of life.

Meredith (1996) put forward the characteristics and character of entrepreneurship as follows: always trying to excel, profit-oriented, have perseverance and perseverance, have a strong determination, like to work hard, energetic and have initiative; can take risks and love challenges; behave as a leader, can get along with others and like constructive suggestions and criticism; innovation and creativity has a strong, flexible, versatile and have a business network; have a perception and perspective oriented to the future, and have the belief that life is the same as hard work.

Molenaar (2002), explains that culture can have a powerful influence on an individual and performance. The same thing was conveyed by Kotter and Heskett (1992) that culture is a force that has a full influence on an individual and his performance even in the individual's work environment. Culture is the difference or similarity of values held in each society that arises from the social environment that originates in its history, life experiences, and belief systems. Culture is as mind software that regulates how to think, act and perceive envy (Hofstede, 2001).

Cultures are the differences or similarities are shared values in every society arising from the social environment that comes to its history, life experiences, as well as its belief system that also spawned the millennial generation bud a yes new. Characteristics and characteristic values of culture millennial generation showed, among others, is to make the technology as a lifestyle (*lifestyle*), as shaded generation (*sheltered*), because they are born from parents who are educated. They are *multi-talented, multi-languages* , more expressive and exploratory. This view of the nature of life, always confident, optimistic, confident, straightforward, and everything was almost instantaneous.

Based on empirical studies and theoretical studies of individual millennial generation characteristics variables, entrepreneurial characteristics and cultural values of the community towards entrepreneurial behavior are very important to be further investigated, then the relationship of the influence of these variables is fascinating to be empirically tested in the context of the Small Business Industries (SMEs) Millennial generation.

Literature Review

The success of an individual in carrying out business activities cannot be separated from the internal characteristics of the individual. In Indonesian setting, Rajiani (2010) suggests some individual characteristics that affect the world of work individuals and companies are Openness ***to Experience***, ***Conscientiousness***, ***Extraversion, Agreeableness, Neuroticism*.** Meanwhile, in the Profile of Indonesian Millennial Generation (2018), it has been drawn that millennial generation has a unique character based on region and socio-economic conditions. One of the main characteristics of the millennial generation is marked by increased use and familiarity with communication, media, and digital technology millennial also has the characteristics of a creative, informative, passionate and productive. They involve technology in all aspects of life, have the characteristics of open communication, fanatical social media users, their lives are strongly influenced by technological developments, and are more open to political and economic views.

Entrepreneurial characteristics can be a factor in the failure of someone trying. Meredith (1996) put forward the characteristics and character of entrepreneurship as follows: always trying to excel,

profit-oriented, have perseverance and perseverance, have a strong determination, like to work hard, energetic and have initiative; can take risks and love challenges; behave as a leader, can get along with others and like constructive suggestions and criticism; innovation and creativity has a strong, flexible, versatile and have an extensive business network; have a perception and perspective oriented to the future, and have the belief that life is the same as hard work. Also, no less important is the success of an individual in carrying out his business activities cannot be separated from the culture that grows and develops in society (Rajiani & Pyplacz, 2018). Molenaar (2002), explains that culture can have a powerful influence on an individual and performance. The same thing was conveyed by Kotter and Heskett (1992) that culture is a force that has a full influence on an individual and his performance even in the individual's work environment.

Individual characteristics and culture value of millennial generation, among others, is to make the technology as a lifestyle (*lifestyle*), as shaded generation (*sheltered*), because they are born from parents who are educated. They are *multi-talented, multi-language* , more expressive and exploratory.

Hypothesis of this research are:

H1: Individual characteristics significantly influence entrepreneurial behavior of millennial generation
H2: Culture value has a significant effect on entrepreneurial behavior of millennial generation
H3: Entrepreneurial characteristics significantly influence the entrepreneurial behavior of millennial generation

Methodology

This research was conducted in November 2018 until May 2019 in the area of Banjarmasin City , which consists of 5 districts namely: East Banjarmasin District, South Banjarmasin, Central Banjarmasin, West Banjarmasin and North Banjarmasin. Locations were selected premises and consideration intentionally that in Banjarmasin, there number of SMEs as much as 36.781. The choice of Millennial generation SMEs to be investigated is because there are unique characteristics in this business. Therefore SMEs generation of millennial in Banjarmasin cannot be exactly examined; the sampling was done by using purposive sampling with 151 respondents.

The data has been collected, then tabulated into tables and discussed descriptively. For *inferential* statistical analysis, the data analysis technique uses a causality or causal approach between the independent variable and the dependent variable. This *inferential* analysis is used to study/analyze the effect of several variables in this study, namely by using multiple linear regression. Data processing is done with tools software of Amos version 26.

Result and Discussion

Variable of individual characteristics among millennial generation in the Banjarmasin city is reflected in the form of ambitious character. It shows that 53.67% of the millennial generation respondents in Banjarmasin City do not have an ambitious character in entrepreneurship. This is reinforced from the results of the mean score *(mean)* indicator of 2.61 included in the low category, meaning that the respondents do not have the ambitious character in running their entrepreneurship. Even those who are successful when they try will be happy to share that success with others. Ambitious is having a strong desire to achieve something (hopes, goals); full of ambition (Big Indonesian Dictionary) and this word is absorbed from the word ambition which means *desired to achieve something.* This ambitious character will lead to negative behavior.

Furthermore, the multitasking indicator is an information technology term in English that refers to a method where much work or also known as a process is processed using the same CPU resources. Thus, the millennial generation is analogous to an operating system that is multitasking and

multiuser like most operating systems that exist today that can or can run multiple tasks and work processes at the same time. Based on the results of a descriptive analysis of 150 millennial generations of SMEs' as respondents, 54.00% said they had multitasking abilities in entrepreneurship. This is also reinforced from the results of the average score (*mean)* indicator of 4.30 included in the category of strong/ good. Thus it can be interpreted that millennial generation SME respondents in Banjarmasin City have a stable multitasking ability/good in entrepreneurship.

Multitasking generally consists of several jobs / tasks in carrying out their duties consciously shifting tasks from one task to another and or doing more work than one with a convergence of task shifts that occurs in a short time (Oswald, 2018). Millennial generation SMEs' entrepreneurs in the Banjarmasin city besides carrying out their entrepreneurial work while also studying in various influential universities. This means they run a business at home through an online business without leaving their primary duties.

Further, the indicator of independence is a character and attitude of the soul that is independent and does not want to depend on other parties to meet their needs. Independent soul does not mean that it does not need another party, but a character that always tries to face and solve its problems. Respondent of millennial generation SMEs' in Banjarmasin City, 46.00% have an independent character or character. This is also reinforced from the results of the average score (mean) indicator of 4.29 included in the category of strong/good. Thus it can be interpreted that millennial generation SMEs' respondents have a good independence character in running their business.

Then, the indicator close to technology, 52,67% respondent is the generation who are literate with technology. This generation is in direct contact with information technology, the internet and smartphone. The typology of the younger generation in using the internet Monggilo (2016) confirms as information, communication and socialization, entertainment, and recreation as well as self-expression. The development of telecommunications and information makes it easier for the millennial generation of SMEs' to be able to reach the world more closely and quickly obtain information that can be utilized for business activities.
Descriptive analysis results of millennial generation cultural value variables that are measured from six dimensions / indices that are reflected into various items of questions in this study, namely: technology as a lifestyle (lifestyle): 46.67% of respondents make technology as a lifestyle (lifestyle) with score of an average indicator of 3.79 included in the category of strong/good.

Based on the result, this analysis showed that the values of the culture that developed in the life of the respondent as technology a lifestyle. They cannot be separated from technology, especially those who come into contact with the internet. All activities that they do every day are always in contact with equipment especially with robust technology such as computers (laptops), mobile phones, and gadgets.

Human relationships 54.67% of respondents said that they were more open to various information accesses with an average score of 3.91 indicators included in the category of strong/good. The view of human relations as reflected in the form of openness to various information accesses that are cross-border, and open to diversity, they are very open to various information and diversity including views on the economy and politics. They do not care about privacy and are willing to share intimate details about themselves with strangers.

Likewise with the indicators of the nature of life values 54.33% of respondents are always confident, optimistic, confident, wanting a concise and instantaneous with an average score of 3.83 indicators ; Perspective to the values of the essence of life, always confident, optimistic, straightforward, and everything is almost instantaneous on SMEs generation of millennial is a necessity.

Indicator values of the nature of work 56,67% of respondents stated that the achievement is something that must be achieved to score an average value of 4.30 is included in the category

of strong/good.

Perspective to virtually work or work that is reflected in the look of achievement on millennial generation is something that must be achieved, working and learning more interactive through teamwork, collaboration and groupthink, independent and structured in the use of technology, communication gadgets, in internet access prefers visual or picture clues.

Meanwhile, for human relationships with 50.00% respondent states that they are trying to develop networks to connect and collaborate with an average score of 3.83 included in the category of strong/good. Perspective human relation with space and time are reflected in trying to develop a network that enables connection to each other to connect and collaborate of respondent in communication is the Network Development, which is developing a network that enables this generation to connect to each another for connection and collaboration.

Whereas for indicators of human relations with nature, 50.67% of respondents said they must master technology and knowledge for the preservation of humanity and nature with an average score of 3.98 in the stable/ good category. The view of human relations with nature is reflected in the necessity of mastering technology and knowledge to be used in the management and preservation of human and natural surroundings. Humans must master technology and science to be used in the use, management, sustainability as well as for harmony, harmony and mastery of nature for the benefit of humanity and the natural surroundings.

Based on the data illustrated in the result study of the six indicators that reflect entrepreneurial characteristics, namely: the courage to take risks. From the graph above illustrates that 70.67% of millennial generation SME respondents have the courage to take risks. This is reinforced from the results of the average score (mean) indicator of 4.07 included in the category of strong/good, meaning that respondents dare to take risks when they run an entrepreneur. They will not be able to avoid the possibility of risks and various obstacles. They can see and assess business challenges and opportunities, and try to gather the resources needed to take the right action to achieve success. The millennial generation of SMEs when running their business has understood the risks they face in the form of losses or failures as a result of external environmental factors and internal business factors.

Conversely, people who lack confidence can find it challenging to be successful. Millennial generation of SMEs in Banjarmasin City, 60.00% have a sense of confidence in entrepreneurship. This is also reinforced from the results of the average score (mean) indicator of 4.21 included in the category of strong / good. Thus it can be interpreted that the respondent has a sense of confidence that strong/good, which can be used as the basis for success in entrepreneurship.

Indicative of the soul of leadership, 63.33% have a leadership spirit in entrepreneurship. This is also reinforced from the results of the average score (*mean)* indicator of 3.83 included in the category of strong/good. Thus it can be interpreted that the respondent has a strong leadership spirit/good, things indeed also become the basis for success in entrepreneurship.

Otherwise, the millennial generation orthodox indicators, only 48.00% have equity in entrepreneurship. This is also reinforced from the results of the average score (*mean)* index factor of 3.59 included in the medium category . Thus it can be interpreted that the respondent SMEs millennial generation has a character originality who in carrying out its business activities.

Then, concerning an indicator task oriented and the results are reflected in the form of need for achievement, profit-oriented, have the perseverance and fortitude, have a strong determination, hardworking, energetic and have initiative, based on the analysis the majority or 65.33% in carrying out their business activities were oriented to the tasks and results.

This is also reinforced from the results of the average score (*mean)* indicator of 4.19 included in the category of strong/good. Thus it can be interpreted that millennial generation SMEs respondents in

Banjarmasin City in running their business have a character-oriented towards tasks and strong/excellent results.

Regarding future-oriented indicators, which are reflected in the form of perception and have a future-oriented perspective/mindset, millennial generation of SMEs in Banjarmasin City are mostly or 68.67% in conducting future-oriented business activities. This is also reinforced from the results of the average score (*mean)* indicator of 4.24 included in the category of strong/good. Thus it can be interpreted that millennial generation in carrying out their business have a strong or proper orientation to the future.

Based on the data illustrated in the resulting study that the indicators try to start a business that is reflected in the form of question items that are starting a new business now on its own and trying to start a new business at this time with others, millennial generation SME entrepreneurs is only 42.33 %, but most of them lack interest in trying to do business activities. This is reinforced from the results of the average score *(mean)* indicator of 2.79 included in the category of strong enough / good enough, meaning that the level of interest in entrepreneurial behavior of millennial is only strong enough , this can be understood because to be an SME entrepreneur not become their first choice, because their mindset is still hoping to become a civil servant.

Based on the results of the descriptive analysis as many as 151 respondent were mostly or 46.22%, while most of them were quite involved in every step towards venture creation. This is also reinforced from the results of the average score (*mean)* indicator of 3.51 included in the category of strong enough/good enough. Thus it can be interpreted that millennial generation only has a strong enough/good enough interest in entrepreneurship.

Table 1 : MODEL DESCRIPTION RATINGS WITH DATA

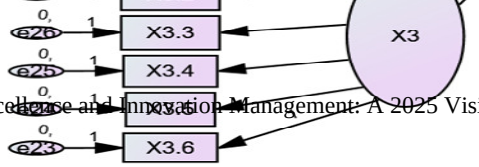
GOF CRITERIA	VALUE	INTERPRETATION
The chi-square ratio with df	1,203	Results are less than 5 and more than 1
Probability value	0,235	More than 0.05
Root mean square error of approximation (RMSEA)	0,091	The value between 0.8-1.0 so that the model is quite reasonable category and not in the category of rejection
Goodness of fix index (GFI)	0,796	value is close to 1 and falls from the number 0 remains <0.90
Incremental Fit Index IFI	0,804	The value 1 and away from the number 0, and more than 0.90 means the fit model.
Comparative fit index (CFI)	1,00	9 means this model is Fit.

According to Table 1, based on the probability value of model 0,235 ≥ 0.05 and goodness of fix index (GFI) 0,796 and then the comparative fit index (CFI) that mean is the model is fit. This study results can be found as follows: The significance test is done by comparing the value of r arithmetic with r table degree of freedom (df) n-k in this case n is the number of samples and k is the construct. In this case df can be calculated 275-72 or df. 203 with alpha 0.05 obtained r table 0.135. If the count r (for each item can be seen in the Corrected Item-Total Correlation column) is more than the r table and the positive value, and if in this table is all larger, then all questions are valid (Hair, 2010).

This research consists of 4 individual variable characteristic, culture value, entrepreneurial characteristic, and entrepreneurial behavior in South Kalimantan. Furthermore, it will be explained in the table of hypothesis test results such as table 2.

Table 2: RESULT OF SOCIAL INDIVIDUAL MATCHING TEST

	Influence		**Estimate**	**S.E.**	**P**	**Mark**
Y	<---	X1	.218	.184	.235	significant
Y	<---	X2	.357	.095	.010	significant
Y	<---	X3	.487	.162	.023	significant
X1.5	<---	X1	1.000			
X1.4	<---	X1	2.565	.698	.022	significant
X1.3	<---	X1	2.296	.632	.020	significant
X1.2	<---	X1	1.879	.526	‘008	significant
X1.1	<---	X1	-.045	.313	.885	significant
X2.6	<---	X2	1.000			
X2.5	<---	X2	.852	.086	.061	significant
X2.4	<---	X2	.400	.077	.210	significant
X2.3	<---	X2	.813	.092	.541	significant
X2.2	<---	X2	.940	.077	.102	significant
X2.1	<---	X2	1.071	.088	.241	significant
X3.6	<---	X3	1.000			
X3.5	<---	X3	.357	.241	.139	significant
X3.4	<---	X3	1.076	.200	.101	significant
X3.3	<---	X3	1.438	.183	.421	significant
X3.2	<---	X3	1.311	.163	.061	significant
X3.1	<---	X3	1.514	.201	.239	significant



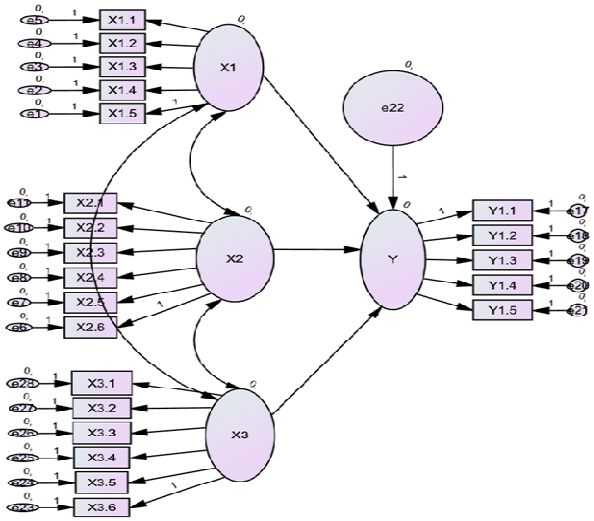


Figure 1: Research Model Analysis

Based on the results of the structural equation test, it can be seen full variables individual characteristics, culture values and entrepreneurial characteristics significantly influence entrepreneurial behaviors.

Regression analysis to draw lines showing the direction of influence between variables, and used to make predictions. This analysis is used to examine the effect between two or more variables, especially to see the pattern of influence whose model is not yet fully known. To see the effect of millennial generation characteristics, millennial generation cultural values and entrepreneurial characteristics on entrepreneurial behavior together using the F test.

Based on the F test, simultaneous testing of millennial generation characteristics variables, millennial generation cultural values and entrepreneurial characteristics on entrepreneurial behavior variables.

As stated by Rajiani (2010) several kinds of individual characteristics influence the world of one's work and company.

Furthermore, the success or failure of a businessman in carrying out his business activities cannot be separated from the cultural values that grow and develop in society. As confirmed by Molenaar (2002) that culture can have a powerful influence on individuals and performance. The same thing was conveyed by Kotter and Heskett (1992) that culture is a force that has a full influence on an individual and his performance even in the individual's work environment. Culture is the difference or similarity of values held in each society that arises from the social environment that originates in its history, life experiences, and belief systems. Culture is as mind software that regulates how to think, act and perceive envy (Hofstede, 2001).

This result confirms a meta-analysis shows that the *Theory of Planned Behavior* accounts for 27% and 39% of the variance in behavior and intention, respectively (Armitage & Conner, 2001).
This theory has been applied to the context of entrepreneurship because engaging in entrepreneurship is behavior that is under the control of the will. Various studies have used the theory to explain the intention to become an entrepreneur (Krueger et al., 2000; Liñan & Chen, 2009) and entrepreneurial behavior. (Kautonen, van Gelderen, & Tornikoski, 2013), as well as the

effects of entrepreneurship education (Athayde, 2009; Ferreira, Raposo, Rodrigues, Dinis, & Paco, 2012; Mwasalwiba, 2010; Rico & Bernardi, 2009). A meta-analysis evaluating *Theory of Planned Behavior* in the context of entrepreneurship reported that attitudes, subjective norms, and perceived behavioral control accounted for 39% of the variance in entrepreneurial intentions (Schlaegel & Koenig, 2011).

Conclusion

The millennial generation of SMEs' in Banjarmasin City have strong/excellent individual characteristics, measured from six dimensions/indicators that are reflected in the form of multitasking, independence and close to technology, while ambitious indicator has low values, meaning that millennial generation SMEs respondents do not have the ambitious character in running his entrepreneurship. Even those who are successful when trying will be happy to share that success with others.

Likewise, the cultural values at millennial generation SMEs in Banjarmasin City are reflected into six dimensions/indicators, namely: technology as a lifestyle, human relations with others, the values of the nature of life, the values of the nature of work/significant works and the relationship between humans and howl of time and human relations with nature are categorized as strong/useful.

Furthermore, the entrepreneurial characteristics of the millennial generation SMEs' have strong/ethical values which are reflected in six dimensions/ indicators, namely: courage to take risks; confidence; leadership spirit; originality; task oriented and results oriented.

Whereas the entrepreneurial behavior at millennial generations on SMEs has a value only strong enough/good enough that is reflected in two dimensions/indicators: trying to start a business, and being involved in every step towards venture creation. The result has shown that individual characteristics significantly influence entrepreneurial behaviors. Likewise, cultural values and entrepreneurial characteristics also have a significant effect on entrepreneurial behaviors.

References

- Andreas, Rauch and Willem, Hulsink (2015). *Putting Entrepreneurship Education Where the Intention to Act Lies: An Investigation Into the Impact of Entrepreneurship Education on Entrepreneurial Behavior*. Academy of Management Learning & Education, 2015, Vol. 14, No. 2, 187–204, http://dx.doi.org/10.5465/amle.2012.0293
- Ajzen, I (1991). *Theory of planned behavior.* Organizational Behavior and Human Decision Processes, 50: 179–211.
- American Psychological Association (2013). Accessed 08/27/2013. Retrieved from: http://www.apa.org/support/about/apa/psychology.aspx#answer.
- Armitage C.J, & Conner M., (2001), *Efficacy of The Theory of Planned Behavior: a Meta-Analytic Review*, British Journal of Social Psychology, 40(4), pp. 71-99.
- Athayde, R (2009). *Measuring potential companies in young people*. Entrepreneurship Theory and Practice, 33 (2): 481-500.
- Bosma, Neils; Hessels, Jolanda; Schutjens, Veronique; Praag, Von, Mirjam; 2012; *Entrepreneurship and Role Models*, Journal of Economic Psychology, Vol. 33, No. 2
- Faisal (2002), If So, I Dare to Be Entrepreneur. Bina Rena Pariwara. Jakarta
- Ferreira, JJ, Raposo, ML, Rodrigues, RG, Dinis, A., & do Paço, A. (2012). *A model of entrepreneurial intention: An application of psychological and behavioral approaches.* Journal of Small Business and Enterprise Development, 19 (3): 424–440.
- Hair J.F., Black W.C, Babin B.J. Aderson R.E.,(2010), *Multivariate Data Analysis*, Seventh, Prentice Hall, Englewoods Cliffs.
- Hofstede, G. (2011), *Dimensionalizing Culture, The Hofstede Model in context*. Online Reading in Psychology and Culture, 2(1). https://doi.org/10.9707/2307.0919.1014
- Iyer, Radha Ms (2018), *Understanding the Entrepreneurial Mind-Set of Millennials*, IOSR Journal

of Business and Management , pp.33-38, www.iosrjournals, org

- Jubari Al Ibrahim, Mosbah Aisah, Talib Zunirah, Sulaiman Anuar, and Jamal Abdul Yuhanis (2019), *How does Culture Shape Entrepreneurial Behaviors?* International Journal of Innovation, Creativity and change, Vol. 5, issue 2, pp. 987-980. www.ijicc.net
- Kautonen, T., van Gelderen, M., & Tornikoski, ET (2013). *Predicting entrepreneurial behavior: A test of the theory of planned behavior*. Applied Economics, 45 (6): 697–707.
- Kotter, J.P, and Heskett (1992), *Corporate Culture and Performance*, The Free Press, New York.
- Krueger, NF (2009). *Entrepreneurial intentions are dead: Long live entrepreneurial intentions. In AL Carsrud, & M. Br¨annback (Eds.), Understanding the entrepreneurial mind*: International studies in entrepreneurship: Pp. 51–74, Springer, London
- Krueger, NF, Reilly, MD, & Carsrud, AL (2000). *Competing models of entrepreneurial intentions*. Journal of Business Venturing, 15 (5/6): 411–432.
- Liñán, F. & Chen, Y. (2009). *Development & Cross-Cultural Application of a Specific Instrument to Measure Entrepreneurial Intentions*, Entrepreneurship: Theory & Practice, 33(3):593-617.
- Lyons, (2004). *An exploration of generational Through in life and at work*. ProQuest Dissertations and Theses 441-4441. Retreved from http://ezproxy.um.my/docview/305203456?accountid=28930
- Mazzarol, Tim; Vollery, Thiery; Ross, Noelle; Thein, Vicki; 1999, *Factors Influencing Small Business Start-Ups: A Comparison with Previous Research*, Journal of Entrepreneurial Behavior and research, Vol. 5, No, 2, Pp 48-63, Emerald Insight. https://Doi.org/10.1108/1355255991027449
- Meredith, Owen, William and Cambray Joseph, 1996, *Journal Review, Journal of Analytical Psychology*, 41/3, pp.417-480, https://doi.org/10.1111/j.14655922.1996.00467.x
- Mhlanga, Oswald, 2018, *Factors influencing hotel experiences for millennial tourists: A South African study*, African Journal of Hospitality, Tourism and Leisure, Volume 7 (3) - (2018) ISSN: 2223-814X
- Molenaar W.Ivo, and Sijtsma Klaas, 2002, *Introduction To Nonparametric Item Respond Theory*, Sage Publisher, http://dx.doi.org/10.4135/9781412984676.
- Monggilo, Zainuddin Muda Z. 2016, *Literature Review of the Typology of Internet Youth Behavior in Indonesia*, Journal of Communication Studies 13 (1), 31-48.
- Mwasalwiba, Ernest Samwel, 2010, *Entrepreneurship education: a review of its objectives, teaching methods, and impact indicators*, Education + Training, Vol. 52 No. 1, pp. 20-47. https://doi.org/10.1108/00400911011017663 Emerald Group Publishing,
- Patrik M. Kreiser, Louis D. Marino, and K. Mark Weaver (2003). *Culture Influences on Entrepreneurial Orientation: The Impact of national Culture on Risk Taking Proactiveness in SMEs, Entrepreneurship Theory and Practice*. Sage Publisher.
- Pelly M.Duncan R., 2017, *Entrepreneurial Opportunity - A Perspective from the Theory of Forms*, American Journal of Management, Vol. 17 (5), Doi: https://doi.org/10.33423/ajm.V175.1732
- Naisbitt, John et. All 2002. *High Tech High Touch* , Jakarta: Mizan Library
- Rajiani, I., & Pypłacz, P. (2018). National culture as modality in managing the carbon economy in southeast Asia. *Polish Journal of Management Studies*, *18*.
- Rajiani, I. (2010). Applying Personality Traits to Predict Loyalty and Neglect among Employees of Bank Jatim Located in 10 Big Cities of East Java (Mc Crae's and Hofstede's Theories on effect of Culture to Personality Revisited). *Jurnal Aplikasi Manajemen*, *8*(3), 617-622.
- Rico, Paz and Borras Cabrer Bernardi, 2009 , *Entrepreneurship, firms creation and Regional performance*, European Journal of Management and Business Economics, Vol.26 No.2, pp. 158-173, Emerald Publishing Limited, Doi: https: //101108EJMBE.07.308.077.
- Sekaran, Uma (2006). *Business Research Methodologies*. 4th Ed, Salemba Publisher.
- Schaper, M. (2002). *The Future Prospects of entrepreneurship in Papua New Guinea*, Journal of Small Business Management. Vol. 40 No.1, pp. 78-83.
- Schlaegel, D., & Koenig, M. (2011). *Determinants of entrepreneurial intent: A meta-analytic test and integration of competing models*. G-Forum, Zuerich, November 2–4.
- Segal, Gerry, Borgia Dan, Schoenfeld Jerry, 2005, *The Motivation to Become an Entrepreneur*, International Journal of Entrepreneurial Behavior & Research, Vol.11, No.1,pp. 42-57,Emerald Group Publisher, https://doi.org/10.1108.13552550510580834
- Shane, S.A and Baron R.A., 2008; *Entrepreneurship A Process Perspective*, 2nd Ed, Mason OH, Thomson South-Western.

- Struckell M. Elisabeth, 2019, Millennial: *A Generation of Un-Entrepreneurs, Journal of Business Diversity*, Vol 19 (2), Doi: https://doi.org/10.33423/jbd.v19i2
- Yanuar Surya Saputra (2016). *Theoretical Review: Generational Difference Theory*, Among Makarti Vol.9, No.18, Journal Stiema.ac.id/index.php/ama/article/viewfile/142/133
- Zimmerer, Thomas. W. (2000) . *Essentials of Entrepreneurship and Small Business Management*, New Jersey: Prentice Hall.

GDP per Capita Convergence in European Monetary Union

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Abstract

For a state to join the Eurozone, its economy must tend to synchronize with the economies of the Member States. The main question that arises is whether, after accession to the European Monetary Union, Member States' economies tend to converge or not. In the present paper we set out to analyze the convergence of GDP per capita within the Eurozone, to see if this indicator of real convergence tends towards convergence or not. In the analysis we use the Sigma convergence test to measure the degree of convergence. According to the results, we can observe the differences in GDP per capita level within the European Monetary Union.

Keywords: GDP, Eurozone, convergence, EMU

Introduction

Real convergence requires reducing the structural differences that have repercussions on the competition and the competitiveness of these economies. These criteria complement the criteria set out in the Maastricht Treaty. They are not imposed as a mandatory condition for accession to the euro area, but it is desirable that they are respected. Especially, since through them you can see the real state of the national economy. Real convergence aims at economic development, so that the states that wish to accede reach the economic level of the Member States. At the same time, the amplitude of the economic cycles of the Member States is also being monitored, because the major growth differences between them can lead to major discrepancies and to imbalances within the union. Real convergence touches on other indicators as well, especially macroeconomic ones: the price level, the GDP, the investments, the unemployment level, the interest rate, the wage level, but also the competition.

Bojești eanu and Manu (2011, p.31) mentioned that the theory of optimal monetary areas expresses the idea that as long as the economic cycle of a member country of a monetary union is not synchronized with that of the partner states, when the autonomy of the monetary policy is renounced, negative economic effects can be created. Therefore, one of the primary conditions for joining a monetary union is the synchronization of business cycles between member countries (Mongelli, 2002, pp. 31-33). If we do not find a synchronization of economic cycles within a monetary union, there is a risk that the common monetary policy will have different effects at the level of the member countries (Artis, 2003, pp. 10-12). Under these conditions, the possibility of conflicts between the members of the monetary union increases, when developing the common monetary policy, as each member wishes to be benefited as much as possible when implementing the act.

In this paper we stop with the study on the most representative indicator of real convergence: GDP per capita. This indicator reveals the degree of development of a state. At the same time, by analyzing it, we can identify the discrepancies that may arise between the economies of the Eurozone member states.

Methodology

In the study of real convergence we will use the sigma convergence test (Barro & Sala-i-Martin, 1995). The Sala-i-Martin is the one that used for the first time this indicator to test the degree of convergence between different economies (Mihuț, 2013, p. 29). He defined this concept as follows: "a group of countries converges in the sense of Sigma convergence if the dispersion in terms of GDP per capita decreases over time" (Sala-i-Martin, 1995). In other words, the convergence σ is revealed by the temporal dependence of the standard deviation or the coefficient of variation of GDP per capita within a group of countries (Dvorokova, 2014, p. 315) (Oprițescu, 2017, p. 138).

$$\sigma = \sqrt{\frac{1}{n}\sum_{1=1}^{m}\left[\log\left(\frac{y_i}{y^*}\right)\right]^2}$$

y_i represents the indicator analyzed at time i
y^* represents the indicator analyzed at time 0

However, the most common indicator used in calculating the coefficient of variation is:

$$Cv_T = \frac{\sigma_T}{\overline{X_T}}$$

Cv_T represents the coefficient of variation between period T
σ_T is the square value of the degree of regional development in the T period and is calculated as follows:

$$\sigma_T = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\left(X_{i,T} - \overline{X_T}\right)^2}$$

$\overline{x_T}$ represents the average level of development during the period T.

GDP per capita convergence within the European Monetary Union

In a first analysis we used the GDP per capita from the countries of the European Monetary Union, from 1999-2018. We must mention that we adjusted the average value of GDP per capita, but also the standard error, following each new accession to the euro area. Following the application of the sigma convergence formula, we obtained the following variation of GDP per capita convergence within the European Monetary Union:

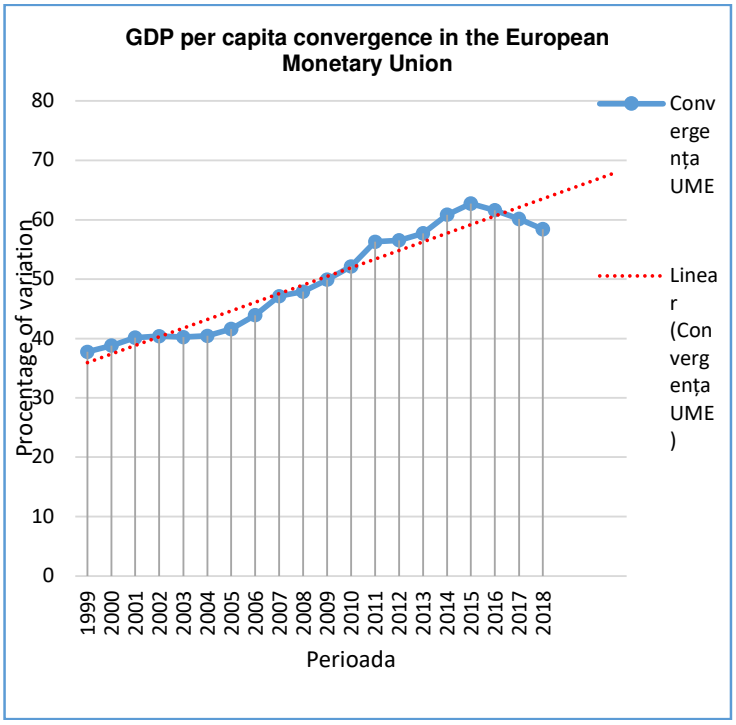


Figure 1: GDP per capita convergence in the European Monetary Union (%), between 1999-2018

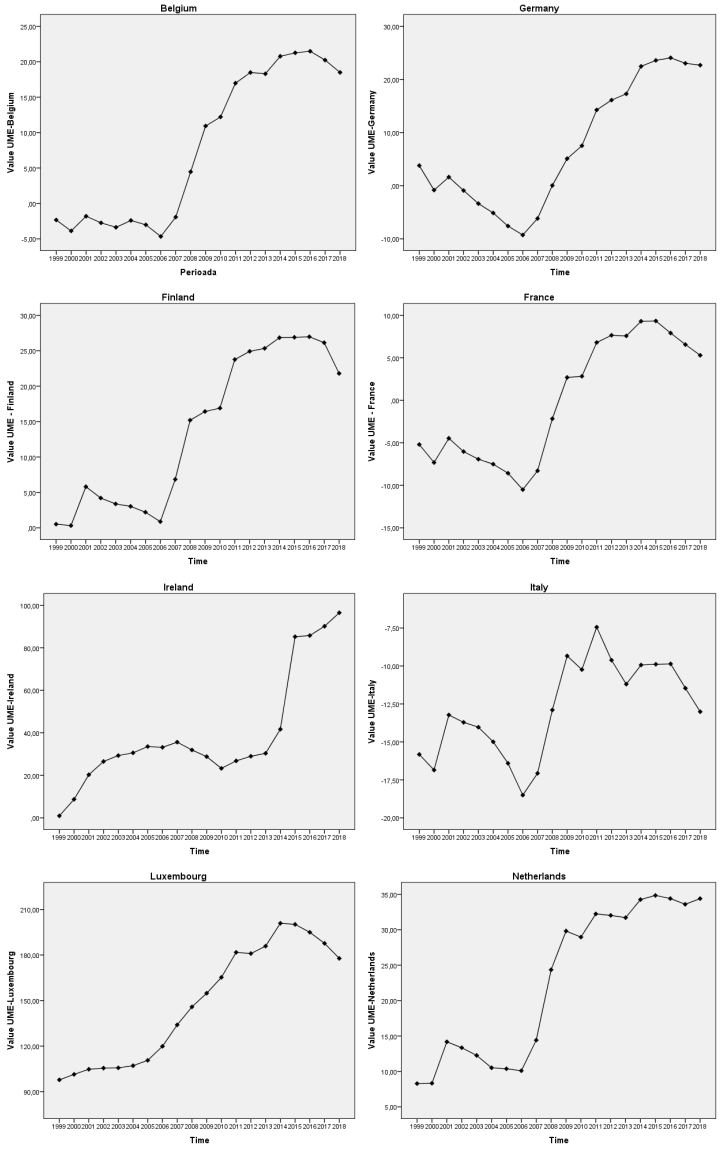
Source: own processing according to Eurostat

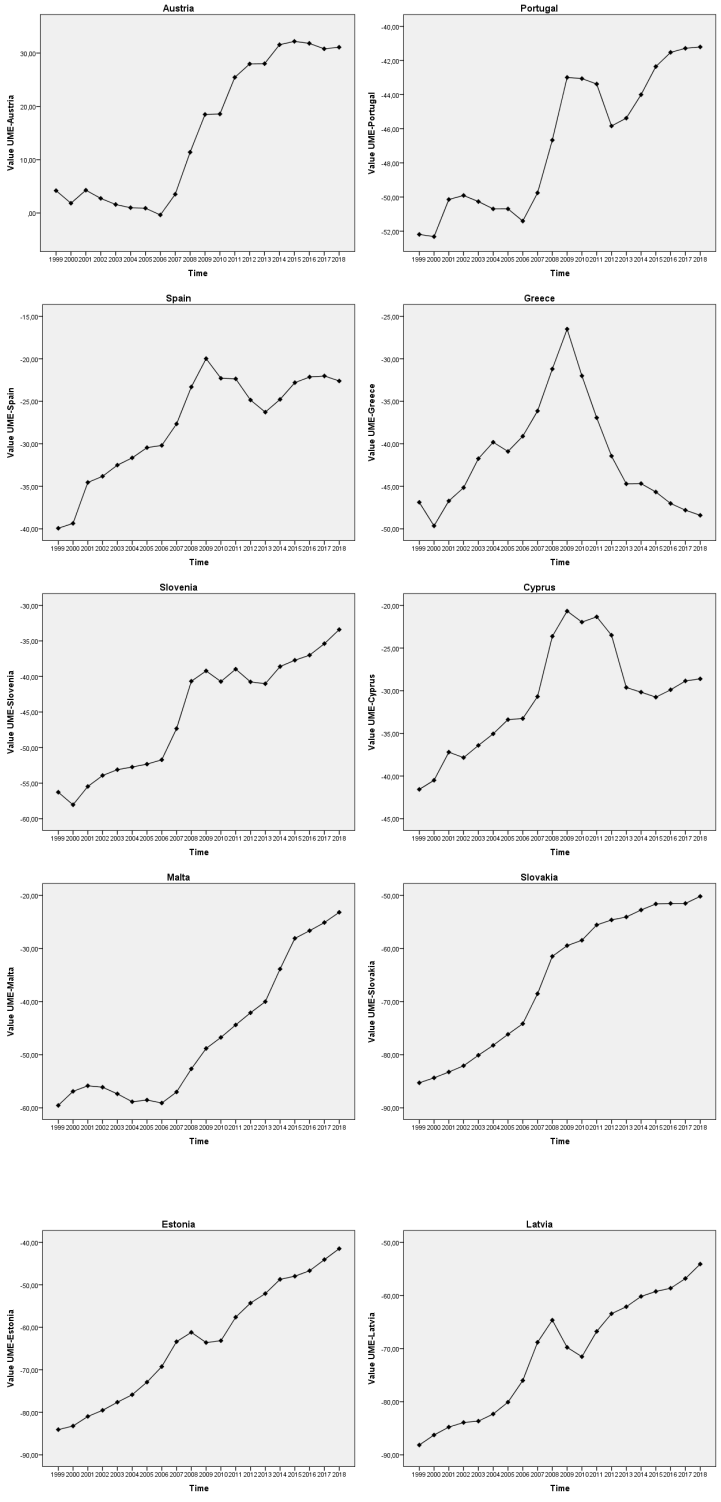
To say that an indicator tends toward convergence, the sigma convergence indicator must tend towards 0. The closer the value is to 0, the more that indicator tends towards divergence. As we can see from the figure no. 1, the GDP per capita of the European Monetary Union is much greater than 0. From this we can deduce that this specific indicator of real convergence does not tend towards convergence within the union, but on the contrary, the trend is one of divergence. Since the establishment of the euro area and until 2010, the GDP per capita variation has remained below 50%. After this year, the variation exceeded the value of 50%, the maximum was reached in 2015, when the variation was 62.71%. This increase in the GDP per capita gap between states leads us to the idea that the level of development between the euro area states is different. Precisely for this reason, in the periods in which new states joined, from central or eastern Europe, the GDP per capita variation increased. To support this assertion comes the period between 2015 and 2018. In 2015, Lithuania became the last state to join the euro area. After this year we can see how the convergence variation decreases. However, the trend is one of increasing GDP per capita variation.

The main problem identified in this context is: how influence this increase in the discrepancy between the level of GDP per capita in the member countries of the European Monetary Union? It is rushed to draw some conclusions from the analysis of a single economic indicator, but nevertheless, if we put in the political and economic context of the European Monetary Union, we can outline certain directions induced by the evolution of GDP per capita. Instead of striving for perfect convergence, between the Member States, the trend is one of divergence. This evolution reveals first of all a discrepancy in the implementation of the various economic measures in the Member States. The main shortcoming in the European Monetary Union is the lack of a common fiscal policy. Even if the European Central Bank plays the role of a national central bank of the whole union, all fiscal measures are adopted by the political authority of each Member State. When the national policy intervenes, the interests of the union pass secondary.

The rate of change of GDP per capita of Member States

As we have seen, GDP per capita within the European Monetary Union, tends towards divergence. For a better observation, we have also chosen to analyze the rate of change of GDP per capita of each Member State in relation to the average of the European Monetary Union. Through this analysis, we aim to see which states are experiencing the greatest difficulties in the process of synchronizing this indicator with the union average.




Austria
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Portugal
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Spain
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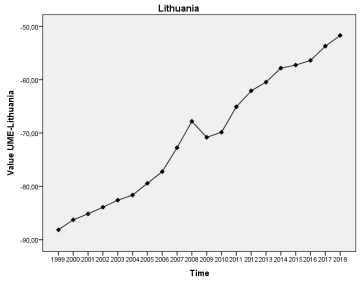

Figure 2: The rate of change of GDP per capita between the Member States and the average of the European Monetary Union (%), between 1997-2018

Source: own processing according to Eurostat data

From Figure no. 2, we can draw several conclusions regarding the convergence of GDP per capita within the European Monetary Union.

First of all, we notice the following group of states: Belgium, Germany, Finland, France, Netherlands and Austria. These states have managed to keep the GDP per capita variation rate below 30%, with the exception of the Netherlands which is slightly above this ceiling. It should be noted that all these states are founders of the euro area. The rate of change in these six states followed the same trend. We can see how at the time of the establishment of the European Monetary Union, the rate of change was low, and by 2007 it was possible to observe a tendency to decrease it, in some states the rate of change became even negative. Which meant that the GDP per capita of those states was lower than the union average. After 2007 we can see a steep trend of increasing the rate of change of GDP per capita. This trend is maintained until 2016, when the rate of change begins to fall, except for the Netherlands, where there is an upward trend.

Another category of states is Ireland and Luxembourg. In both countries, the rate of change from the average of the European Monetary Union is very high. Ireland started in 1999 with a variation rate of about 0% and reached a variation rate of about 100% in 2018. Between 2014-2015 we can see the steepest increase in the rate of change of GDP per capita in Ireland. In the case of Luxembourg, by 2014, the rate of change of GDP per capita against the euro area average has increased to a value of 200%. After this period, the rate of change has a slight downward trend. The two states have the highest GDP per capita, which is also due to the high variation rate.

On the other hand we have: Portugal, Spain, Slovenia, Cyprus, Malta Slovakia, Estonia, Latvia and Lithuania. All these states have a negative rate of change of GDP per capita compared to the European Monetary Union average. Which means that GDP per capita in these states is lower than the euro area average. What we notice is that even though these states have a negative rate of variation, this is on an upward trend that tends towards 0. This fact indicates that the GDP per capita of these states tends towards convergence. In the period 2009-2013, in the case of Spain and 2009-2015 in the case of Cyprus, the rate of change went away from 0, thus abandoning for a short period of time the convergence trend.

The last category includes the states with a negative variation rate, but which still tends to move away from 0. Here we find Italy and Greece. In the case of Italy, from 2012 it can be observed how the rate of change moves away from 0, reaching in 2018 a value of -13%. Greece is a special case. Since 2009 it has seen a trend of removing the rate variation from the value 0, but compared to Italy, the decrease is much more drastic. In 2018, the rate of change of GDP per capita compared to the average of the European Monetary Union in Greece was -48.40%.

Conclusions

Following the analysis of GDP per capita convergence within the European Monetary Union, we have reached a number of conclusions:

The GDP per capita indicator tends rather to divergence within the Euro Zone. We could observe that instead of diminishing the differences between states regarding this indicator, for the most part of the analyzed period, the differences were accentuated.

There are significant differences between the rate of change of GDP per capita between different countries of the Euro Zone and the union's average. We could observe that there are four categories of states: those with a positive variation, but which tends towards 0; with a positive variation, but far from 0; with negative variation and tending towards; negative variation, but it goes away from 0.

Italy and Greece are the states with the biggest problems. As we could see the level of GDP per capita is below the Eurozone average and at the same time, it tends to go even further.

We can say that there are major development gaps between the Member States of the European Monetary Union, in terms of GDP per capita.

Acknowledgement

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References

- Artis, M. J., 2003. Is there a European business cycle?. *CESifo Working Paper*, Issue 1053.
- Barro, R. & Sala-i-Martin, X., 1995. *Economic growth*. New York: McGraw-Hill.
- Bojeșteanu, E. & Manu, A. S., 2011. Empirical analysis of business cycle synchronization an shock similarity between Romania and the euro zone. *Munich Personal RePEc Archive*, Volume 31295, pp. 1-49.
- Dvorokova, K., 2014. Sigma Versus Beta-convergence in EU28: do they lead to different results?. *WSEAS Transactions on Business and Economics* , 11(1), pp. 314-321.
- Mihuț, I. S., 2013. *Creșterea economică și criteriile de convergență în cadrul economiilor emergente din Europa centrală și de est.* Teză de doctorat ed. Cluj Napoca: Universitatea Babes Bolyai, Facultatea de științe economice și gestiunea afacerilor.
- Mongelli, P. F., 2002. New views on the optimum currency area theory: What is EMU telling us?. *ECB*, Volume Working Paper 138.
- Oprițescu, E. M., 2017. Econometric Assessment of the Degree of Economic Convergence between Member States of the European Union. *Finante - provocarile viitorului (Finance - Challenges of the Future),* 1(19), pp. 136-144.
- Sala-i-Martin, 1995. The Classical approach to convergence analysis. *Economic Working Paper*, Volume 117.

Modern Information Technologies How Means of HR Activity

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Abstract

The article is devoted to modern information technologies as a means of successful implementation of HR-activities. In the period of an active state and social policy in the field of dissemination and popularization of the principles of digitalization in the world as a whole, and in Russia in particular, the use of the potential of information technologies in personnel management becomes especially important. The Internet, various specialized mobile sites, applications and programs for selecting and evaluating personnel in terms of hiring, supporting and adapting personnel at the enterprise during the period of employment have a significant impact. The analysis is carried out and the strengths and weaknesses of using modern information technologies as a means of HR-activity are revealed. The materials of the article touch upon urgent issues of the shortage of modern scarce professions, the problems of finding workers, as well as the role of modern IT technologies in the implementation of the function of providing the organization with personnel. The importance of information technologies in the implementation of the work of an HR specialist is emphasized. In particular, the use of modern sites for recruiters, staff appraisals and developed mobile applications and programs based on them.

Keywords: HR-Activity, Information Technology, Digitalization, Mobile Application

Introduction

In modern conditions, the problem of digital updating of the tools of professional activity of an HR specialist is caused by the processes of digitalization, informatization and the growth of automation of the modern Russian economy. Personnel management specialists who are actively introducing new digital technologies into their practice in the segment of personnel selection, adaptation, assessment, and development are no exception. According to McKinsey Global Institute estimates, in 15 years, up to 50% of all work processes will be fully automated. Based on such a forecast, it is logical to assume the mass dismissal of workers, job cuts, as well as a strong degree of differentiation in wage levels. The stratification of the labor market that will follow the expansion of information technology will lead to a situation where jobs of the “middle” level will be actively replaced by low-paying and high-paying, depending on the level of application of digital technologies. One of the likely consequences of the global digitalization of the economy will be the stratification of the population by income level, increase, unemployment rate, especially in single-industry towns and for people with limited health and labor [6]. These negative phenomena are almost inevitable, but there are also positive aspects to this global process. So, the introduction of information technology in all areas of the economy entails and the emergence of new professions and jobs that did not previously exist, for example, a tutor, Big Data administrator, Big Data analyst. As a result, a real situation related to personnel shortages may soon appear in today's relevant professions. That is, if there is the possibility and desire for retraining, every liberated specialist as a result has a chance to take a high-paying position related to the use of digital technologies [4]. In fact, this situation is beneficial for employees and disadvantageous for employers. At present, objective difficulties are observed in the training of such workers. There is, on the one hand, a certain deficit of scientific and pedagogical personnel, specialists of the training

departments of a practical but not theoretical orientation, in particular for practical specialties. On the other hand, first of all such a shortage of personnel is caused by insufficient motivation of employees to master their competencies in the context of the digitalization of the economy, as well as the frequent resistance of older people to changes in the implementation of software products.

In any case, information technology is being actively introduced into the practice of specialists of all levels, one of the latest "new products" in the field of personnel management, in particular, are mobile applications, sites and programs. They take into account many of the needs of the organization - the selection, assessment and development of personnel, including mobile applications, sites and programs can just be used as a platform for searching for specialists in “scarce” professions, when other methods of selection are already exhausted [5].

Materials and Methods (Model)

The main theoretical sources were the works devoted to the problems of personnel development management in the digital economy (Belonogova E.I., 2018). Digitalization and its impact on the Russian economy and society: advantages, challenges, threats and risks (Khalin V.G., Chernova, G.V., 2018).Innovative forms of organizing work on managing human resources of an organization (Shekurova, M.M., Latypov, Z.Ya., 2018). Current status and prospects for the development of cloud technologies in Russia (Sobolev A. Yu., 2017). Cloud-based human capital management systems (K. Noskova) and cloud technologies in the personnel management system (D.K. Zakharov, 2018). The use of digital technologies in the selection and assessment of personnel (Rytova E.V., Lukashina A.S., 2018), digitalization of personnel management as part of the organizational culture of the enterprise (Gasparovich E.O., Uskova E.V., 2019). Gender trajectories of professional and personal development as a condition of effective management in a digital economy (Gasparovich E.O., Tokareva Y., Tokarev A., 2017). The use of modern information technologies as a means of optimizing the educational process in the training of personnel management specialists (Uskova E.V., Gasparovich E.O., 2019).

The aim of the study was the study of modern information technology as a means of successful implementation of HR-activities. Research objectives: analysis of modern information technology as a means of HR-activity; the definition of the role of modern IT-technologies in the implementation of the function of providing personnel for the organization; identification of the importance of information technology in the implementation of the work of an HR specialist. in particular, the use of modern sites for recruiters, staff evaluations and developed mobile applications and programs based on them.

The study was conducted in three directions and allowed to consider: programs, sites and mobile applications as a means of HR-activity.

Programs as a means of HR-activity

Programs along with applications and sites become an important part of the HR specialist toolkit. We single out the most demanded of them in the Russian digital market, identifying the practical benefits of using the HR manager in the activities: E-Staff Recruiter, Experium, Recruiter, Resumax, Staffery 2009, “Oracle Taleo Cloud Service”, “Microsoft Dynamic CRM Recruitment Agency”, “1C: Enterprise 8. Recruitment Agency”, “Molga (SAP)”.

Program "E-Staff Recruiter". One of the oldest and most popular digital software products. It can be used as a comprehensive program for an HR department employee, and as a universal tool for large recruitment agencies. The Internet module imitates human actions, saving time and effort in filling out forms and processing the results generated by sites. Options include automatic publication of vacancies on job search sites (there are more than 40 in the main list) and collecting feedback from job seekers. The program keeps records of clients, vacancies and applications [9]. There is a function of sending resumes and messages according to customized templates, a fairly convenient search for

resumes according to specified criteria. For management, statistics on the work of the re-crusher campaign and on employee employment are kept. Of course, there is a function to import resumes of candidates from mail services and Word or OpenOffice documents and integration with other systems (Boss-Kadrovik, 1C, SAP, WebSoft, WebTutor).

What is the use of the E-Staff Recruiter program: automatic posting of vacancies, search for resumes on professional portals.

The program "Experium". The program is convenient to use, it takes into account all the features of the work of HR-specialists. Service capabilities allow you to publish and analyze vacancies on popular sites, collect feedback directly from the program, create and maintain a database of not only candidates, but also the company's own specialists [9]. It is used in two versions: as a program for recruiting, and as a complete program for managing internal resources. In the program, you can store data on the organizational structure, company employees, work with arrays of documents in text and graphic formats, generate reports by any parameters. The Experium diary is synced with Outlook, Mozilla, or Google Calendar.

What is the use of the Experium program: a full cycle of recruiting projects.

The program "Recruiter". It was created to work with a large number of vacancies and customers. The developers clearly saved on the design, so the program is not able to amaze the imagination. At the same time, it is quite useful in working with vacancies and job seekers. “Recruiter” allows you to keep a record of all information about candidates, employers, interviews and tests, payments and contracts, recommendations and letters. The “usefulness” of the program should include: organizing competitive selection, rating candidates and employees, automating business correspondence, the ability to integrate with a website, simplifying control over contracts and payments, and a convenient database for monitoring [10].

What is the use of the Recruiter program: it is designed to work with a large number of vacancies and customers.

The program "Resumax". At first glance, this program barely overshot the artisanal level of development. In fact, software can pleasantly surprise you with its obvious simplicity and functionality. It provides for the creation on the company’s website of a section that is able to automatically post vacancies, accept questionnaires from applicants and conduct preliminary testing. Basic options: notification of new candidates, new applications or interviews. Automatic response by e-mail, a perfectly sane search for data according to specified criteria and keywords. The main advantage is the cloud service, where there is no binding to specific machines: work from home, on the road, from another office. You can also note the multilingual interface, support for HR-XML, the ability to configure at several system levels, when each user has individual access to the functions that are provided to him [7].

What is the use of the Resumax program: an online service for HR managers and job seekers.

The program "Staffery 2009". The program greatly simplifies the work of the company's HR specialists. In addition to storing personal data, it facilitates the quick search for employees by manually selected criteria. It also allows employees to make changes to their personal card or resume themselves. The application is certified by Microsoft during the testing of affiliate products.

What is the use of Staffery 2009: designed to manage data and track information about education, professional experience and skills of employees.

Oracle Taleo Cloud Service Program. The program is able to accumulate all information about employees throughout their labor biography, convenient navigation through the personnel potential of the company. Based on the data collected, the program allows you to predict the possible needs of specialists in various industries (although the forecast is approximate). This is Oracle, so the

interactive structure of the application is intended for companies of the widest scale and from any industry. Taleo is one of the world leaders in the number of users [11].

What is the use of the Oracle Taleo Cloud Service program: one of the most comprehensive, advanced and latest cloud programs in the HR sphere.

Program "Microsoft Dynamic CRM Recruitment Agency." As with any products of this reverently beloved by advanced users of the developer, everything is simple, reliable and even beautiful. The solution of typical industry tasks in the field of recruiting: recruiting employees, automating the interaction of employers and job seekers, monitoring deadlines for executing contracts, monitoring orders of company executives, and others. The obvious advantages include maintaining a common database regarding applications, contracts, vacancies, the use of automated selection of applicants and candidates for specific parameters. For HR managers, automation of their daily work, convenient navigation, quick access to information about the availability of vacancies, monitoring of task performance, etc., is set up [9].

What is the use of the Microsoft Dynamic CRM Recruitment Agency program:
this is the use of capabilities, potential, tools of Microsoft.

The program "1C: Enterprise 8. Employment Agency." The main function of the program is the automation of everyday work in recruiting and personnel agencies. The processes of assessing professional knowledge, skills, individual qualities of candidates are simplified as much as possible. When developing software, the task was to facilitate the business processes of recruiting agencies and personnel services, to automate the relationship between customers and the company. Among the strengths include maintaining a common information base of candidates for vacancies, automatic comparison of the requirements of employers and the capabilities of applicants. The target audience - HR managers - software offers convenient information processing, increasing efficiency in managing work and reducing the likelihood of errors when working with clients [10].

What is the use of the 1C: Enterprise 8. Recruitment Agency program:
this is the use of capabilities, potential, tools "1C".

The program "Molga (SAP)". For all corporate SAP users, it's clear without description how the next program of this global system looks. For the uninitiated, any description is unnecessary, in addition, small and medium-sized businesses will still refuse to buy the solutions of this company because of an unbearable budget. The application, in addition to the search and selection of employees, includes the development of an optimal model of personnel management, unification of payroll processes, accounting for an enterprise strategy regarding HR issues and much more [1].

What is the use of the Molga (SAP) program: this is the use of capabilities, potential, tools of the international company SAP AG.

Sites as a means of HR-activity

In modern conditions of economic development and personnel management, sites are emerging to help in the successful use of information technology as a means of HR-activity. It should be noted that almost all mobile applications use from 20 to 50 sites with resume databases (job.ru, rabota.ru, zarplata.ru, hh.ru, joblist.ru, rabota.mail.ru, rjb. ru, resume-bank.ru, resuminka.ru, job.ws, etc.). Most of the modern systems can adapt to: user, specialization, company scale, integrate with the "1 C" platform, which is significant for Russian companies.

Mobile applications as a means of HR-activity

Mobile apps that help HR professionals in finding potential candidates for vacancies, a sufficient number are represented in the global economy. However, in our country they are not yet very

popular, although, as world practice shows, their potential is huge. For this reason, most of these applications do not "support" the Russian language. However, as was noted, due to the high degree of potential and to some extent the inevitability of the beginning of their widespread use in Russian companies in the future, some applications that are already popular abroad in the business environment should be considered [12]. The above does not mean that such applications are not created in Russia, for example, in table 1 of the six applications considered, four are the development of Russian specialists.

Table 1: Overview of mobile applications for HR professionals

Mobile attachment	**Characteristic**	**Cost**
1. Jobvite Personnel Search Application	1. Developer: Jobvite Inc. (USA, California, Burlingame). 2. Key feature: application integration into the global recruiting system. 3. Application features: integrated into social networks (LinkedIn, Twitter and Facebook), the relevance is due to the fact that many job seekers look for work through social networks, communities, friends, groups, and can easily offer vacancies to their acquaintances and friends that they saw; allows you to send information about the vacancy in one click; This application is especially useful for an HR specialist, since it contains the function of “tracking paths” of receiving recommendations from friends of the applicant. Such a “tracking path” helps the cadre employee to better understand the candidate and draw up an initial opinion about him. 4. The main drawback for Russian users: the application is not Russified.	500 - $ 1,500 / month
2.BeKnown staff search app	1. Developer: Monster.com (USA, New York). 2. A key feature: it works as an aggregator of social networks and mail services, as a result, it turns out to be a kind of “super network” in which you can post vacancies and share company news. 3. Application features: job seekers can share job links with other users; the gamification mechanism is used, for a large number of "business connections" the user receives "badges"; obvious advantages are: scale, support for 19 languages (including Russian), while the application is free.	Is free
3.Experium search	1. Developer: Heliosoft (Russia, Moscow).	50,000 -

application	2. Key feature: all resumes of applicants are transformed by type of card with 25 fields (in meaning). 3. Application features: □ works as a tool for staff recruitment from the beginning of the search to successful completion; □ greatly facilitated search allows you to quickly find a suitable candidate; □ integration with recruiting sites, as well as links to social networks and mass mailings; easily integrates with MS Outlook calendar and corporate website of the company; □ The obvious advantage is the function of access to the HR network - a service that enables communication between recruiters. 4. The main drawback for Russian users: very high cost.	300,000 rubles
4.Application for personnel search Staffim	1. Developer: Russian startup “Staffim” (Russia, Moscow). 2. Key feature: application integration into domestic recruiting sites. 3. Application features: □ posting vacancies on several HR portals at once, and new responses come to the smartphone with notifications; □ integrated into mail servers, i.e. you can have working correspondence with candidates; □ has its own database of applicants; □ work with QR codes to quickly find the right candidate profile; □ excludes the possibility of re-saving the questionnaire of the same candidate, which allows not to overload the database of applicants. 4. The main drawback for Russian users: the application does not have a foreign information base.	1000 - 19500 rubles / month
5.Pruffi Friends Staff Search App	1. Developer: Pruffi Friends (Russia, Moscow). 2. Key feature: ideal for scarce professions or complex vacancies (for example, the synchrophasotron collector), as well as companies doing business in a specific field (for example, art painting). 3. Application features: □ allows you to search for candidates on social networks (including Russian networks); □ the purpose of the application is to daily send out	Is free

	information about vacancies to users, which can then be reposted, sent to other users; gamification mechanisms are used, a user who recommended a friend who is suitable for the employer receives a money transfer, as a result it is a kind of free recruiting on the network. 4. The main drawback for Russian users: an inconvenient interface, the catalog contains mixed vacancies from different industries, in one list.	
6. HeadHunter employee search application	1. Developer: HeadHunter (Russia, Moscow) 2. Key feature: widely used application, covers dozens of cities in Russia, having high-quality functionality, intuitive interface. 3. Application features: for the user: creating auto search by keywords and categories; job seekers can leave clicks; Jobs are sorted by category; for the employer: personal account, all resumes are co-stored in the database; The advantage for applicants and employers is the wide coverage of the territory of Ukraine, Belorussia and Kazakhstan. 4. The main drawback for Russian users: unlike the site of the same name, it is not possible to edit the vacancy and resume online, only through access to the main page; focus on the applicant, the recruiter can use the application mainly to solve the problem of monitoring the level of wages in the industry, field of activity.	Is free

Summarize, the previously analyzed and listed mobile applications (except for HeadHunter) are actively starting to gain momentum in Russia.

As an addition, we note that in foreign practice there are applications that are already quite popular, and, accordingly, have a chance to take a place in the Russian market in the future. As the most promising for integration into the Russian digital economy, experts consider Worki and Huntflow (Huntflow) applications.

The Worki application allows you to find employees based on their place of residence, and in a fairly quick time. When registering, the geolocation function is used, and first of all the applicant sees those vacancies that are close to his residence. This type of search is relevant for enterprises in the field of public catering, retail chains, salons of communication, serving enterprises of household services. Such companies have vacancies with not very high earnings, which is why it is taken into account that the applicant can be attracted by the opportunity to work near the house [5]. Also, for an HR specialist, this application may turn out to be important, when it is required to recruit personnel to a

specific outlet. The registration form in this application, unlike many others, is very simple: a code is sent to the mobile phone number, after receiving it a HR specialist can immediately add a vacancy indicating the location of the company. There is also a chat function with job seekers. According to the manufacturer, you can find an employee in one day, although this, of course, will be highly dependent on the city (locality). The obvious advantage of this mobile application is its free, but there are also paid functions - for example, publishing vacancies in excess of the package, highlighting ads among others).

The Huntflow application integrates all vacancy feedback from different sites, forming a single database. A key feature is the removal of repeated resumes. The application has the function of a joint interview on the type of holding a conference online. Huntflow was mainly created as a tool for forming the personnel reserve of the company [4].

The wide range of programs, sites and mobile applications proposed for analysis allows us to talk about the relevance of these modern information technologies as a means of HR-activity.

Results and Discussion

A practical study of the use of mobile applications as a means of HR-activity was carried out in the Personnel Management Department on the basis of Sberbank PJSC in Yekaterinburg in 2019. It was decided to use the Team.si mobile application. The functionality of this application:

- application - a portal where several HR resources are combined;
- personal account of each user;
- internal social network for communication and exchange of experience and information.

The main goal and objectives for the practical study of the use of mobile applications, sites and programs as a means of HR-activities were: increasing the level of adaptation of employees; simplifying the collection of feedback and information; viewing courses for off-line training.

The results of the implementation and the effectiveness of using the Team.si mobile application in the practice of Sberbank PJSC (according to the reports of Sberbank PJSC) for the first year of operation are as follows:

- increase in the level of adaptation of employees increased by 5.6%;
- simplification of the collection of feedback and information by 10.2%;
- increase in the level of work on personnel assessment by 8.0%.

When analyzing the foreign practice of using mobile applications as a means of HR-activity, the research experience of “Bersin by Deloitte” is of interest. A note in “WhatWorks” (2016) presents the generalized results of the study “HR applications for training and personnel search for smartphones”. The study showed that 93% of the 45 human resource management (HCM) solution providers surveyed now offer HR applications and employee search features on smartphones, and many of them are initially designed specifically for mobile devices. Such applications typically use the specific functionality of smartphones. First of all, the ability to provide small information, more personalized and do it instantly. This explains why training and employee search applications are most popular on mobile platforms. 73% of surveyed developers offer mobile apps for conducting surveys related to training, quizzes and employee assessment. The study also shows that developers focus on mobile applications that make it possible to make decisions on work issues (64%), manage productivity (56%) and self-organization of employees (49%). The function of searching for employees, in particular, has become the object of increased attention.

According to a New Research Center article “Evidence on the use of mobile technology ”, 64% of all adult Americans have a smartphone, which is usually defined as a cell phone and performs many computer functions.

The study also showed that the percentage of developers offering mobile applications for managing human resources and on-demand employees differs depending on the functions performed and the areas of application. According to a survey on the practice of using mobile applications, the study showed the possibility of using mobile applications as a percentage. So, 41% of respondents say that they help harmonize performance indicators. 35% of respondents say that they allow coordinating staffing decisions on payment. 8% of respondents say that they allow you to coordinate applications for absenteeism. 27% of respondents say that they help to manage bonuses and compensations. 24% of respondents say that they help regulate requests for changes in the work schedule.

Conclusion

The results of the study show the disappointing results of a brief test of mobile applications, programs and sites that are relevant in Russia. If we turn to the experience of Western companies, then the development of mobile applications, programs from site aggregators for re-establishment there is many times higher. Abroad, unlike Russian practice, today there is a variety of mobile applications, there are products with a good study. For Russian users may be useful applications that allow you to search for workers in neighboring countries. The most popular applications in the oil and gas industry, such as: “Oil and Gas Job Search” from the portal of the same name or “UK Job Search”.

It should be noted the special importance for recruiters of mobile applications of professional and social networks. The best among such networks abroad today is the LinkedIn application. This mobile application has a convenient menu, a clear interface, and the functionality is not inferior to the usual web version of the site. Russian social networks, including VKontakte, do not have such potential for HR specialists [12].

A large line of mobile HR applications is represented by products of companies in the field of career counseling. As a rule, they are created as memos for users containing information – tips interviews, resume writing, and more. The Russian user of the application will help and refresh the current vocabulary in memory. There are several similar applications in the AppStore. In the Resume Service Plus application, you can watch video training on how to conduct a co-talk and write a resume. The Interview app contains a large number of questions in English with detailed comments on them and the ability to record your answers. You can find many short appendices-memos on writing resumes from "nameless" authors, such as "CV / Resume Lite".

Information applications, HR magazine applications or Internet portals are also useful to keep on your mobile. It’s important to have applications with the ability to read materials on the road from Russian HRM, Recruiting News and others, but, unfortunately, Russian users have so fardo not have such an opportunity. Western thematic publications often have paid subscription applications, but there are also free versions. Among them there is the HR Management application, the HR News from People Management Magazine application and the SHRM HR News application. All three applications are free and interesting enough for acquaintance. Paid applications (by subscription) are also included in Russian publications, for example, the magazine “Director for Human Resources”.

Summarizing the study, we note that the study of modern information technologies allows their use as a means of successful implementation of HR-activities. The analysis of modern information technologies as means of HR-activity allowed us to determine the significant role of modern IT-technologies in the implementation of the function of providing the organization’s personnel and emphasize the importance of information technologies in the implementation of the work of an HR specialist. in particular, the use of modern sites for recruiters, staff evaluations and developed mobile applications and programs based on them.

Thus, we can conclude that through the use of information technologies as a means of HR-activity, the possibilities of performing almost all operations through a computer, including the provision or receipt of various information and the execution of transactions, are qualitatively and quantitatively increased. However, in addition to a number of advantages, digital transformation carries certain risks. As we can see, the market for mobile applications related to the topic of job search and staff

recruitment is rather undeveloped. In Russia, unfortunately, the mobile application market is only just beginning to develop, but it has huge development potential, especially when dealing with scarce frames.

References

- Belonogova, E.I. (2018) 'The main problems of managing the development of personnel in the digital economy,' *Bulletin of Science and Education*, 6, 115-122.

- Gasparovich E.O., Uskova E.V. (2019) 'The meaning of organizational culture and university social responsibility in teaching students with disabilities.' Proceedings of the 34th International Business Information Management Association (IBIMA), ISBN**:** 978-0-9998551-3-3, 13-14 November 2019 **–** Madrid, Spain, 2308-2315.

- Gasparovich E.O., Tokareva Y. and Tokarev A. (2017) 'Gender trajectories of professional and personal development as a condition of effective management.' Proceedings of the 3rd International Conference on Advances in Education and Social Sciences (ADVED), ISBN: 978-605-82433-0-9 6, 9-11 October 2017- Istanbul, Turkey, 992-999.

- Zakharov, D.K. (2018) 'Cloud technologies in the person-scrap management system,' *University Bulletin*, 6, 225-231.

- Noskova, K. A. (2012), "Cloud management systems for human capital," *Humanitarian scientific research.* [Online], [Retrieved October 7, 2019], http:// human.snauka.ru/ 2012/12/2116

- Rytova, E.V. and Lukashina, A.S. (2018), 'The use of digital technologies in the selection and assessment of personnel for work in the Arctic territories,' *Scientific Bulletin of the Southern Institute of Management,* 12, 14-19.

- Sobolev, A.Y. (2017) 'The current state and prospects for the development of cloud technologies in Russia,' *Scientific journal*, 11, 190-195.

- Uskova E.V., Gasparovich E.O. (2019) 'Analysis of the activities of the educational organization through the prism of the" hidden curriculum": "advantages" of the university before the school (search for solutions on the example of the direction of training – "personnel management")." Proceedings of the 34th International Business Information Management Association (IBIMA), ISBN**:** 978-0-9998551-3-3, 13-14 November 2019 **–** Madrid, Spain**,** 1011-1021.

- 'Digital Russia: a new reality'. [Online], [Retrieved October 11, 2019], https://www.mckinsey.com/ru/our-insights

- 'Digital economy and its main characteristics'. [Online], [Retrieved October 11, 2019], http://www.mckinsey.com/global-locations/europe-and-middleeast/russia/ru/

- Shekurova, M.M. and Latypov, Z.Y. (2018). 'Innovative forms of organizing work on managing human resources of an organization,' *Bulletin of the Kazan Technological University*, 1-2, 177-186.

- Bielawski L., Metcalf D. (2002) Blended eLearning: Integrating Knowledge, Performance Support, and Online Learning, HRD Press, Inc.

- 'Best Practice Guide: Take your HRMS to the Cloud' [Online], [Retrieved October 8, 2019], http://www.oracle.com/us/products/applications/hcm-taking-hrms-to-the-cloud-2549998.pdf

• 'IFR International Federation of robotics' (2019) [Online], [Retrieved October 4, 2019], http://robotrends.ru.

• Khalin V.G. and Chernova, G.V. (2018). 'Digitalization and its impact on the Russian economy and society: advantages, challenges, threats and risks,' *Management Consulting* , (10 (118)), 46 – 63.

Information Systems and Technologies in the Insurance Protection of Agricultural Sector of Economy

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Abstract

The article assesses the development of information systems and technologies in the insurance industry in general and examines their impact on the organization of insurance protection in the agricultural sector, in particular. The expediency and necessity of a widespread use of modern information technologies in the organization of insurance protection of agricultural producers has been substantiated, which is not only a global trend, but also the realities of today. According to the results of generalization of a specific set of information systems and IT technologies in the insurance protection of the agricultural sector of economy, the most common of its forms are characterized. As a consequence, the latter include: multispectral sensing using unmanned aerial vehicles; estimation of vegetation cover on the basis of satellite images; remote sensing with data display in the Geographic Information System (GIS); analysis of multispectral images of the Internet of Things; digital early warning networks; crowdsourcing; social media-based information interaction tool. The peculiarities of the use of UAV technologies and drones in the insurance protection of the agricultural sector of economy are revealed.

Keywords: Information Systems and Technologies, Unmanned Aerial Vehicles, Remote Sensing, Crowdsourcing, Social Networks, Digitization, Insurance Protection, Agricultural Sector Of Economy.

Introduction

In terems of the number of IT employees, Ukraine holds a leading position in Eastern Europe. At present, the development of this sector is surprisingly dynamic, which, to some extent, is commensurate with the development of the agricultural sector of the economy. After all, in recent years, the domestic agricultural sector creates about 9-13% of the gross value added of the country and is one of the main budget-forming sectors of the national economy. In addition, it can be viewed from the perspective of the most promising direction of structural transformation of the domestic economy. That is why, in the context of modern integration processes, the agricultural sector of economy is becoming increasingly important.

As a result, there is a reasonable combination of these two upcoming sectors: agriculture and information technologies (IT).

Modern technologies, in particular in the context of social, mobile, analytical and cloud types, based on the capture, transmission and storage of information, influence the development of the agricultural sector of economy more significantly than ever before. This information, or the use of information advantage as a strategy, will completely refocus the competitive environment in the insurance industry in general, and one of its segments - agri-insurance, in particular.

Analysis of the latest studies and publications

Various aspects of the functioning of such an important financial instrument, as agricultural insurance market, were investigated by a number of scholars and practitioners, among which Herasymenko & Zhemoida, 2009; Martsenyuk-Rozaronova, 2010; Navrotskyi, 2012; Nesterchuk et al., 2018; Pikus et al., 2018; Polchanov, 2013; Potiko, 2017; Sholoiko, 2014; Vilenchuk, 2014 and others should be pointed out.

In their works, the researchers studied the main tendencies of the Ukrainian agricultural insurance market in general and certain aspects of its development, generalized the historical aspects of its formation and start-up, studied the peculiarities of insurance legislation, as well as the specifics of the investigated market structure.

At the same time, at present the problem of implementation of information technologies and systems in the insurance industry have not been properly researched in the publications of Ukrainian scientists. Only a small number of scholars are engaged in research on this subject, including Hudz, 2016; Erastov, 2015, 2017.

The considerable attention to the use of information systems and technologies in the insurance protection of agricultural entrepreneurship was paid by foreign researchers: Byerlee, de Janvry & Sadoulet (2009), as well as international companies related and specialized in IT technologies, insurance activities and consulting services in the agricultural sphere: Allianz Re Suisse, BoughtByMany, Accenture Digital, Cognizant Insurance Business Unit, InsureMyFriend, Gartner Inc., Swiss Re.

Research Methods

For the scientific solution of the goal, the general scientific methods of scientific cognition and study of economic phenomena were used, the dialectical method of cognition, in particular - for the analysis of scientific practices of domestic and foreign scientists on the influence of modern information technologies and systems on the system of insurance protection in the agricultural sector of economy; the method of empirical research - as part of the assessment of the current state and development of the study object; analytical - to outline a combination of factors for the development of modern IT technologies and determine their impact on the development of insurance services in the agricultural enterprise; comparative analysis - to compare and study the current development state of information technologies and systems in the insurance protection of the agricultural sector of economy, as well as to study the trends and patterns of other indicators and criteria development, which was carried out in the article; graphic method – to integrate and visually display the processed material; abstract-logical approach - to summarize the study results and draw the conclusions on this basis.

Aims

The article is to evaluate the development of information systems and technologies in the insurance industry in general and to investigate the peculiarites of their impact on the organization of insurance protection in the agricultural sector, in particular.

Results

The increase in the intensity of crops cultivation causes the need to obtain information on the state of environment.

Remote methods, including in the context of satellite imagery, onboard photos, unmanned aerial vehicles (UAVs)/drones and ground spectral measurements can significantly simplify the monitoring of crops and decision-making to optimize the payment of claims under the loss of agricultural producers (Fig. 1).

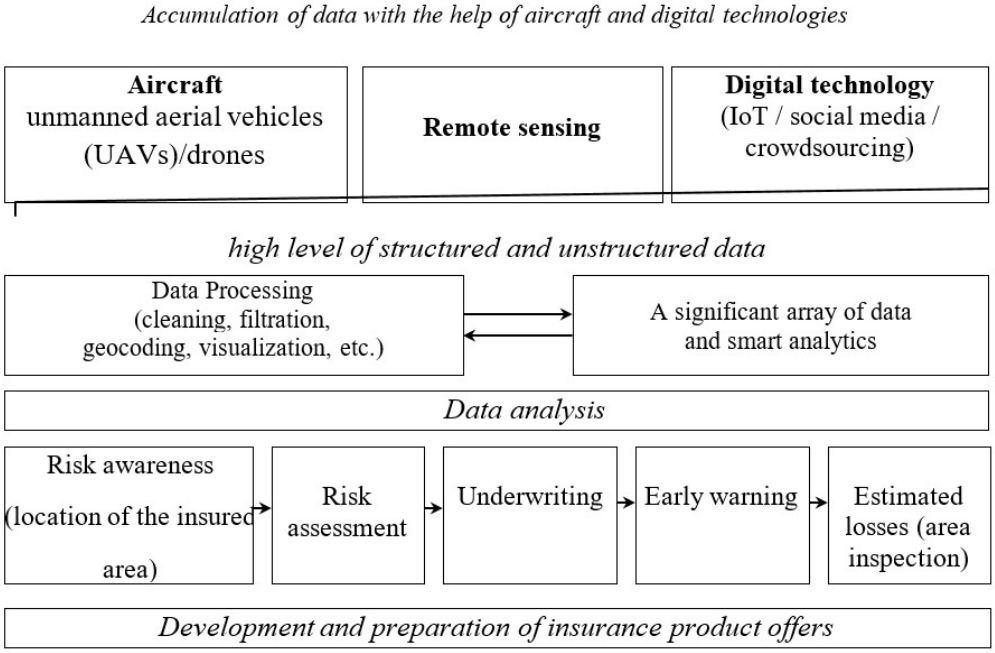

Fig. 1: Modern information technologies and systems in insurance protection of the agricultural sector of economy

UAVs are characterized by the advantages of being small in size, relatively inexpensive, and allow accurately and effectively survey and video significant areas. These technologies simplify and update the process of performing the loss assessment.

The use of drones can be considered in the agricultural insurance as an auxiliary tool for crop monitoring and risk management in agriculture (Fig. 2). Solutions for both insurance companies and agricultural producers include a number of measures, grouped in fig. 2.

Multispectral sensing, performed on a mounted drone camera, is capable to provide new data for the crop monitoring. As a result, these technologies will allow farmers to identify stressed areas and potential threats and, therefore, respond immediately to challenges. Combining such data into a common database (in the agricultural insurance market) will allow to monitor in detail agricultural land at the state level, which will ensure the development of agri-industry. In particular, insurers should consider using drones to improve efficiency, reduce operating costs, and improve service quality.

There are two key benefits to drones for agricultural producers. First, aerial images of the crop make it possible to cover everything from irrigation problems to soil change, and even detect the presence of pests that are not obvious at a ground level due to the scale of the area. Secondly, sensors mounted onboard cameras are capable of taking multispectral images to identify differences between healthy and problematic plants and, thus, improve management.

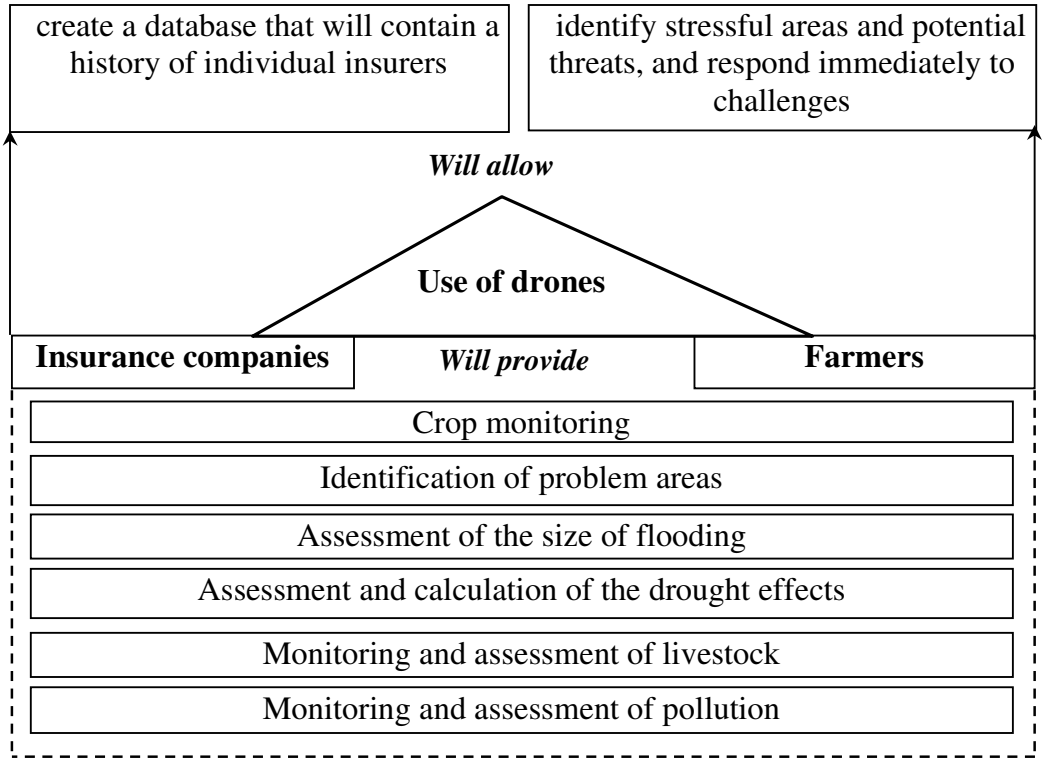

Fig. 2:Patterns of the use of drones in the insurance protection of the agricultural sector of economy

Considering current trends and forecasts for the perspectives of different technologies in agriculture in the short term, based on the statistics of Canada, it should be noted that the country is actively using information systems and technologies in the agricultural sector of economy.

UAV technology (UAV is an unmanned aerial vehicle) and drones are currently used by about 39% of Canadian farmers, while projecting that their number will increase by 35% in the next few years (by 2025), that is, it will nearly double. Satellite monitoring data is used by 65% of farmers in Canada, and in the next few years their number will increase by 15%. Soil sampling from GPS is already carried out by 81% of farmers. This technology has already reached its peak, so the trend of its development in the near future is not high (5%). Mapping of soil properties in Canada is carried out by 79% of producers, but in the short term their number will increase to 90%.

Also interesting is the fact, that in Canada 62% of farmers used the no-till soil cultivation system in 2018. Agricultural producers of the country are actively involved in modern technologies and their direct use in their practice: 70% of them used the technology of automatic switch-off of sections on sprayers, 36% - on fertilizer spreaders, 26% - on seeders. And only 27% of surveyed Canadian farmers have no section control technology on any of the equipment.

The IT trend is gradually coming to the Ukrainian agricultural sector. However, its development is constrained by a number of factors (Fig. 3).

Fig. 3: Obstacles to the digitization of the agricultural sector of the Ukrainian economy

It is advisable to mark five key trends to attract modern IT technologies in the agricultural sector of Ukraine (Fig. 4).

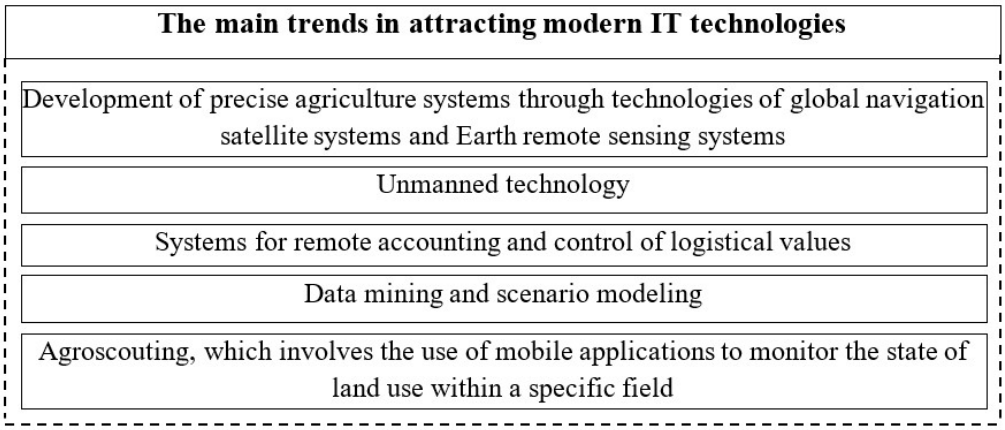

Fig. 4: Key trends in the atraction of modern IT technologies into the agricultural sector of the Ukrainian economy

At the level of agricultural enterprise and insurance company the use of IT technologies allows to carry out: monitoring of production processes; monitoring of plant development processes; crop yield forecast; assessment of the crops state; determining the dynamics of changes in the crops state; identification of areas requiring fertilizers and toxic chemicals; control of crop rotations and quality of agricultural measures; determination of crops freezing areas; assessment of snow cover, humidity.

Nowadays intensive development of the agricultural sector is possible only under condition of maximum use of modern science and technology. Telecommunications and information technology are of great importance. Their development is so intense that they undego changes within a relatively short period of time. Therefore, it is necessarily to develop IT technologies in the agricultural sector of economy as a whole, and in its insurance protection, because it is not only a global trend, but the facts of today.

The practice of using information systems and technologies is now being acquired in the active development of the insurance industry. In the current context, where IT technologies are at the forefront of various sectors of the global economy, there is a significant need for research into the effectiveness of their use. The insurance industry at this stage, requires a significant improvement in the methodology of business operations, the efficiency of providing insurance services, the modernization of existing insurance schemes and their product offerings within their limits, according to innovative technologies. Agricultural producers are constantly confronted with the consequences of risks affecting production efficiency and, consequently, the profitability of business operations. The development of information technologies and the growing role of the Internet as a platform for doing business, make it possible to constantly monitor agricultural enterprises in real time at all stages of production.

The challenge that we believe are key in achieving maximum efficiency of information systems and technologies in insurance protection of agricultural sector are grouped and displayed in Fig. 5.

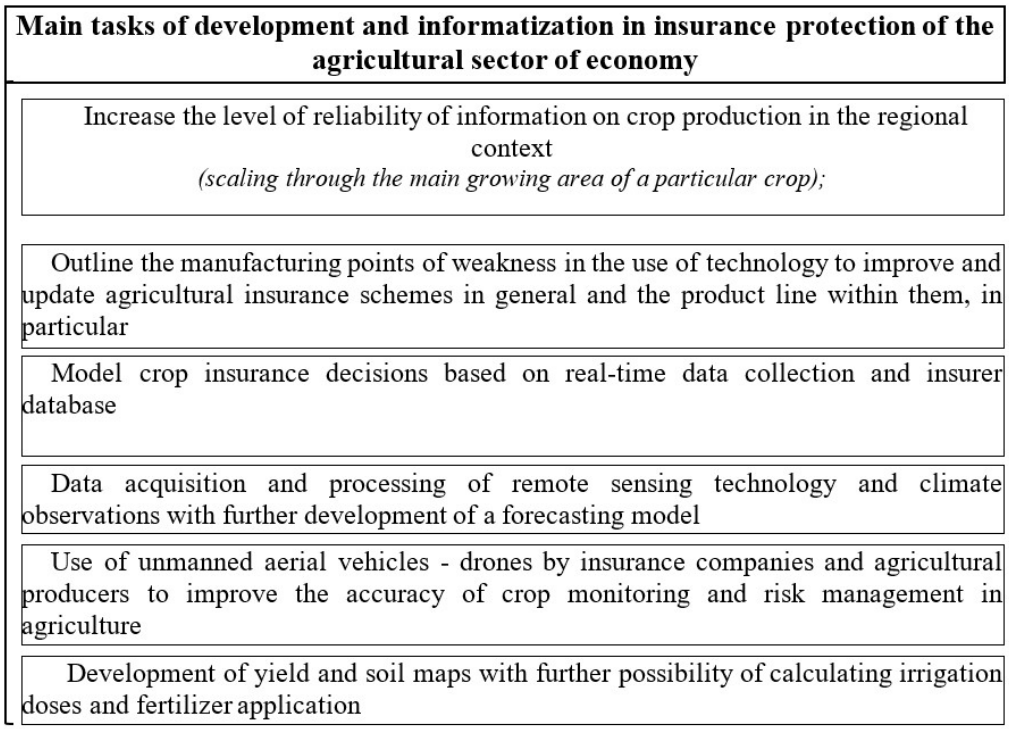

Fig. 5: Tasks to achieve maximum efficiency of information systems and technologies in insurance protection of the agricultural sector of economy

Thus, the results of generalization of a specific set of information systems and IT technologies in the insurance protection of the agraricultural sector economy characterize its most common forms, which include: multispectral sensing by the use of unmanned aerial vehicles; estimation of vegetation on the basis of satellite images; remote sensing with data display in the Geographic Information System (GIS); analysis of multispectral images of the Internet of Things; digital early warning networks; crowdsourcing; social media-based information interaction tool.

Conclusions

The conducted research shows that the practice of using information systems and technologies is quite in active use in the insurance industry. In today's context, there is an essential need for research

into the effectiveness of these technologies, as they have a prominent place in various areas of the global economy.

At this stage, the insurance industry requires a significant improvement in the methodology of conducting business, the efficiency of providing insurance services, the modernization of existing insurance schemes and product offers within their limits, according to innovative technologies.

The agricultural industry stands out from all other industries by a number of specific features, one of which is the direct dependence on natural disasters and climate conditions, which causes the industry to be in constant high-risk mode with a significant impact on production indicators.

With the development of information technology and the increasing role of the Internet as a platform for conducting business, agricultural producers can provide continuous monitoring in real time at all stages of production.

As a consequence, there is a need for further research into the effectiveness of information systems and technologies in the insurance protection of the agricultural sector of economy. The range of tasks that need to be solved in the short term is as follows:

- to increase the level of reliability of informatization regarding crop production in the district context (scaling according to the main area of cultivation of a certain crop);
- to formulate manufacturing points of weakness in the use of technology to improve and update agricultural insurance schemes;
- to model crop insurance decisions based on real-time data collection and insurance companies database;
- to summarize the data of remote sensing technology and climate observations with the possibility of further development of the forecasting model;
- to improve the accuracy of monitoring of the use of drones by insurance companies and agricultural producers;
- to develop yield and soil maps to determine irrigation dosage and fertilizer application.

References

- Allianz Re Suisse [online], available at: http://www.allianzre.com/ [Accessed 30 May 2016].
- Byerlee D., de Janvry A., Sadoulet E. (2009), 'Agriculture for Development: Toward a New Paradigm'. *Annual Review of Resource Economics*. 1 (1). 15-20.
- BoughtByMany [online], available at: http://boughtbymany.com/ [Accessed 30 May 2016].
- Digital Agriculture: Improving Profitability / Accenture digital, available at: https://www.accenture.com/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Digital_3/Accenture-Digital-Agriculture-Point-of-iew.pdf
- Drones: The Insurance Industry's Next Game-Changer? Cognizant's Insurance Business Unit, available at: http://www.cognizantasia.com/blog/drones-the-insuranceindustrys-next-game-changer.
- Erastov, V.I. (2015). 'Current Trends in the Development of Internet Insurance in Ukraine'. Scientific Bulletin of Bukovyna State Financial and Economic University. 28. 141-146.
- Erastov, V.I. (2017). 'Valuation problems of investment results in information systems and technologies by insurance companies.' Scientific Bulletin of Uzhgorod National University. Series: International Economic Relations. 12 (1). 98-102.
- Herasymenko, N.A., Zhemoida, O.V. (2009). Risks in agriculture with consideration to a regional aspect. Economy of agro-industrial complex., 9, 62-65.
- Hudz He.O. (2016), 'Information systems and technologies in insurance protection of agricultural enterprise'. Research and production journal 'Accounting and Finance'. Kyiv, 2 (72), 95-104.
- InsureMyFriend [online], available at: http://www.insuremyfriend.com/ [Accessed 30 May 2016].
- Martseniuk-Rozaronova, O.V. (2010), 'State support in the insurance of agrarian producers.

Economy of Agro-industrial Complex*, 10*, 91-95.

- Malyovanyi, M., Prokopchuk, O., Lysa, N., Chernega, I. & Malyovana, M. 'Evaluation of Financing the Health Care System in Ukraine'. Proceedings of the 33rd International Business Information Management Association Conference (IBIMA). Vision 2020: Sustainable Economic Development and Application of Innovation Management. 10-11 April 2019, Granada, Spain, 957-968.
- Navrotskyi, S. A. (2012). 'State and development trends of the agrarian insurance'. *Science and economy, 1 (25)*, 61-68.
- Nesterchuk, Y., Prokopchuk, O., Tsymbalyuk, Y., Rolinskyi, O. & Bilan, Y. (2018), 'Current status and prospects of development of the system of agrarian insurance in Ukraine'. *Investment Management and Financial Innovations*, *15 (3),* 56-70. http://dx.doi.org/10.21511/imfi.15(3).2018.05.
- Pikus R., Prykaziuk, N. & Balytska, M. (2018). 'Financial sustainability management of the insurance company: case of Ukraine'. *Investment Management and Financial Innovations, 15(4),* 219-228. doi:10.21511/imfi.15(4).2018.18
- Polchanov, A.Iu. (2013). 'Agrarian insurance as a part of food security of a state'. *Bulletin of Kyiv National University of Trade and Economics, 4,* 48-57.
- Potiiko, S.V. (2017). 'Development of the agrarian insurance in the context of the European integration'. *Accounting and finance, 77,* 107-111.
- Prokopchuk, O.,Tulush, L., Guzar, B., Korotieiev, M. & Melnyk, K. (2018), 'Functioning of Insurance Protection System in the Agrarian Sector of Economy in Ukraine'. Proceedings of the 32nd International Business Information Management Association Conference (IBIMA). Vision 2020: Sustainable Economic Development and Application of Innovation Management from Regional expansion to Global Growth. Seville Spain, 1614-1624.
- Prokopchuk O., Nesterchuk Y., Tsymbalyuk Y., Rolinskyi O. (2019). 'Current trends in agricultural insurance market operation in Ukraine'. *Problems and Perspectives in Management*, 17(3), 57-75. doi:10.21511/ppm.17(3).2019.05.
- Sholoiko, A. S. (2014). 'Insurance market of Ukraine: approaches to its classification ans periodization'. *Bulletin of the National University of Life and environmental sciences if Ukraine*, *200 (3),* 94-102.
- Vilenchuk, O.M. (2014). 'State and development prospects of the agrarian insurance in Ukraine'. *Accounting and Finance 2.* 91-96.
- 22 Research Products & Services / Gartner, Inc. [online], available at: http://www.gartner.com/technology/research/products.jsp [Accessed 30 May 2016].
- Swiss Re Natural catastrophes and man-made disasters in 2015: Asia suffers substantial losses / report sigma №1/2016, available at: http://www.swissre.com/sigma.

Structural Features of the Agricultural Insurance Market of Ukraine

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Abstract

The article investigates structural features of the agricultural insurance market, which results in the definition that the latter has a complex three-sector internal structure and is surrounded by the external environment. It is determined that its internal structure, in turn, consists of a set of components that are combined into three sectors: sector I - an authorized body for insurance activity supervision; II - structural elements; III - infrastructure elements. External environment is a system of interdependent factors that surround and affect the internal system. Such grouping more fully and orderly reflects the structural composition of the agricultural insurance market from the point of both internal and external components. The interpretation of 'agricultural insurance' concept has been improved. As a result, the four key definitions of this category as well as its key advantages have been identified and outlined. The essence of the concept of 'insurance protection in the agricultural sector of economy' is investigated.

Keywords: Agricultural Insurance, Agricultural Insurance Market, Structure, Insurance Protection, Insurance Protection System, Agricultural Sector of Economy

Introduction

One of the key features of agriculture is its dependence on natural conditions. Along with price volatility, the presence of commercial risk and raiding, Ukrainian farmers are also suffering from weather freaks and features of used production assets - biological assets.

Insurance is called to minimize losses from the latter. That is a system of economic relations to guarantee insurance protection in order to ensure the income stability and the available property conservation.

At the same time, the agricultural insurance market in Ukraine is still undeveloped, and insurance products are not well-received among farmers. As a result, a certain imbalance arose - a powerful development of the agri-industrial complex in Ukraine in recent years has not been accompanied by the proper development of the insurance market, which goes against the generally established international practice. After all, the majority of countries in the world where agriculture are successful (the USA, Canada, Spain, China, etc.), are characterized by a high level of agricultural insurance development. Instead, Ukraine is an exception from the general rule that determines the need to strengthen scientific research in order to deepen theoretical and methodological principles

and methodological and organizational aspects of agricultural insurance development in Ukraine in order to ensure the level of its distribution at least comparable to that of developed agrarian countries.

Analysis of the latest studies and publications

Different aspects of the functioning of such an important tool as agrarian insurance were studied by the number of national scientists and practitioners, among them are Martseniuk-Rozaronova, (2010); Navrotskyi, (2012); Nesterchuk. (2018); Polchanov, (2013) et al. In their research the scientists studied the main development trends of the Ukrainian agricultural insurance market in general and some problematic aspects of its development, generalized historical aspects of its formation and establishing, studied the specific features of insurance legislation, and found out the specific character of the insurance market. Ukrainian scientists researched insurance products and insurance schemes that provide insurance protection of agricultural producers: Nesterchuk, Tsymbalyuk & Rolinskyi (2018); Sinitsina (2011).

Some theoretical and practical aspects of agricultural insurance were profoundly investigated by foreign scientists, among them the following should be mentioned: Adhikari, Belasco & Knight (2010); Assa (2015); Komadel, Pinda & Sakalova (2018); Nunoo & Acheampong (2014); Rejesus, Goodwin, Coble & Knight (2010).

It is necessary to mention that foreign scientists provide a profound and elaborate analysis of insurance programs, used in the agrarian insurance. This aspect was covered by foreign researchers in the context of classical, parametric and specific insurance schemes.

A great body of scientific literature deals with parametric schemes in the agricultural insurance, that is the index insurance products for agriculture. This aspect is sufficiently and elaborately researched by the following foreign scientists Mußhoff, Hirschauer, Grüner & Pielsticker (2018); Xiao & Yao (2018).

At the same time, the realities of today are such that the structure of the agricultural insurance market is disparate in nature, as it is limited by the classification of structural and partly infrastructural elements, as well as by the supervisory and control bodies and lacks a holistic perception.

In view of this, at this stage, the question of the structure peculiarities of the agricultural insurance market requires more and more attention.

Research Methods

For the scientific solution of the goal set out in the article, general scientific methods of scientific cognition and study of economic phenomena were used, in particular the dialectical method of cognition - for the analysis of scientific works of scientists on the domestic and foreign functioning problems of the agricultural insurance market in general, and the study of its structure peculiarities, in particular; the method of empirical research - as part of the assessment of the current state and development of the study object; graphical method - for systematization and visual representation of research results; abstract-logical approach - to summarize the study results and formulate conclusions on this basis.

Aims. The aim of the article is to study the features of Ukrainian agricultural insurance market structure.
Results. The presence of risk elements that accompany social production, entrepreneurial activity in the conditions of market economy development and life of individual citizens, creates the need for prevention of possible risks, compensation and reduction of possible negative consequences. This need can be met by providing insurance protection. The economic content of the category ‘insurance protection’ is shaped by relationships between people about providing stable guarantees for the protection of their property interests.

The need for insurance protection is determined by the following aspects:

- the economic aspect of insurance protection is explained by the need to organize public relations based on the mobilization and use of financial resources to compensate for losses in order to ensure a continuous process of social reproduction;
- from the standpoint of the natural interests of mankind, insurance protection has emerged as means of preserving material well-being in the event of unforeseen situations or incidents, with the aim of distributing losses caused to individual citizens, among many members of society, in order to reduce casualties;
- the social need for insurance protection is caused by the need to address social issues in society to protect the personal interests of citizens;
- in the legal aspect, the organization of insurance protection as civil legal relations is carried out in accordance with the current insurance legislation and the insurance contract;
- the international aspect of insurance protection is to eliminate national differences in the laws of different countries in order to provide sufficient financial guarantees for insurers and underwriters.

Thus, insurance protection is a set of economic relations related to the prevention, overcoming or reduction of the negative impact of perils (risks) and compensation of their consequences in order to ensure continuous and uninterrupted social manufacture, financial stability of the state, its sustainable economic development and general well-being.

As an economic category, insurance protection has the following characteristics:
- accidental nature of adverse events;
- uneven damage;
- the expression of loss in real and in monetary forms;
- the objective necessity of indemnity of losses;
- taking measures to prevent and mitigate the effects of adverse events.

Insurance protection can be provided only if there are resources that are concentrated for these purposes in the social insurance fund. As an aggregate of natural and monetary reserves, the insurance fund is formed at the expense of gross domestic product (GDP), which as a result of distribution is transformed into consumption and accumulation funds. Insurance funds are created to indemnify for losses and belong to accumulation funds.

In terms of building market relations, insurance protection of agricultural producers in the economic stabilization of their development plays a significant role. Insurance may be one of the most effective tools for managing industrial, market and legal risks, but agricultural insurance is undeveloped in the country.

Features of the agricultural insurance market structure are shown in Fig. 1.

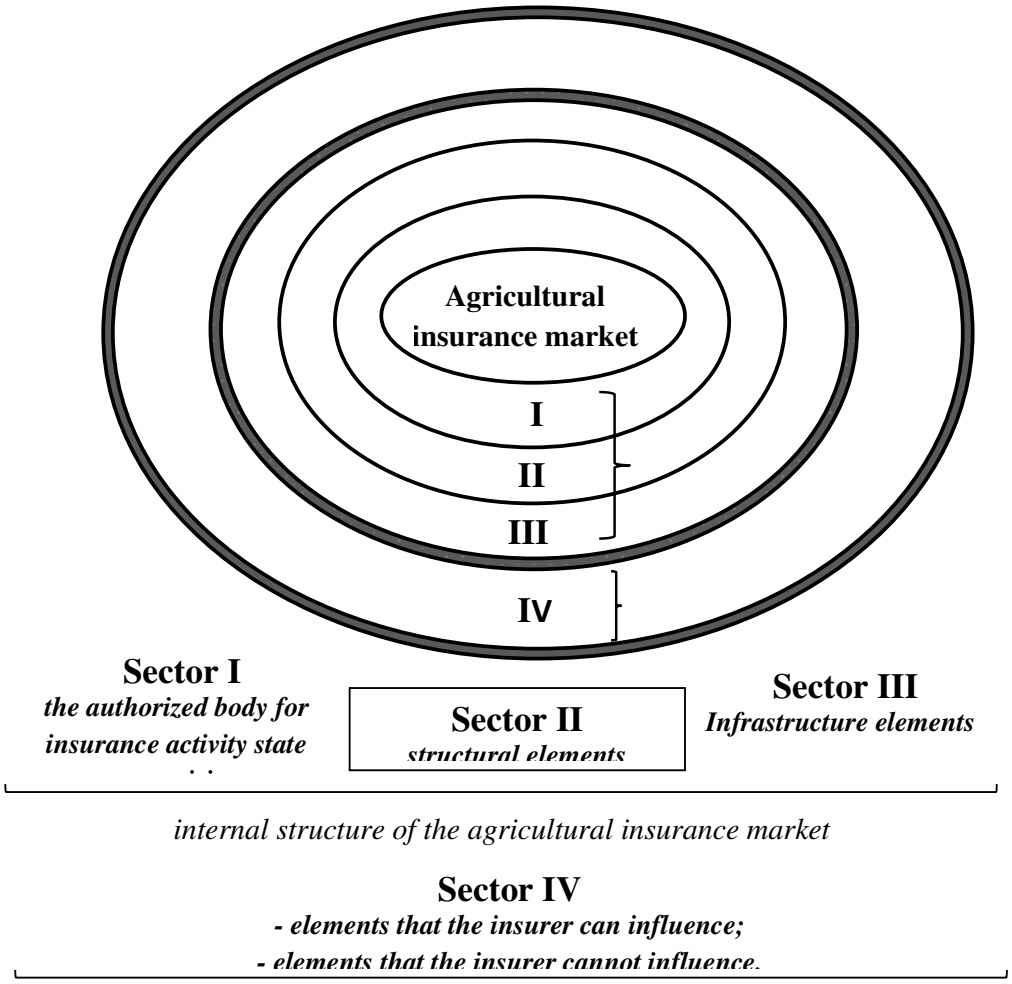

Fig. 1: Features of the agricultural insurance market structure of Ukraine

Thus, it should be noted that the Ukrainian agricultural insurance market has a complex three-sector internal structure and is surrounded by the external environment. The key sectors that shape its internal structure include: I sector - the authorized body for insurance activity supervision; II - structural elements; III - infrastructure elements. The external environment of the insurance market is a system of interaction between the factors that surround and influence the internal system. It is represented by elements that the insurer can manage (market demand, competition, insurance know-how, insurance market infrastructure) and those that it cannot influence (population, age and sex, seasonal migration, consuming purchasing power), but should take into account in the activity. In more detail, the features of the internal structure of the agricultural insurance market are shown in Fig. 2.

Internal structure of the Agricultural Insurance Market

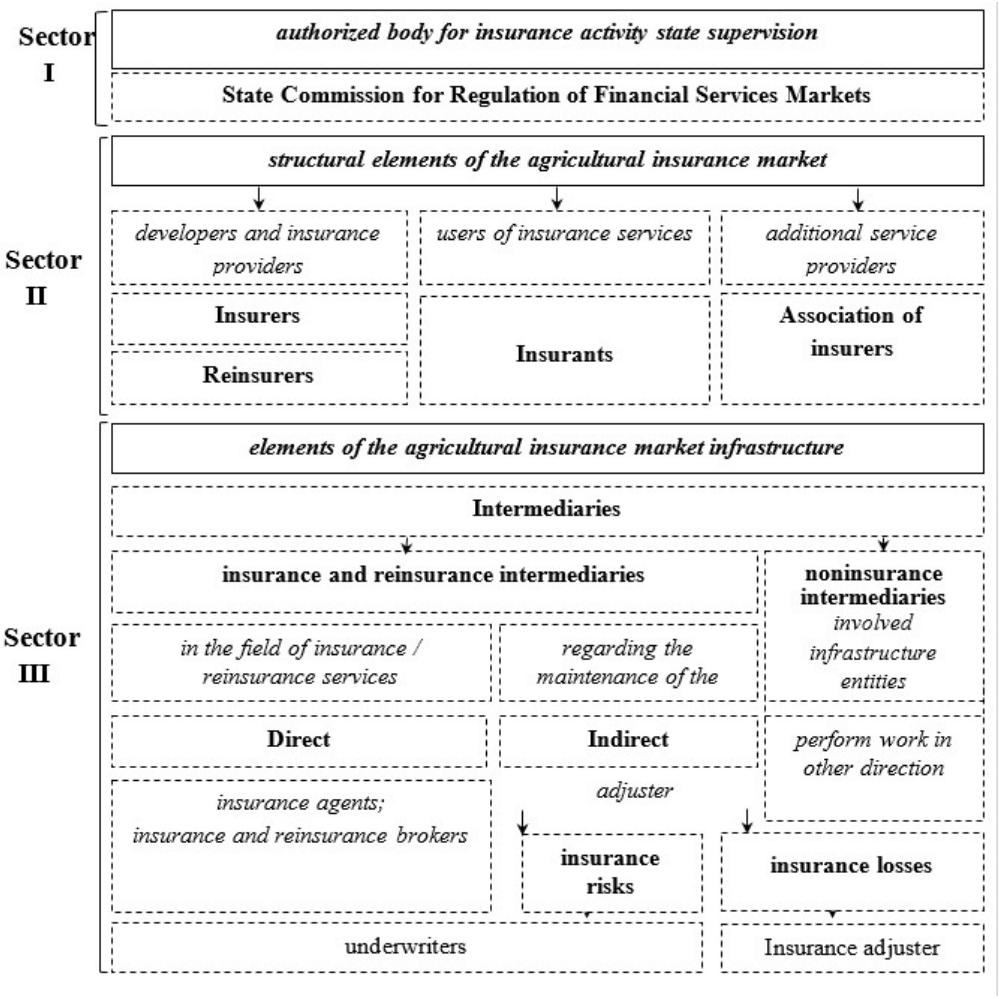

Fig. 2: Features of the internal structure of the agricultural insurance market

Insurance protection in the agricultural sector of the economy - economic, redistributive relationships that are formed in the process of preventing, overcoming and compensating losses caused by agricultural production.

According to the modern characteristics, insurance protection of the agricultural sector of economy acts as a set of redistributive relations in connection with overcoming and loss compensation caused to agricultural production.

When buying insurance protection, agricultural producers, as a rule, pursue several aims, one of which is dominant and the others are secondary (Fig. 3).

Risk financing **Risk management** **Risk minimization**		This goal was the cause of insurance relations. In these circumstances, insurance protection acts as a risk management tool.
Compliance with current legislation		In some cases, farmers has no other motive for purchasing insurance protection than his legal obligation. *Thus, for four years (2005-2008) Ukraine's agricultural insurance market operated within the framework of the state support program, subject to compulsory insurance.*
The tool to achieve other objectives (possibility of internal company financing)		The practice of using insurance protection as a tool to achieve other objectives by agricultural producers is common. *In such cases, the insurance is purely formal and only accompanies the process of taking out a loan or in other situations where the conclusion of an insurance contract is a condition for carrying out other operations.*

Fig. 3: Key motives for purchasing insurance protection by agricultural producers

Agricultural production has a high degree of risk. This is due to the fact that it is an area of activity, the success of which is heavily influenced by a variety of weather and climate factors that cannot be controlled.

There are several approaches by which farmers can regulate the risks to which their economy is exposed (Fig. 4).

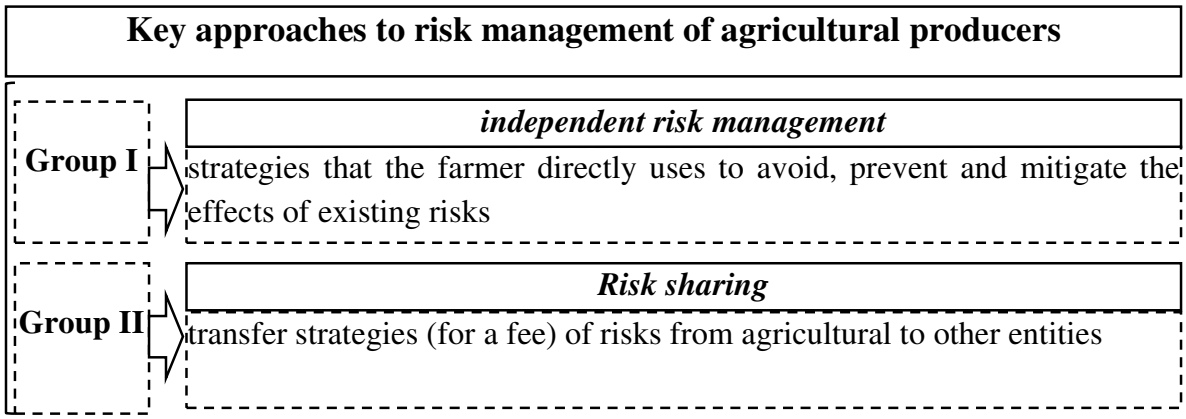

Fig. 4: Approaches to regulate the risk effects the farmers run

The most common tool for risk transferring (full or partial) of agricultural production is insurance. The key benefits of agricultural insurance are grouped in fig. 5.

AGRICULTURAL INSURANCE ADVANTAGES	
I	It is a relatively inexpensive way of risk managing compared to others
II	In the event of total or partial crop loss, there is a possibility to cover the losses due to insurance payments, which allows to stabilize the agricultural producer income and continue to work without long interruptions in work or problems with financial stability.
III	Loss copmpensation allow farmers to pay on time to processors, material and technical providers and other partners
IV	Encourages the use of modern technical and technological achievements, including the use of reliable crop protection, which helps to promote increase production efficiency
V	Allows to repay the borrowed funds by insurance indemnity in case of an adverse event and facilitates access of agricultural producers to credit resources, which is very important in Ukraine today

Fig. 5: The key benefits of agricultural insurance

The positive dynamics of agricultural production development in Ukraine in recent years is mainly due to the tandem of two key factors: the implementation of effective innovative technologies and the presence of relatively favorable weather conditions in recent years.

At the same time, all this requires a stable financial support. World practice shows that recources directed at the development of agricultural production must be supported by agricultural insurance (Fig. 6), which guarantees the possibility of their return to creditors in case of occurrence of insured events.

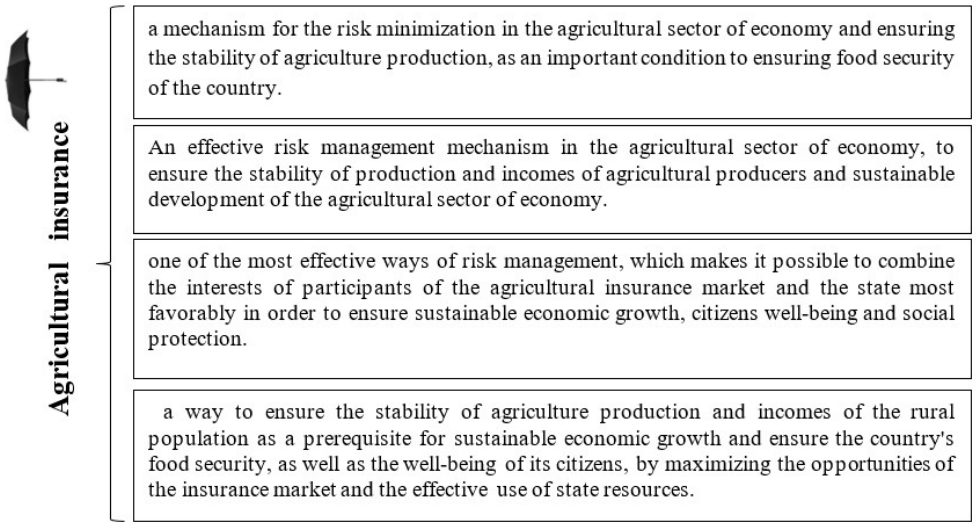

Fig. 6: Agricultural insurance definitions

In Ukraine, this instrument for minimizing production risk is still not too demanded by agricultural producers. And this greatly enhances their lack of money and limits the ability of the banking sector and investors to properly finance the agricultural sector. Against the background of its dynamic development, this problem has become much more widespread in recent times, and therefore needs to be solved.

Conclusions

At present, the structure of the agricultural insurance market is fragmented since it is limited by the classification of structural and partly infrastructural elements, as well as by the supervisory and control bodies and lacks a holistic perception.

Considering the broader sense of the agricultural insurance market structure, its classification has been improved by structuring the latter into three sectors: sector I - an authorized body for insurance activity supervision (State Commission for Regulation of Financial Services Markets); II - structural elements (developers and providers of insurance services - insurance/reinsurance companies providing services in the agricultural sector; users of insurance services - agricultural producers; providers of additional services - association of insurers); III - infrastructure elements (intermediaries - insurance/reinsurance (in the sale field of insurance/reinsurance services and concerning support of insurance services), which are direct (insurance agents, insurance/reinsurance brokers) and indirect (insurance risk assessors - underwriters and insurance losses – insurance adjusters) and involved infrastructure entities (noninsurance intermediaries) performing other business - auditors, rating agencies etc.). The external environment of the agricultural insurance market is a system of interrelated factors that surround and affect its internal system.

This classification makes it possible to describe the structure of the agricultural insurance market as a complex polystructural system having a three-sector internal structure and surrounded by the external environment and to substantiate the feasibility of complex supervision, regulation and development of all its constituents.

References

1. Adhikari, S., Belasco, E., Knight, T. (2010), 'Spatial producer heterogeneity in crop insurance product decisions within major corn producing states', *Agricultural Finance Review*, 70 (1), 66-78, https://doi.org/10.1108/00021461011042648.

2. Assa, H., (2015), 'A financial engineering approach to pricing agricultural insurances', *Agricultural Finance Review*, 75 (1), 63-76. https://doi.org/10.1108/AFR-12-2014-0041.

3. Komadel, D., Pinda, L., Sakalova, K. (2018), Securitization in crop insurance with soil classification, *Agricultural Economics*, Czech, 64, 131-140.

4. Martseniuk-Rozaronova, O.V. (2010), 'State support under insurance of agricultural producers', *Economy of agroindustrial complex,* 10, 91-95.

5. Malyovanyi, M., Prokopchuk, O., Lysa, N., Chernega, I. & Malyovana, M. 'Evaluation of Financing the Health Care System in Ukraine'. Proceedings of the 33rd International Business Information Management Association Conference (IBIMA). Vision 2020: Sustainable Economic Development and Application of Innovation Management. 10-11 April 2019, Granada, Spain, 957-968.

6. Mußhoff, O., Hirschauer, N., Grüner, S. & Pielsticker, S. (2018) 'Bounded rationality and the adoption of weather index insurance: Evidence from an extra-laboratory experiment with farmers in Germany', *Agricultural Finance Review*, 78 (1), 116-134. https://doi.org/10.1108/AFR-02-2017-0008.

7. Navrotskyi, S. A. (2012), 'State and development trends of agricultural insurance', *Science and Economics,* 1 (25), 61-68.

8. Nesterchuk, Y., Prokopchuk, O., Tsymbalyuk, Y., Rolinskyi, O. & Bilan, Y. (2018), 'Current status and prospects of development of the system of agrarian insurance in Ukraine', *Investment Management and Financial Innovations*, 15 (3), 56-70. http://dx.doi.org/10.21511/imfi.15(3).2018.05.

9. Nunoo, J., Acheampong, B. (2014), 'Protecting financial investment: agriculture insurance in Ghana', *Agricultural Finance Review*, 74 (2), 236-247. https://doi.org/10.1108/AFR-10-2013-0037.

10. Polchanov, A.Yu. (2013), 'Agrarian insurance as a component of state food security'. *Bulletin of the Khmelnytsky National University of Trade and Economics,* 4, 48-57.

11. Prokopchuk O., Nesterchuk Y., Tsymbalyuk Y., Rolinskyi O. (2019). 'Current trends in agricultural insurance market operation in Ukraine'. *Problems and Perspectives in Management*, 17(3), 57-75. doi:10.21511/ppm.17(3).2019.05.

12. Prokopchuk, O., Tulush, L., Guzar, B., Korotieiev, M. & Melnyk, K. (2018), Functioning of Insurance Protection System in the Agrarian Sector of Economy in Ukraine. *Proceedings of the 32nd International Business Information Management Association Conference* (IBIMA). Vision 2020: Sustainable Economic Development and Application of Innovation Management from Regional expansion to Global Growth. Seville Spain, 1614-1624.

13. Rejesus, R., Goodwin, B., Coble, K. & Knight, T. (2010), 'Evaluation of the reference yield calculation method in crop insurance', *Agricultural Finance Review*, 70 (3), 427-445. https://doi.org/10.1108/00021461011088530.

14. Sinitsina, T. (2011), Crop insurance products: a comparative characteristic. Agrosvit, 9, 48-52.

15. Sun B., Guo Ch., Kooten G., (2014) 'Hedging weather risk for corn production in Northeastern China: The efficiency of weather-indexed insurance', *Agricultural Finance Review*, 74 (4), 555-572. https://doi.org/10.1108/AFR-01-2014-0001.

16. Xiao, Yu., Yao, J., (2018), 'Double trigger agricultural insurance products with weather index and yield index', *China Agricultural Economic Review*. https://doi.org/10.1108/CAER-01-2018-0021.

Efficiency Study in Implementation of The State Financial Sustainable Development Policy of Ukraine

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Abstract

The paper suggests a scientific and methodological approach to assessing the efficiency level in implementation of the state financial sustainable development policy. The calculation procedure is substantiated for the composite index of benchmarks in terms of the individual task execution considering the priority of the sustainable development goals. The proposed scientific and methodological approach differs from the similar, previously considered, by the study of the significance level of sustainable development goals of Ukraine, which make up a single system of Ukraine's financial policy. Based on the assessment of integral level of the SFSDP course implementation efficiency, recommendations for each of these options for the indicator value are given.On the grounds of the significance (priority) level of the sustainable development goals forming the mainstay of financial policy guidelines of Ukraine until 2030, the priority level of the goals to be sought is established as building a partnership for sustainable development; responsible consumption and production. Composite indices are calculated for implementation of the sustainable development goals of Ukraine in 2015-2018 regarding target fulfilment of the state financial policy. The efficiency radar is offered for implementation of the SFSDP of Ukraine in 2015-2018. The integral level of implementation efficiency is evaluated for a direction of the state financial sustainable development policy. The study was carried out using general scientific and special research methods. In particular, the use of inductive and deductive scientific methods allowed the study of complex indicators for the implementation of sustainable development goals, graphic - for a visual display of the efficiency radar of the SFSDP course of Ukraine implementation in 2015-2018., settlement and constructive - for carrying out calculations of significance (priority) level of the sustainable development goals, which form the basis of Ukraine's financial policy goals up to 2030; abstract-logical - for theoretical generalizations and the formation of conclusions.

Keywords: State Financial Sustainable Development Policy, Sustainable Development Goals, Financial Mechanism.

Introduction

One of the steps to achieve the sustainable development goals is their integration into the state policy of sustainable development, which is impossible without financial support. Level determination of the SFSDP (state financial sustainable development policy) implementation efficiency is one crucial target of managing the financial support for the national economy development under the current economic environment. To increase the efficiency of the state financial sustainable development policy implementation, it is extremely important to harmonize the following main elements: economic growth and government regulation of bills. These elements are interconnected, and all of them are crucial for improving the country's financial growth. It defines both the need to adjust the individual parameters and goal priorities of the SFSDP within its application, and the necessity to move towards other principles of its implementation being, in general, a course change for such policies depending on a behavior and development trends of the factor system which forms and implements it.

The direction selection for the SFSDP implementation is subject to rational and optimizing financial policies aimed at harmonious development of all areas of society on the basis of the gross domestic product redistribution and ensuring the society development through the use of balanced economic, environmental and social orientation.

The conducted studies enable the state authorities to choose the right direction for the development of SFSDP, depending on the required level of efficiency. In particular, it was proposed to develop and implement financial mechanisms to stimulate sustainable development, aimed at improving the values of the established target indicators.

Literature Review

The efficiency research in implementation of the state financial sustainable development policy is revealed in the works of domestic and foreign scientists. The works of B. B. Bakker & L. E. Christiansen (2011) should be highlighted among foreign scholars who investigated fiscal challenges in European developing countries. In addition, issues related to the emergence of the financial crisis under a market environment are revealed in the works of R. Hemming, M. Kell & A. Schimmelpfennig (2003), as well as in the works of E. Ilzetzki & C. A. Vegh (2008).

Special attention should be given to the works (Dolls, Fuest, and Peichl, 2010; Zohlnhöfer, 2005) researchers focus their attention on comparing situations, measures taken, and outcomes over public financial policy. Recently, however, financial policy seeks to be responsible for the economy secured for its sustainable development. The study of the sustainable development concept and its relation to the economic growth issues are substantiated by S. Prykazka (2014). It should be pointed out that sustainable development is ensured by three main areas as environmental, social and economic one. It should be noted that the economic direction plays one leading role within the development of the state financial policy.

It should be pointed out that the relationship between state, finance and sustainable development was discovered in 1969 (R. W. Goldsmith (1969)) and proceeded with the works of R. I. McKinnon (1973). It could be also observed within the papers of famous contemporaries. M. V. Honcharenko particularly discloses the essence of the financial mechanism for the strategy implementation of the territory sustainable development (M. V. Honcharenko), O. S. Badrak proposed improvement of the financial mechanism for ensuring the sustainable development of Ukraine (O. S. Badrak, 2006), I. M. Vakhovych substantiated the implementation processes of the regional policy of financial support of sustainable development (I. M. Vakhovych). Despite the large arsenal of research in that direction, insufficient attention has been paid to the study of the efficiency level in implementation of the state financial sustainable development policy of Ukraine.

Having regard to the above the main objective of the paper is to investigate the efficiency level in implementation of the state financial sustainable development policy of Ukraine.

Methodology

As evidenced by the practice of applying economic and mathematical methods and techniques, it is advisable to use taxonomic analysis in order to assess the efficiency level in implementation of the SFSDP as a process of controlled change of benchmarks. This is because it allows comparison of multidimensional objects characterized by a large number of controlled parameters accumulating all the features that characterize the phenomenon or process under an integral indicator, a taxonomic indicator of the development level (S. A. Ashmanov, 2001, B. Pliuta, 1980).

While determining the taxonomic indicator of the efficiency level in implementation of the SFSDP, it is envisaged the formation of a data matrix including standardized indicators for each target competence of such a policy being the sustainable development goal identified through a set of benchmarks.

Considering the multidimensionality of the efficiency parameters for the implementation of the SFSDP (first of all, the goal differentiation for tasks, as well as the definition of specific target indicators for each of these tasks), we propose to use a comprehensive approach based on combining taxonomic analysis and a radar method to evaluate such efficiency.

The efficiency radar for implementation of the SFSDP will constitute a polygon built on axes meeting target competencies of the policy. That is, application of this method involves circular division into sectors, which number corresponds to the number of sustainable development goals determining the direction of the respective SFP.

Therefore, a height of the line segments forming the efficiency radar polygon for implementation of the SFSDP is suggested to determine through taxonomic analysis. The result of its application is a system development of composite indicators of task achievement under the context of sustainable development goals calculated by the method of determining the development level for the taxonomic indicator. A value increase of such indicators illustrates moving further away from the circle center and indicates the efficiency growth in implementation of the SFP under the terms of the achievement promotion of the relevant sustainable development goal.

We propose a scientific and methodological approach to assessing the efficiency level in implementation of the SFSDP consisting of sequential application of six stages aimed at calculating and qualitative evaluation of the integral indicator system, which allow both to determine and evaluate the implementation level of the of the selected SFP direction in general, and obtain a comprehensive assessment the achievement level of individual sustainable development goals and tasks, as well as the correspondence of the achieved indicators and established benchmarks taking into account their priorities (Figure 1).

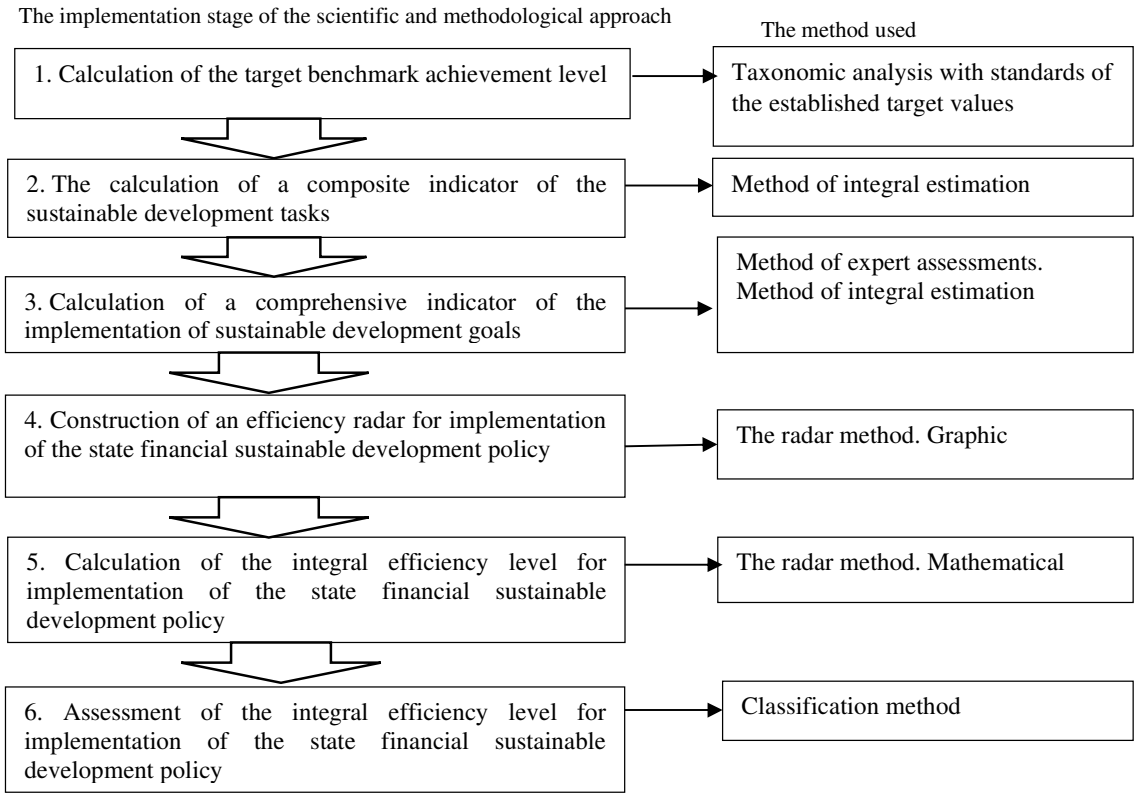

Fig. 1: Scientific and Methodological Approach to Assessing the Efficiency Level for Implementation of the SFSDP

Source: author's developments

The calculation of the composite indicator of the target indicators achievement in terms of the fulfillment of individual tasks is based on the taxonomic analysis with standardization of relatively established target values and taking into account the sustainable development goals priority and assumes:

1) forming a data matrix (X), which can be submitted as follows:

$$X = \begin{pmatrix} X_{11} & X_{12} & X_{13} \dots X_{1j} \dots & X_{1m} \\ X_{21} & X_{22} & X_{23} \dots X_{2j} \dots & X_{2m} \\ X_{i1} & X_{i2} & X_{i3} \dots X_{ij} \dots & X_{im} \\ X_{n1} & X_{n2} & X_{n3} \dots X_{nj} \dots & X_{nm} \end{pmatrix} \quad (1)$$

where i – the number of the observation period in order ($i = \overline{1,n}$);

n – the quantity of observation periods;

j – Target indicator of the Sustainable Development task ($j = \overline{1,m}$);

m – the quantity of Sustainable Development Goals;

X_{ij} – the actual value of target indicator j over time i.

2) the standardization procedure, which allows to obtain a matrix of standardized values of indicators and provides for their reduction to a comparable form. Considering that one of the main criteria for the effectiveness of the implementation of the SFP course, in our opinion, is to ensure that the targets for indicators are met, we propose to standardize against the target values set for a certain period of time:

$$\overline{X} = \begin{pmatrix} \overline{X}_{11}\ \overline{X}_{12}\ \overline{X}_{13} \ldots \overline{X}_{1j} \ldots \overline{X}_{1m} \\ \overline{X}_{21}\ \overline{X}_{22}\ \overline{X}_{23} \ldots \overline{X}_{2j} \ldots \overline{X}_{2m} \\ \overline{X}_{i1}\ \overline{X}_{i2}\ \overline{X}_{i3} \ldots \overline{X}_{ij}\ \ldots \overline{X}_{im} \\ \overline{X}_{n1} \overline{X}_{n2} \overline{X}_{n3} \ldots \overline{X}_{nj}\ \ldots \overline{X}_{nm} \end{pmatrix} \quad (2)$$

where $\overline{X}_{ij}$ – the target value of the target indicator *j* over time *i.*

It should be noted that, depending on the application of differentiation of target values by years of implementation of the SFSDP or the establishment of a single target for the period, either the matrix or the vector of target indicators ($\overline{X}$) can be used in standardization.

Formation of the standardized values matrix is carried out by the formula:

$$Z_{ij} = \frac{X_{ij}}{\overline{X}_{ij}} \quad (3)$$

where Z_{ij} – the standardized value of target indicator j over time *i.*

3) the calculation of the distance between the metrics and the targets:

$$C_j = \sqrt{\sum_{i=1}^{n} (Z_{ij} - 1)^2} \quad (4)$$

where C_j – the distance between the reached and the target values of the target indicator j*;*

1 – the standardized value of the target indicator *j.*

4) the calculation of the average distance between the achieved indicators and the target values for the period of the SFSDP course implementation:

$$\overline{C} = \frac{1}{m} \sum_{j=1}^{m} C_j \quad (5)$$

5) the calculation of the standard deviation (S), the maximum possible deviation from the composite target reference parameter for the implementation of the SFP course (C_e) and the definition of a composite dynamic indicator of the target indicators achievement of the implementation of the sustainable development task (d_j):

$$S = \sqrt{\frac{1}{m}\sum (C_j - \overline{C})^2} \quad (6)$$

$$C_e = \overline{C} + 2S \quad (7)$$

$$d_j = \frac{C_j}{C_e} \quad (8)$$

6) the calculation the level of the target achievement by indicator j:

$$K_j = 1 - d_j \quad (9)$$

The target benchmarks achievement level in the indicator may range from 0 to 1. The higher the indicator, the higher the level of achievement of the established target indicator during the study period of the SFSDP course implementation;

7) the calculation of the composite indicator of the performance of individual tasks of sustainable development (K_I) is proposed to be carried out using the arithmetic average of the target indicators achievement levels:

$$K_I = \frac{\sum_{j=1}^{m} K_j}{m}. \quad (10)$$

In our opinion, it is advisable to use the traditional scale of developmental taxonomic value differentiation for qualitative assessment of the status of the target indicators achievement in terms of individual indicators (K_j), as well as interpretation of the obtained values of the composite indicator of the target indicators achievement (K_I) in terms of performance of individual tasks (Table 1).

Table 1: Achievement Level Ranking of the Target Indicators of Sustainable Development

The target indicator achievement level	Estimated level of the target indicatorsachievement
Highest	1,00 - 0,80
High	0,79 - 0,60
Medium	0,59 - 0,40
Low	0,39 - 0,20
Lowest	0,19 - 0,0001

It is proposed to calculate a composite indicator of the implementation of the Sustainable Development Goals by the formula of the arithmetic average of the composite indicators of the performance of individual tasks (K_I).

At the same time, in our opinion, such assessment should be carried out both without and taking into account the priority of the respective goal. Such consideration is provided by adjusting the significance (priority) ratio of the relevant goal:

$$R_I = w_I \cdot \frac{\sum_{j=1}^{m} K_{IJ}}{m} \quad (11)$$

where w_I – the priority ratio of the Sustainable Development Goal

Empirical analysis and Discussions

To determine such significance (priority) levels it is suggested to rely on the expert assessment results. Table 2 presents the results of the calculation of the significance levels of theSustainable Development Goals, which form the basis of Ukraine's financial policy targets for 2030, based on the expert assessments of the priorities and rankings of the Sustainable Development Goals conducted by Osborn D., A. Cutter and F.Ullah. The basis of table 2 is the calculation of formulas 1-11.

Table 2: Significance (Priority) Levels of the Sustainable Development Goals Forming the Basis of Ukraine's Financial Policy Targets until 2030

Goal	Expert assessment, point	Significance level (priority)	
		unit.	%
Goal 1. Overcoming poverty	1.8	0.05625	5.63
Goal 5. Gender equality	2.2	0.06875	6.88
Goal 8. Decent work and economic growth	2.7	0.084375	8.44
Goal 9. Industry, innovation and infrastructure	2.1	0.065625	6.56
Goal 10. Reducing inequalities	3.6	0.1125	11.25
Goal 11. Sustainable development of cities and communities	2.6	0.08125	8.13
Goal 12. Responsible consumption and production	6.3	0.196875	19.69
Goal 16. Peace, justice and strong institutions	2.7	0.084375	8.44
Goal 17. Partnership for Sustainable Development	8	0.25	25.00
Total	32	1	100.00

Source: author's developments

Table 3 presents the results of our assessment of the composite indicators of the implementation of the Sustainable Development Goals of Ukraine in 2015-2018 in terms of the implementation of SFP tasks. As can be seen from the above indicators, without taking into account the set priorities for the set of foreseen targets for the implementation of the sustainable development goals and tasks, which are related to the financial support, the operation of financial mechanisms, instruments and levers, implementation of the state financial policy, Ukraine as a whole demonstrates a high level of security achievement of the Sustainable Development Goals for most of the targets set by the current SFSDP course.

The medium level of implementation is observed for the Task 9 "Industry, Innovation and Infrastructure", according to which the medium of the taxonomic indicators of target parameters achievement by the set of tasks is 0,5571, which indicates that the system of expected targets is only 55.7%. The highest level of the Sustainable Development Goals achievement is observed in terms of the implementation of the Task 10 “Reducing inequalities” and Task 12 “Proper consumption and production”, according to which the integrated indicator of implementation without priority is 81.3% and 83.2% respectively.

The calculation of the integral efficiency level in the implementation of the SFSDP course (R_{EFP})

can be determined by the formula (11):

$$R_{EFP} = \frac{S_R}{S} \quad (11)$$

where S_R – the area of actual efficiency radar for the course implementation;
S – the area of the benchmark radar.

Given that, according to the 2030 Sustainable Development Goals of Ukraine, the Financial Indicators are foreseen for the nine objectives, the actual radar area for the efficiency of the implementation of the SFSDP course is calculated as the sum of the areas of 9 triangles according to the formula:

$$S_R = \frac{1}{2}\sin\frac{360}{k}\cdot(R_1 \cdot R_2 + R_2 \cdot R_3 + ... + R_i \cdot R_{i+1} + ... + R_k \cdot R_1) \quad (12)$$

where R_i – a composite indicator of the implementation of the i-th Sustainable Development Goal;
k – the number of sustainable development goals pursued by the SFSDP.

Table 3: Composite Indicators for Implementation of the Sustainable Development Goals of Ukraine in 2015-2018 as regards Implementation of the SFP Tasks*

Sustainable development goals	w_I, unit	Assessment of sustainable development goals				A comprehensive indicator of the implementation of the sustainable development goals	
						without priority	weighted priority
Goal 1	0.0563	Task*	1.1.	1.2.	1.3.	0.6063	0.0341
		K_I	0.6254	0.6374	0.5562		
Goal 5	0.0688	Task*	5.6.			0.7138	0.0491
		K_I	0.7138				
Goal 8	0.0844	Task*	8.1.	8.2.	8.6.	0.6828	0.0576
		K_I	0.5712	0.7242	0.7529		
Goal 9	0.0656	Task*	9.4.	9.5.		0.5571	0.0366
		K_I	0.6824	0.4318			
Goal 10	0.1125	Task*	10.1.	10.4.	10.5.	0.8132	0.0915
		K_I	0.8023	0.8812	0.7562		
Goal 11	0.0813	Task*	11.1.			0.6782	0.0551
		K_I	0.6782				
Goal 12	0.1969	Task*	12.1.			0.8324	0.1639
		K_I	0.8324				
Goal 16	0.0844	Task*	16.4.			0.7735	0.0653
		K_I	0.7735				
Goal 17	0.2500	Task*	17.1.	17.2.	17.3.	0.6711	0.1678
		K_I	0.6278	0.6543	0.7312		

** Task numbering according to (Sustainable Development Goals: Ukraine (national report)*
Source: author's calculations

Considering that, in accordance with the 2030 Sustainable Development Goals of Ukraine, the Financial Indicators are foreseen for the implementation of 9 goals, and that the maximum level of sustainable development goals without priority is 1, the area of the reference radar is determined by the formula 12 and is 0.037066.

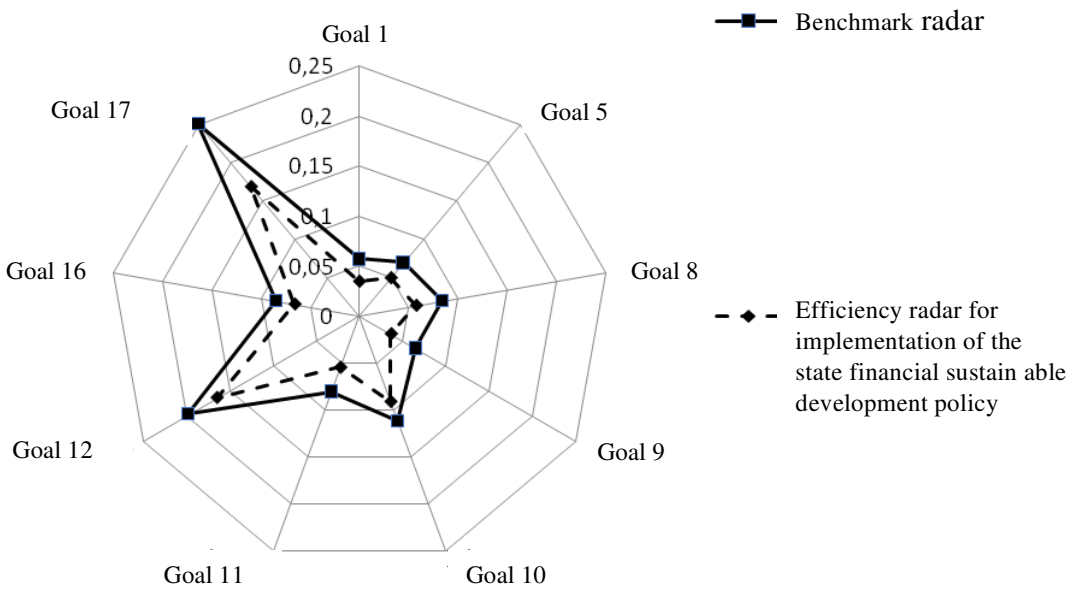

Fig. 2: Efficiency Radar for Implementation of the SFSDP of Ukraine in 2015-2018
Source: author's calculations

The value of the integral efficiency level indicator of the SFSDP implementation is in the range from 0 to 1. It shows the extent to which the targets set during the SFSDP course have been implemented.

Figure 2 presents a graphical representation of the SFSDP implementation radar of Ukraine, built on the basis of the proposed scientific and methodological approach.

At the same time, the integral efficiency level in the implementation of the SFSDP of Ukraine in 2015-2018 (R_{EFP}) is equal to:

$$R_{EFP} = \frac{0,019146}{0,037066} = 0,51653 . \quad (13)$$

The integrated efficiency level in the implementation of the SFSDP of Ukraine in 2015-2018 indicates that the aggregate targets of this policy achieved the level of achievement of the set targets of sustainable development, taking into account their priority is only 51.6%. This corresponds to the medium efficiency level (Table 4).

Table 4: Assessment of the Integral Efficiency Level in theImplementation of the SFSDP

A value of the indicator R_{EFP}	Efficiency level	Recommendations
$R_{EFP} \geq 0{,}95$	Highest	Maintaining the current state of using the tools of the financial mechanism for sustainable development. Changing course by defining a new system of goals and tasks.
$0{,}80 \leq R_{EFP} < 0{,}95$	High	Stabilization of the financial mechanism for sustainable development. Changing course by reviewing priorities
$0{,}40 \leq R_{EFP} < 0{,}80$	Medium	Development and implementation of financial mechanisms for promoting sustainable development aimed at improving the values of the identified target indicators. Adjustment of target values
$R_{EFP} < 0{,}40$	Low	Revise the target indicator system

Source: author's calculations

Conclusions

Such efficiency level in implementation of the SFSDP, on the one hand, evidences of the possible overestimation of the target indicator values set as a benchmark for such policy for a certain time period, discrepancy between the established quantitative parameters for achieving the goals and tasks and actual potential of financial support for sustainable development of the Ukrainian economy, and, on the other hand, it points to the need to develop and implement effective financial mechanisms promoting sustainable development under the directions identified by the target indicators underlying the elaborated state financial policy.

Hence, the suggested scientific and methodological approach makes it possible to comprehensively evaluate the efficiency in implementation of the SFP, since unlike existing ones it facilitates to extensively assess both the performance index in whole and in part characterizing the implementation status for certain target indicators, tasks and goals of the sustainable development, identify its contribution to the development of the integral efficiency indicator, consider the priority of individual goals and tasks.

References

- Ashmanov S. (2001), Mathematical models and methods in economics. M.: Economics, 2001.

- Pliuta V. (1980), Comparative analysis in economic research: methods of taxonomy and factor analysis / [trans. from the V. Zhukova scientific edition]. M.: Statistics.

- Osborn D., Cutter A. and Ullah F. (2015), Universal Sustainable Development Goals. Understanding for Developed Countries. Report of a Study by Stakeholders Forum. [Online], [Retrieved December 26, 2019], https://sustainabledevelopment.un.org/content/documents/1684SF_-_SDG_Universality_Report_-_May_2015.pdf

- Sustainable Development Goals: Ukraine (national report) [Online], [Retrieved December 18, 2019], https://menr.gov.ua/files/docs/%D0%9D%D0%B0%D1%86%D1%96%D0%BE%D0%BD%D0%B0%D0%BB%D1%8C%D0%BD%D0%B0%20%D0%B4%D0%BE%D0%BF%D0%BE%D0%B2%D1%96%D0%B4%D1%8C%20%D0%A6%D0%A1%D0%A0%20%D0%A3%D0%BA%D1%80%D0%B0%D1%97%D0%BD%D0%B8_%D0%BB%D0%B8%D0%BF%D0%B5%D0%BD%D1%8C%202017%20ukr.pdf

- Bakker B. & Christiansen L. (2012), "Crisis and Consolidation – Fiscal Challenges in Emerging Europe," Proceedings of the Oenb Workshops „Limited Fiscal Space in CESEE: Needs and Options for Post-Crisis Reforms"28February 2012, Vienna, Austria, 25-40.

- Hemming R., Kell M. & Schimmelpfennig A. (2003), Fiscal Vulnerability and Financial Crises in Emerging Market Economies, International Monetary Fund Occasional Paper no. 218, IMF. Publisher – Google Scholar – British Library Direct

- Ilzetzki E. & Vegh C. A. (2008), "Procyclical Fiscal Policy in Developing Countries: Truth or Fiction," NBER Working Paper no. 14191. [Online], [Retrieved February 18, 2019], http://www.nber.org/papers/w14191.pdf. Publisher

- Prykazka S. (2014), The concept of sustainable development and the problem of economic growth and development. Academic papers collection. "DEMOCRATIC GOVERNANCE". Issue 13. [Online], [Retrieved December 12, 2019], http://lvivacademy.com/vidavnitstvo_1/visnik13/fail/Prykazka.pdf

- Goldsmith R. (1969), Financial Structure and Development, Yale University Press, New Haven,Connecticut.

- McKinnon R. (1973), Money and Capital in Economic Development, Brookings Institution Press, Washington, DC.

- Honcharenko M. (2014), The Essence of the Financial Mechanism for the Implementation of the Sustainable Development Strategy of the Territory [Online], [Retrieved December 14, 2019], http://kbuapa.kharkov.ua/e-book/apdu/2014-1/doc/2/03.pdf

- Badrak O. (2006), Improvement of the Financial Mechanism for Sustainable Development of Ukraine: Dis ... Cand. econom. Sciences: 08.08.01. 239 p.

- Vakhovych I. Theoretical and methodological bases of formation and realization of regional policy of financial support of sustainable development: dissertation of ... Doctor of Sciences: 08.00.05 [Online], [Retrieved December 24, 2019], http://www.disslib.org/teoretyko-metodolohichni-zasady-formuvannja-ta-realizatsiyi-rehionalnoyi-polityky.html.

- Dolls M., Fuest C. and Peichl A. (2010), "Automatic Stabilizers and Economic Crisis: US vs. Europe," NBER Working Papers, No. 16275. [Online], [Retrieved January 28, 2020], http://www.nber.org/papers/w16275.

- Zohlnhöfer R. (2005), "The Politics of Budget Consolidation in Britain and Germany: The Impact of Blame-Avoidance Opportunities," West European Politics, 30(5), 1120-1138.

Regional Insurance Market of The Russian Federation: Efficiency, Factors, Risks

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Abstract

The general state of the Russian insurance market is characterized by its regional segments functioning and hence the problem of their status, position and effectiveness analysis is relevant. Regional insurance markets (RIM) should provide the region with insurance cover against risks in terms of content and amount that meets the region's needs for it (that appears to be the first strategic goal of the RIM's functioning and development). At the same time, the regional insurance market is an independent segment of the regional economy and therefore it is interested in making a profit (the second strategic goal of the RIM's functioning and development). The extent of these goals achievement characterizes the effectiveness of the RIM's functioning. The paper discloses two criteria for the effectiveness of the RIM's functioning and development related to these strategic goals achievement. The effectiveness of the RIM's functioning is influenced by many different-leveled factors, which are studied in the paper. The proposed division of factors into two groups - factors that positively and negatively affect the development of RIM, allowed to divide the group of negative factors into two parts - already implemented and those that can be implemented. The latter determined the ability to describe potential negative factors through risks.
The identification of factors and risks of the RIM's functioning is reasonable because management aimed at enhancing positive factors impact, reduces the influence of negative factors and prevents the realization of risks, contributes the increase of the RIM's effectiveness. The proposed approach to determination of the RIM's effectiveness, to factors classification and risks identification, can be used to increase the effectiveness of RIM. Results obtained may also be used to develop and implement national and regional strategies for socio-economic development, including the use of insurance as an institute of social and financial protection against risks.

Keywords: Regional Insurance Market, Strategic Objectives Of The Regional Insurance Market Functioning, The Regional Insurance Market Effectiveness, Factors And Risks Of The Regional Insurance Market.

Introduction

Insurance is the most important institute that provides social and financial protection against risks. Hence the effectiveness of this institute functioning will be determined by the quality of such protection provision both at the level of the country as a whole and at the level of any individual region.

Currently, the level of the Russian insurance market development is presented (2018 data) (See table 1).

Table 1: performance indicators of the Russian insurance market for 2018

Types of insurance	Insurance premiums		Insurance payments	
	million rubles	share,%	million rubles	share,%
Life insurance	452 400	30,60	67 070	12,82
Personal insurance other	321 364	21,74	128 335	24,53
Property insurance	361 481	24,45	154 405	29,51
Liability insurance	48 638	3,29	10 206	1,95
Business and financial risk insurance	43590	2,95	11365	2,17
Total voluntary insurance	1 227 473	83,03	371 381	70,98
Compulsory motor vehicle liability insurance	225 965	15,28	137902	26,36
Other compulsory insurance	24968	1,69	13905	2,66
Total compulsory insurance	250 933	16,97	151 807	29,02
Total	1 478 406	100,00	523 188	100,00

Calculated according to: Official website of the Bank of Russia. [Electronic resource]. URL: http://www.cbr.ru.

The regional insurance market (RIM) is a segment of the national Russian insurance market. Therefore the level of its functioning has a significant impact not only on the development of the corresponding region, but also on the development of the entire national insurance industry.

In the framework of this study, the region refers to the subjects and federal districts of the Russian Federation, and the regional insurance market refers to the totality of organizations which act in a particular region's insurance market.

An example one of the regional insurance markets functioning is given in table 2.

Table 2: performance indicators of the regional insurance market of the Republic Khakassia for 2018

Types of insurance	Insurance premiums		Insurance payments	
	thousand roubles	share,%	thousand roubles	share,%
Life insurance	486 435,	34,14	37 733,	6,09
Personal insurance other	162 223,	11,39	44 216,	7,13
Property insurance	247 673,	17,38	99 378,	16,03
Liability insurance	15 870,	1,11	735,	0,12
Business and financial risk insurance	9608	0,67	812,	0,13
Total voluntary insurance	921 809,	64,69	182 874,	29,49
Compulsory motor vehicle liability insurance	481 656,	33,80	434 627,	70,10

Other compulsory insurance	21406	1,50	2545	0,41
Total compulsory insurance	503 062,	35,31	437 172,	70,51
Total	1 424 871,	100,00	620 046,	100,00

Calculated according to: Official website of the Bank of Russia. [Electronic resource]. URL: http://www.cbr.ru.

The most important strategic goal of regional insurance development as an industrial organization sector of the regional economy is the insurance services provision a structure and size of which is adequate to the regional needs for insurance protection.

As an independent financial institute operating in market conditions, the regional segment of the national insurance market is interested to gain profit. Therefore, the second strategic goal of any RIM, as an element of a market economy, is a profit maximization.

A task of strategic goals achievement poses the problem RIM's functioning and development effectiveness.

Currently, there are different approaches to the definition of effectiveness. However, the significance and content of the RIM's functioning and development strategic goals necessitate their consideration in effectiveness comprehension.

This article is devoted to the disclosure of the concept of effectiveness for RIM, as well as the identification of factors and risks that affect effectiveness level, which determines the relevance of the research topic.

The purpose of the article is to highlight the strategic goals of RIM development, justify and formulate the concept of the effectiveness of the functioning of the regional insurance market, build a model for identifying the factors and risks that determine the effectiveness of the functioning of RIM. The hypothesis of the study is formulated as follows: the increase of the RIM's functioning effectiveness as an extent of its two strategic goals realization, is possible by identifying and managing factors and risks of different levels, aimed at enhancing the influence of positive factors on RIM, weakening the impact of negative factors and reducing or preventing the impact of different risks realization.

The analysis of the stated problem elaboration showed the following.

A lot of research has been devoted to the issues of regional insurance and the study of its development factors. Most authors agree on the uneven development of regional insurance markets. So, Belozerov et al. (2018), Kirillova (2018) attribute this uneven development to the influence of different factors and the presence of various risks in in the regions. Kuznetsova et al. (2019), Porrini (2017) identify various factors in the development of RIM, dividing them into external and internal, as well as general and specific.

Alyakina et al. (2017), Arkhipov et al. (2017), Chernova et al. (2019), Tarasova et al. (2018) pay attention to regional risks – the risks of functioning and development of regions, their specificity and causes of occurrence. The world theory and practice of insurance as an institute of financial protection is connected to risk management at the level of a particular region and the world insurance market as well. Currently, the risks' identification and management problems are considered not only at the level of a particular region. The studies by Chernova et al. (2017), Kalayda and Chernova (2016), Blake (2013), Laux and Muermann (2010) on risks arising in the financial markets and risks associated with financial convergence processes are of particular significance. This is due to the fact that the development of financial markets and the deepening of financial convergence processes cover different regions of the country and, thereby, contribute to the emergence of specific regional risks that are external to the region. Gaganis et al. (2019), Mnykh (2017), Njegomir and Stojić (2010) note that national characteristics, organizational and legal factors for the development of the country's insurance market have an important effect on the level of internal regional risks.

The mechanisms and methods of risk management at the regional level are closely related to the effective functioning of the insurance market. As a socio-economic category, the effectiveness of insurance is comprehensively covered in the works of Prokopjeva (2018), Kuznetsova and al. (2019). The effectiveness of the insurance market functioning is also associated with macroeconomic processes in the national and global economies. Therefore, it is worth noting the studies of Mohy ul din et al. (2017), Porrini (2017), Zheng and Zhao (2017), which describe the relationship between the development of the insurance market and economic growth.

Basically, the issues of insurance markets of the regions, factors of their development and increasing the efficiency of functioning are significantly studied in the scientific literature. At the same time, in determining the effectiveness of the regional insurance markets functioning a traditional approach is mainly used that does not consider the strategic goals of the regional insurance markets development. A more detailed analysis requires the classification of RIM development factors, as well as the ratio of factors and risks of RIM development.

This range of problems with the participation of the authors is investigated in this paper by a sequential consideration of the following issues:

1) Chernova G.V., Khalin V.G.: building a theoretical model of the effectiveness of the regional insurance market functioning; substantiation of the assessment of the effectiveness of RIM as the degree of implementation of its strategic goals; building a model for identifying factors and risks, developing a theoretical approach to considering risks as potential negative factors for the development of RIM;
2) Prokopjeva E.L., Kuznetsova N.P., Chernova G.V.: analysis of the possibilities of application and selection of specific data for testing a theoretical model for assessing the effectiveness of RIM development to achieve two strategic goals;
3) Prokopjeva E.L., Kalayda S.A.: selection and analysis of all-Russian and regional factors of development of the RIM of the Republic of Khakassia;
4) Prokopjeva E.L., Kuznetsova N.P., Khalin V.G.: justification and selection of priority types of insurance based on the risks identified due to the influence of potential negative factors on the development of RIM.

The effectiveness of the RIM's functioning

It is well-known that often efficiency is understood as the implementation of a process with minimal costs, efforts and losses, and economic efficiency is usually understood as the ratio of the economic effect (output) and the costs (input).

The activity of a separate economic actor (enterprise, company, organization) is considered to be economically effective if it is carried out at minimal cost. Moreover, the result can be described by any indicators (profit, output, etc.), and the costs can be represented by some resource or factor of production (labor, capital, etc.). Resource efficiency indicators are, for example, labor productivity, material consumption, etc.

The theory of efficiency gained some development through the use of the concept of maximum public utility introduced by V. Pareto, which is called the "Pareto optimum". Pareto optimum is defined as follows: conditions under which the state of economic efficiency (where no one can be made better off by making someone worse off) occurs. Also called Pareto optimal or Pareto optimality.

In accordance with it, the performance of a separate economic entity (enterprise, company, organization) is considered to be economically effective if, given the level of knowledge and quantitative factors of production, it is impossible to produce more of one product without sacrificing to produce a certain amount of another product (Pareto-efficient allocation resources in production).

The operational efficiency of an individual business unit, measured by Pareto, in the general case is not identical to the operational efficiency of a particular economic system. The functioning of a certain financial system is cost-effective if the system is in a state in which it is impossible to increase the degree of satisfaction of the needs of at least one person without worsening the position of another member of the society (Pareto-efficiency of the economic system).
In order to evaluate the effectiveness of the RIM's functioning, it is necessary to keep in mind the following consideration. The strategic goal of the functioning and development of any RIM is to provide the region with social and financial protection from the risks to which it is exposed.

The degree of implementation of the strategic goal set for RIM can characterize the effectiveness of the RIM's functioning and development. In other words, the effectiveness of RIM can be understood as the extent to which the entire insurance coverage provided by the regional insurance market to the region corresponds to its size, which is determined by the region's need. At the same time, the higher the volume and type of insurance provided by the regional insurance market protection meets the regional need, the higher the effectiveness of RIM. Otherwise, the higher a mismatch between the provided insurance cover and the need for the region, the lower the effectiveness of RIM. Only when RIM provides full insurance coverage one can say that RIM is functioning efficiently. This statement defines the first criterion for the effectiveness of the RIM's functioning - RIM is effective if it provides the region with insurance coverage adequate (in structure and scope) to the regional level of development.

The achievement of the goal for providing insurance coverage for the region is carried out through the implementation of the insurance activity itself. Therefore, the effectiveness of the RIM's functioning can be assessed through the degree to which the quality and cost of the insurance services provided are of standard quality and cost of similar services. The average or industry best values of the relevant indicators can be considered; performance indicators of the region considered as the best, etc.
In this case, the effectiveness of RIM can be understood as the degree of adequacy of the quality and cost of the insurance services it provides with the standard quality and the cost of similar services in the entire Russian insurance market. Moreover, the higher the quality and cost of the services provided meets the standard requirements, the higher the efficiency of RIM. The greater the discrepancy between the quality and cost of the insurance services provided by the regional insurance market to the standard services, the lower the effectiveness of RIM. Only in the case when RIM provides insurance coverage of the proper (reference) quality and cost, one can say that RIM functions efficiently (implementation of the second strategic goal of RIM development). This statement defines the second criterion for the effectiveness of the RIM's functioning - RIM is effective if it provides the region with insurance coverage in quality and cost meeting the reference requirements.

The use of two criteria for the effectiveness of the RIM's functioning and development is determined by the most important social role of insurance as an institute of financial protection (the first criterion) and the survival requirements of RIM in a competitive environment (second criterion).

Since both goals of RIM functioning are strategic for it, we understand by RIM's effective functioning and development such a state that meets the achievement of both strategic goals set for it (simultaneous fulfillment of the first and second criteria for the effectiveness of RIM functioning).

Various factors influence the level of efficiency of the RIM's functioning and development. Therefore, increasing the efficiency of the RIM's functioning and development involves identifying these factors and developing such solutions for their management that would enhance the effectiveness of RIM — the achievement of both strategic goals by the regional insurance market.

Factors of the RIM's functioning and development

Solving the problem of ensuring the necessary RIM's efficiency according to both criteria determines the feasibility of factors identification, as well as analysis of the latter influence on the RIM's functioning and development (See fig. 1).

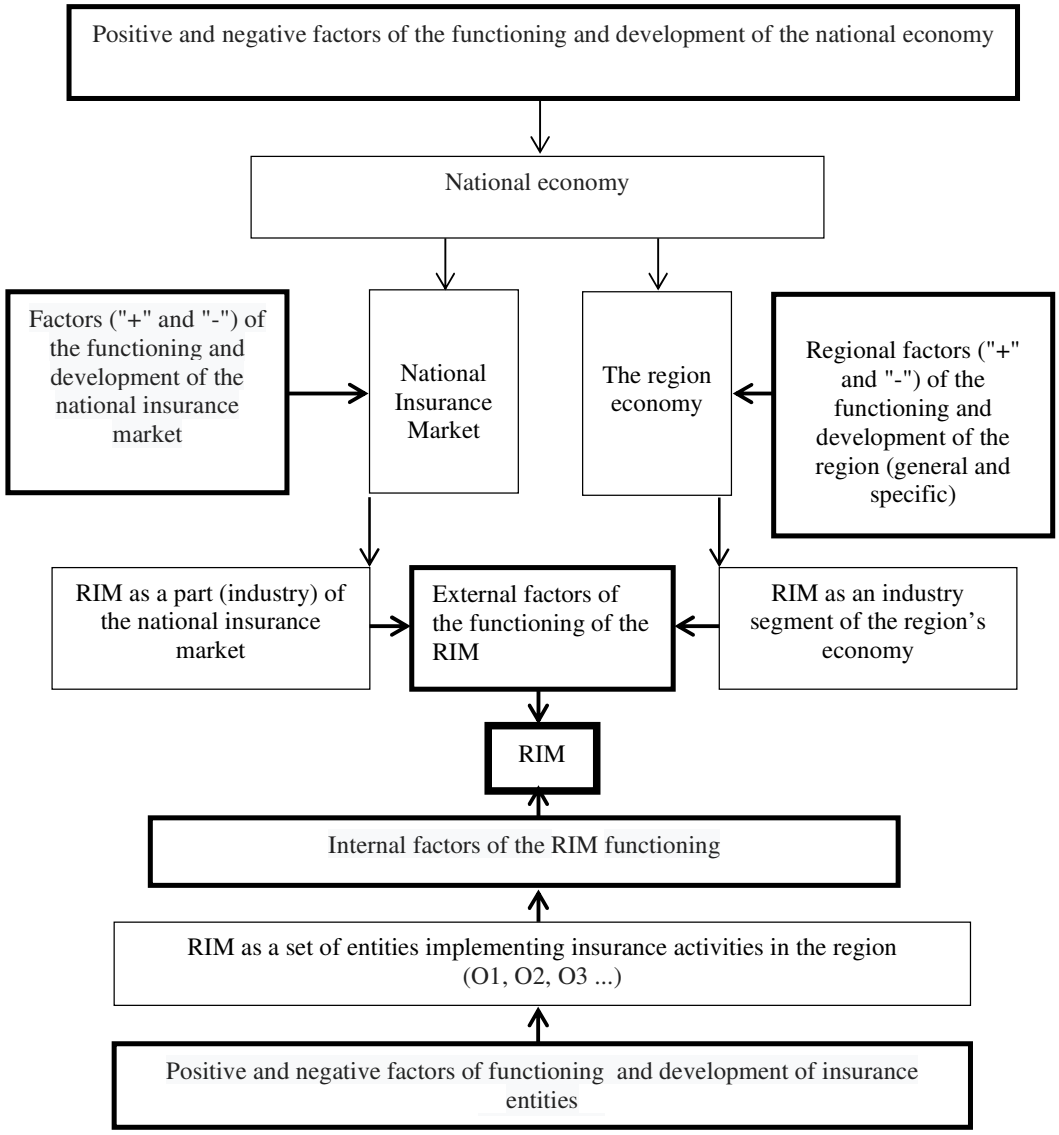

Fig. 1: The factor scheme of the RIM functioning and development

Source: compiled by the authors.

All factors can be divided into 2 large groups according to their influence on RIM:

- external factors affecting the functioning and development of RIM from the outside as a segment of the national insurance market and as a sector of the region's economy.
- internal factors that determine the functioning and development of RIM from the inside out — as a set of entities that carry out insurance activities in the region.

External factors of the RIM's development. The Russian national economy includes such an industry as the national insurance market, within the framework of which any RIM is its segment. For this reason, the functioning and development of any RIM is indirectly (through the national economy and through the Russian insurance market) influenced by the functioning and development of the economy and factors of the national insurance market. External factors include the imbalance in the regional structure of the insurance market; overpriced insurance costs; lack of incentives for long-term insurance; inefficient investment activities of insurers; constant changes in legislation; strengthening government regulation and increasing the transparency of insurance operations; the opportunity for insurers to participate in the pension system and the growth of accumulative life insurance; expected growth of manufacturing industries insurance; improving of insurance portfolios quality and etc.

The economy of any region is a part of the national economy. At the same time, it includes RIM as its separate sector. For this reason, the functioning and development of any RIM is indirectly (through the national economy and through the economy of the region) influenced by the functioning and development of the economy and the development factors of a particular region.

Internal factors of RIM development as factors in the insurance activities implementation in the region are: the level of diversification of the economy and its industrial structure; mineral reserves; investment attractiveness and innovative activity; effectiveness of the financial markets functioning; level of budgetary provision; agglomeration development and population density; population income and quality of life; touristic potential; degree to catastrophic risks exposure and environmental conditions.

The RIM's functioning and development as a set of entities implementing insurance activities in the region may be influenced by general factors, (similar for all regional insurance markets), and specific to each of the region's factors. One should keep in mind the following - insurance entities present in the region may have different responsibilities and functions with respect to RIM, as well as different goals of their activities at RIM. Such a variety of functions and goals leads to differences in the factors affecting the activities of these entities in the implementation of the insurance activity itself.

All external and internal factors of RIM can be divided into the following groups:

- positive (stimulating) factors in the development of RIM. These factors can include: improving the quality of insurance portfolios; strengthening state regulation and increasing transparency of insurance operations; agglomeration development and population density.
- negative (inhibiting) factors in the development of RIM. These factors may include: the imbalance in the structure of the Russian insurance portfolio and the instability of its loss; overpriced insurance services; inefficiency of financial markets functioning; low level of budgetary provision.
- factors changing the way of influence on RIM - under certain conditions, they have a stimulating effect on RIM, and under others - a negative one. The factor of strengthening state regulation helps to improve the quality of insurance services, but with excessive strengthening will lead to the curtailment of insurance activities. The factor of investment activity of insurers in the region, on the one hand, can stimulate the development of the region and its insurance market, on the other hand, can lead to capital outflows to other regions with insufficiently flexible regional policies.

Common factors for all regions for the development of the regional insurance market include, for example, the imbalance in the structure of the entire Russian insurance portfolio by type of insurance and the territorial unevenness in the development of regional insurance markets (negative factors), the cleansing of the market from financially unstable insurance companies (positive factor). As the analysis showed, a significant influence on the development of the region and on its regional insurance market is exerted by geographic, demographic, national and other features that determine the specific development factors of a particular RIM. The latter include, for example, the level of diversification of the region's economy and its sectoral structure, investment attractiveness and innovative activity, etc. A variety of regional features makes it necessary to identify specific regional factors for each of the RIMs that determine the development of RIM. For the Republic of Khakassia

(Siberian Federal District), taking into account the peculiarities of the regional development the following regional factors for the development of RIM were identified: a difficult environmental situation, a single-industry structure of the economy (poor diversification of the regional economy), limited financial capabilities of enterprises (negative factors); favorable conditions for the development of agriculture (positive factors).

In order to increase the efficiency of the RIM's functioning and development, determined by both criteria for the effectiveness of RIM functioning, the development of management decisions that would be consistent with maintaining or enhancing of positive factors impact and eliminating or reducing the impact of negative factors on the RIM's functioning and development.

Risks of the RIM's functioning and development

Among the positive factors in the functioning and development of RIM, one can distinguish those that have a well-known positive impact on RIM, and those that can be enhanced by additional management decisions.

Among the negative factors of the RIM's functioning and development, one can distinguish those which negative (restraining) influence is already manifested, and those which negative impact may occur. That is why the latter (factors) can be described by the corresponding risks - the risks of negative (constraining) factors of the RIM' functioning and development. Fig. 2 presents a diagram of the RIM's functioning and development risks due to external and internal factors influence.

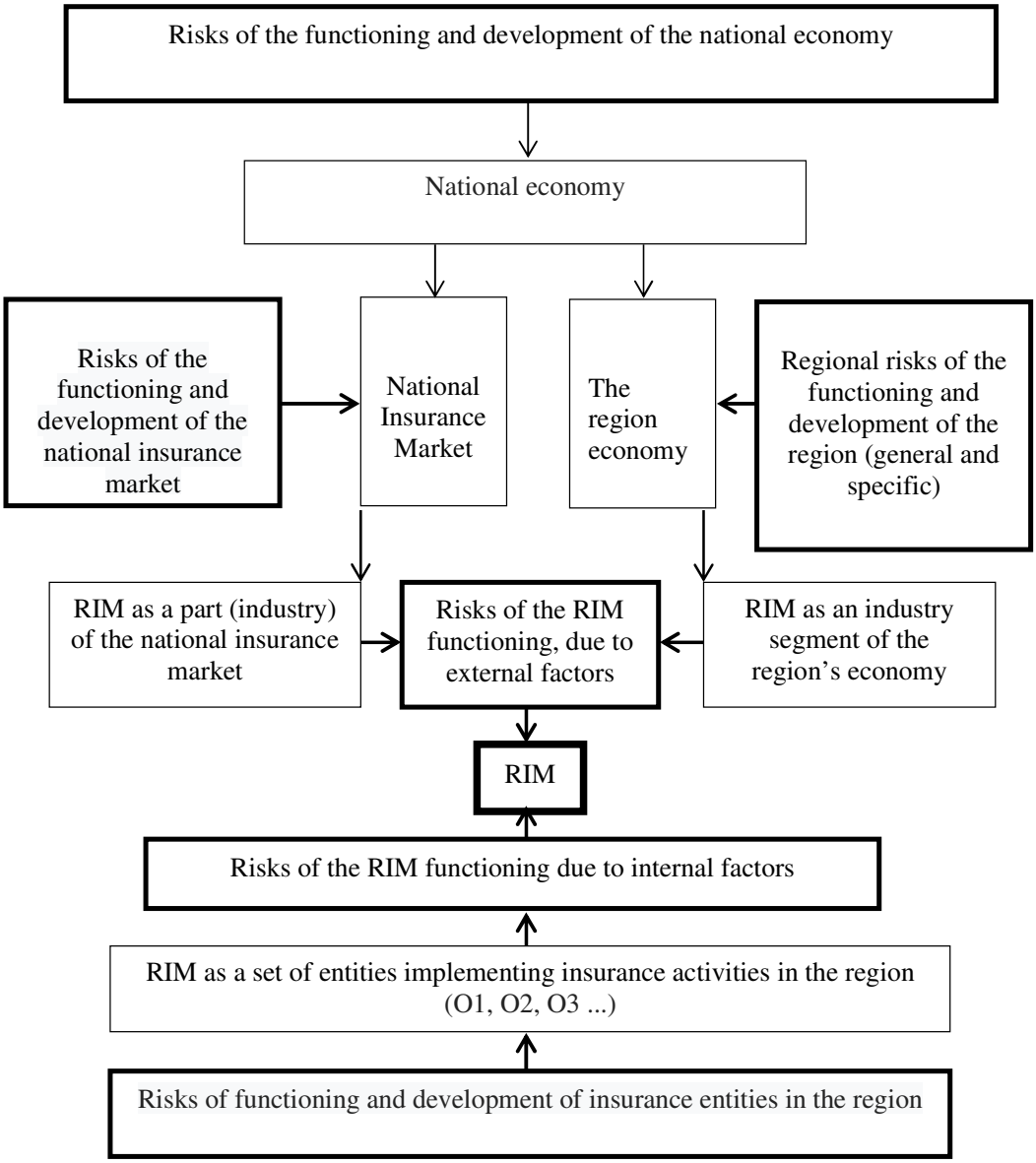

Fig. 2: The risk scheme of the RIM functioning and development

Source: compiled by the authors.

Negative management distinguishes difference between two situations. In the first case, management decisions should be aimed at eliminating the already known consequences of the influence of negative (restraining) factors, and in the second – at preventing the risks' implementation of the of negative (restraining) factors for the RIM's functioning and development.

An example of a negative regional factor impact can be the presence of hazardous industries that have shown their negative influence on the development of the Republic of Khakassia. In particular, a technological accident that occurred in one of the largest Sajano-Shushenskaja hydro-electric power station (HEPS) in August 2009. The legislative and managerial decisions made after that were aimed at correcting the situation, at restoring production facilities, but with the observance of more stringent measures to ensure the safety of HEPS functioning. An example of a negative factor, the manifestation of which is possible in future, is the presence in the region of a large number of

enterprises of the coal and metallurgical industries. This factor can be described, for example, by environmental risks, risks of public health loss.

The use of the concept of risks in describing the negative factors of the RIM's functioning and development provides the following advantages. Firstly, since the risks are associated only with the possible negative consequences of the influence of constraints on RIM, managing them can prevent these consequences. Secondly, risks are the object of insurance protection, and therefore, they determine those types of insurance, the development of which the region is experiencing. Through the identified regional risks, it is possible to determine the types of insurance that have priority for a given region, develop them, and thereby increase the efficiency of RIM functioning, which is determined by the first criterion. According to this criterion, RIM will be effective to the extent that it meets the needs of the region in insurance coverage.

For the example presented above, a measure of protection against environmental risks may be the development of environmental insurance, which is a priority for the region, and voluntary medical insurance of the population of the region for protection against risks of health loss.

The risks of the national economy functioning and development, as well as the risks of the national insurance market are the same for all regional markets of the Russian Federation. But the regional risks of the functioning and development of various constituent entities of the Russian Federation can be divided into 2 groups - common for all regions and specific for each region either for a separate group of regions. The level and specificity of the regional socio-economic development have a significant influence on a list of regional risks. Table 3 gives an example of significant regional risks specific to the regions of the Siberian Federal District (SFD). The choice of Siberia is due to its specificity - remoteness from the capital, resource- oriented economy, harsh natural and climatic conditions, technological and environmental risks.

Table 1: significant regional risks and necessary types of insurance on the example of the Siberian Federal District

Significant regional risks		**Necessary types of insurance**
Class of risks	**Specific risk manifestation**	
Financial	- low budgetary security - limited tax potential - low efficiency of financial markets - credit risks (insolvency)	- business risk insurance - insurance of financial risks - credit operations insurance - real estate insurance against fire and natural disasters
Economic	- mono-industry structure of the economy - low diversification, predominance of extractive industries	- insurance of production risks - liability insurance
International economic	absolute predominance of raw materials exports	- insurance of export-import operations - insurance of transport, casco and cargo risks
Environmental	activity of coal and metallurgical enterprises - hydroelectric power station /HEPS activities	- insurance of environmental risks; - voluntary medical insurance for employees and other residents
Investment	- lack of organizational and financial support for investors - low efficiency of small business	- business risk insurance; - insurance of investments and construction risks;
Tourist	- poorly developed touristic infrastructure and seasonality of touristic activity	- tourism insurance; - insurance of building risks

Natural	- exposure to natural disasters (flooding, fires)	- insurance of natural and legal persons' property from fire and natural disasters
Technogenic	- potential flood zone of the world largest hydroelectric power station, - blasting at mining enterprises	- liability insurance; - insurance of production risks; - accident insurance
Agricultural	- risks of crop loss as a result of natural disasters and weather conditions - seasonal nature of production	- crop insurance against adverse weather conditions and natural disasters
Social	- the dependence of employment on the structure of the economy - low level of social protection - influx of migrants from other countries	- cumulative life insurance

Source: compiled by the authors.

The increased impact of positive factors, the reduction of existing negative factors influence on the RIM's development, the reduction or elimination of possible negative factors described by risks will contribute to the fact that, firstly, the insurance cover provided by the regional insurance market will meet the needs of the region, and, secondly, it will help to reduce costs and increase profitability of the regional insurance. The latter corresponds to the achievement of the strategic development goals of RIM, i.e. meets the increased efficiency of RIM.

The directions of further research of this problem include the consideration of issues related to the development of a program for managing national and regional factors and RIM development risks. The program should be aimed at improving the effectiveness of the RIM functioning, evaluated by both criteria. The formation of such a program should include: clarification of general and regional factors for the development of RIM, identification of stimulating and constraining factors groups, the development of managerial decisions aimed at strengthening stimulating factors and at weakening or eliminating constraining factors. Another area of further research is the development of a method for assessing the impact of changes in the level of RIM's development on the development of the region itself.

Conclusions

The paper proposes an author's approach to determining the effectiveness of the RIM's functioning. In accordance with it, the effectiveness of the RIM's functioning is understood as the degree of achievement of strategic goals set for RIM.

The most important strategic goals for the RIM functioning and development are determined by two performance criteria. The first of them is the complete satisfaction of the region's needs for social and financial protection from regional risks by the regional insurance market; and the second is the provision of standard quality and cost insurance services by the regional insurance market. At the same time, the RIM performance and development indicator by the first criterion shows the degree to which the regional insurance market has achieved the first goal, and the efficiency indicator by the second criterion - the degree to which it has achieved the second goal.

The RIM's functioning and development is significantly influenced by various factors. RIM, on the one hand, is a segment of the national insurance market, and, on the other, - a sector of the regional economy, is influenced by factors that are external to RIM.

At the same time, RIM functions as a specific business system, subject to the influence of internal factors.

All external and internal factors have different directions of impact on RIM - stimulating its development, inhibiting it, as well as factors that (under different conditions of RIM development) can have different effects.

The identified negative factors can be divided into two subgroups - those that already negatively affect the RIM functioning and development, and those that currently do not yet manifest themselves, but may manifest themselves in the future.

The latter can be represented as risks of negative factors in the RIM's functioning and development. Since the realization of such risks can be accompanied by severe negative consequences, their management, aimed at reducing such consequences, is extremely important.

In general, increasing of the RIM's effectiveness involves managing the positive and negative factors of its functioning and development, however, the severity of the possible realization of the negative (restraining) factors risks also necessitates the particular management of these risks.

The study confirms the hypothesis advanced by the authors. Increasing the efficiency of RIM functioning, defined as the degree of achievement of two strategic goals, can be reached by identifying factors and risks of different levels, managing them aimed at strengthening the influence of positive factors, weakening the impact of negative factors and reducing or preventing possible risks.

References

- Alyakina, D.P., Kaygorodova, G.N., Pyrkova, G.Kh. (2018) «Features of risk management of a regional insurance company», Kazan Economic Bulletin. 2 (32), 12-18.

- Belozerov, S.A., Chernova, G.V., Kalayda, S.A. (2018) «Modern factors of development of the Russian insurance market», Insurance business, 6, 31-35.

- Kirillova, N.V. (2018) «Improving the regional insurance policy in 2018-2020», Economics. Taxes. Right, 11 (1), 83-88.

- Prokopjeva, E.L. (2018) «Sources and mechanisms for increasing the regional effectiveness of insurance», Novosibirsk: ANS SibAK, 208.

- «Insurance and risk management: problems and prospects»: monograph (2017) Arkhipov, A.P., Bazanov, A.N., Belozerov, S.A. [and etc.]; under the editorship of S.A. Belozerov, N.P. Kuznetsova, Moscow: Prospect, 528.

- «Insurance and risk management»: a textbook for bachelors (2019) Chernova, G.V. [and etc.]; Revised. and add, Moscow: Publishing house Yurayt, 767.

- Tarasova, Yu.A., Voskovskaya, E.S., Yarusova, K.V. (2018) «Evaluation of regional insurance markets and their impact on the Russian insurance market», Insurance business, 10 (307), 36-53.

- Chernova, G.V., Pisarenko, Zh.V., Kuznetsova, N.P. (2017) «Factors, premises and parameters of financial convergence», Insurance business, 3, 3-13.

- Kalayda, S.A., Chernova, G.V. (2016) «Application of world experience in accounting for insurance risks in the activities of Russian insurers». Collection of materials III International science-and-practice Conference «Innovation and protection of the insurance market of Ukraine», 19-20 april, Kiev: KHEY, 134-137.

- Blake, D. (2013) «Longevity risk and capital markets: The 2011–2012 Update», Journal of Risk and Insurance, 80 (3), 495–500.

- Gaganis, C., Hasan, I., Papadimitri, P., Tasiou, M. (2019) «National culture and risk-taking: Evidence from the insurance industry», Journal of Business Research, 97 (4), 104-116.

- Kuznetsova, N.P., Chernova, G.V., Prokopjeva, E.L., Boldyreva, N.B. (2019) «Governance of factors for the regional insurance market development (evidence from Russia)», Problems and Perspectives in Management, 17 (3), 492-507.

- Laux, C., Muermann, A. (2010) «Financing risk transfer under management problems: mutual versus stock insurers», Journal of financial intermediation, 19 (3), 333-354.

- Mnykh, M.V. (2017) «Competition in the insurance market of Ukraine and the peculiarities of its control», Priority research areas Collection of scientific articles, 79-94.

- Mohy ul din, S., Regupathi, A., Abu-Bakar, A. (2017) «Insurance effect on economic growth–among economies in various phases of development», Review of International Business and Strateg, 27 (4), 501-519.

- Njegomir, V., Stojić, D. (2010) «Does insurance promote economic growth: The evidence from ex-Yugoslavia region», Ekonomska misao i praksa, 31-48.

- Porrini, D. (2017) «Regulating big data effects in the European insurance market», Insurance Markets and Companies, 8 (1-16), 6-15.

- Zheng, H., Zhao X. (2017) «The dynamic relationship between insurance development and economic growth», New evidence from China's coastal areas, 11 (5), 102-109.

Ergonomics as An Innovative Workflow Management Tool

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Abstract

The aim of the article is to present ergonomics as an innovative path to organize and manage work. The research method used was an internet survey and snapshot observation. The research included two small enterprises from the area of Kujawsko-Pomorskie Voivodeship. The organizations operate in the same industry and carry out tasks that are their key business area in a similar way. As a result of the survey, it was possible to create a comparative analysis showing how the work environment is shaped in two companies with the same business profile. The first company implemented low-budget ergonomic solutions, while the second company has been working in unchanged working conditions for many years. The results of the research show how an ergonomic approach to the management of organizations and human capital affects the achievement of economic and social benefits in the workplace.

Keywords: Management, Organization, Ergonomics, Work Process, Productivity.

Introduction

Ergonomics is a scientific discipline dealing with the adaptation of the working environment to the human being, to his interpersonal characteristics and to his physical and mental abilities. Such a way of organizing work is extremely beneficial for the employee, because it makes it much easier to perform work tasks, the employee gets tired more slowly and is able to achieve very good results. Much better than people working in positions not adjusted to their individual needs. Unfortunately, in Poland this discipline of learning is still underestimated by entrepreneurs. This is mainly due to the fact that it is treated marginally and is not given any attention within research projects. And it is only by carrying out scientific research that it can be proved that economic and social effects for enterprises implementing ergonomic recommendations are very high. That is why an attempt was made to prove how the working environments are shaped in two companies that have a similar business profile and only one of the companies has implemented ergonomic solutions.

The aim of the articles is to present ergonomics as an innovative method used to manage organizations. What is more, by applying ergonomic recommendations in an enterprise, it is possible to increase work efficiency, as well as improve morale of employees and increase their job satisfaction. However, the most important issue is that the implementation of ergonomics and its indications reduce the occurrence of skeletal-articular ailments in employees, i.e. improve their well-being by eliminating pain.

Ergonomics and work management in the company

Managing a company is a very complex task. The need to plan work for each activity, organize resources, train and prepare employees, as well as the necessary control element in each area. Faced with so many tasks, employers often forget about one important aspect, namely the creation of an appropriate working environment in technical terms. The proper adaptation of machines, equipment, tools, space to workers and their basic needs will allow them to perform their work better and more efficiently. However, as a consequence, an employer may obtain a better financial result and make his employees work more efficiently (Imada, Nagamachi, 1995, pp. 309).

One of the most important links between ergonomics and work management is the employee. It depends on employees if company will achieve the effects. In order for an employee to obtain the best possible results, increase his productivity, but thus not feel chronic fatigue and monotony at work, it is necessary to apply ergonomic solutions (Binczycki, 2013, p. 264). Only proper management of the work process will allow to achieve these goals. First of all, individual selection for particular work tasks. Already at the stage of recruitment it is necessary to decide whether the personal qualities possessed by an employee predestine him/her to work on a given position. In human capital management, it is extremely important to look at the employee through the prism of competences, skills and personal qualities and, on this basis, assign him or her an area of tasks to be performed.

Another important area combining ergonomics with work management is to ensure that the employee has all the necessary equipment, tools and workstation equipment so that he can work efficiently, effectively, safely and at the lowest possible biological cost. Only such ergonomic working conditions give the employer confidence that he has guaranteed everything that is important for the employee to perform the tasks entrusted to him (Kalkis, Roja, 2016, item 36). In a situation where the workplace is not adequately equipped to meet the requirements of the employee, it should be reckoned with the fact that his productivity will be lower, the time of work will be longer and the effects of work may be unsatisfactory for the employer.

The last factor that concerns work management and is closely related to ergonomics is the organization of working hours and breaks. This is an element that largely determines the effects of work. Contrary to what employers consider a fact, long working hours do not mean a better financial result. An employee working for a long time, who is entitled to only one break, will be tired of work, more nervous, prone to make frequent mistakes (Nakphet, Chaikumarn, Janwantanakul, 2014, pp. 342). It is a big challenge for the employer to properly manage his working time, first of all to complete all orders on time, and secondly to optimize the employee's work.

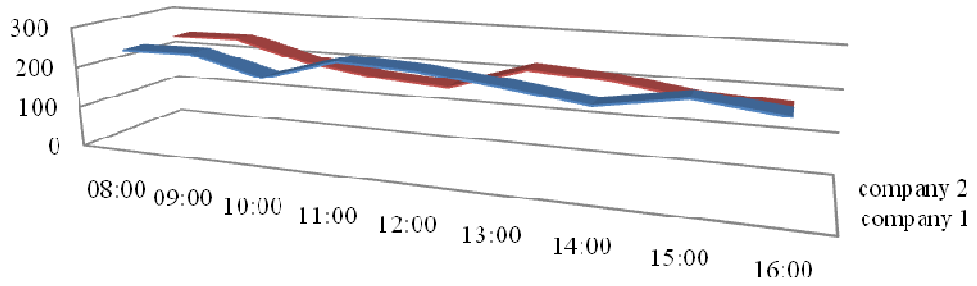
Ergonomics in the working environment – Research Project Results

The research was conducted using three different methods. The first method was snapshot observation of workplaces. The second method was the analysis of the company's documentation, and the third method was an internet survey.

At the beginning of the survey, employees in both companies were observed to gather information about the working environment and to prepare a proper questionnaire. The developed electronic questionnaire was sent out to employees to answer 15 short questions. The documentation of the companies made it possible to examine employee performance in different periods.

Due to the limited form of the article, only selected elements of the research project, concerning working time and position at work, will be presented below.

In the first company for a year there have been new work rules in place, which were introduced after the director completed training in ergonomics. He decided that it is worth to implement low-budget solutions and check what effects they will bring. The first solution that was implemented was to introduce one additional break lasting 15 minutes. So the working time was divided into three equal sections by two breaks. The first break at 10:30 and the second one at 13:30. In the second company, however, employees are only entitled to one 15-minute break during the day, at 12:30. On the basis of observation and analysis of documentation, it was established what amounts of details are produced by individual employees on an hourly basis. The average quantity for employees in one and the other company was determined and then presented in a graphic version. Figure 1 shows a comparison of the average number of produced details by employees of two companies. In the first case, employees have two breaks of 15 minutes each, and in the second only one break, which lasts 15 minutes.



	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00
company 1	240	243	198	250	242	222	198	229	209
company 2	243	246	200	175	164	221	210	184	175

Fig. 1: Average number of produced parts per working hour in two companies
Source: Own study

The effects of 20 production workers from the first company and the same number of production workers from the second company were allowed for analysis. It turned out that the introduction of one additional break is a very accurate measure, because the productivity of the employees, which was very much decreasing at about 1 p.m., increased significantly just after coming back from the second break. On the other hand, in the second company, a decrease in productivity can be observed from 10 a.m., and productivity growth occurs only after returning from the break. It is very interesting that although the employees of the first company perform their work shorter than their colleagues from the second company, they are still able to produce more than 200 pieces more during the day. The conclusion of this study is unambiguous and shows that employees doing monotonous work with increasing worked hours produce fewer pieces. One additional break is enough to increase their productivity.

Another improvement that was introduced in the first company was the possibility to change the position at work. Employees were given chairs without a backrest, on which they could sit down during production of details and perform work in a sitting position. The possibility of changing the body position proved to be very important for those working on the assembly tape. The employees were asked about this aspect in the questionnaire. It turned out that in the first company, where the possibility to change position during work has been introduced, job satisfaction, caused by the reduction of pain, increased significantly. Figure 2 shows the answers of production workers to their position in working time.

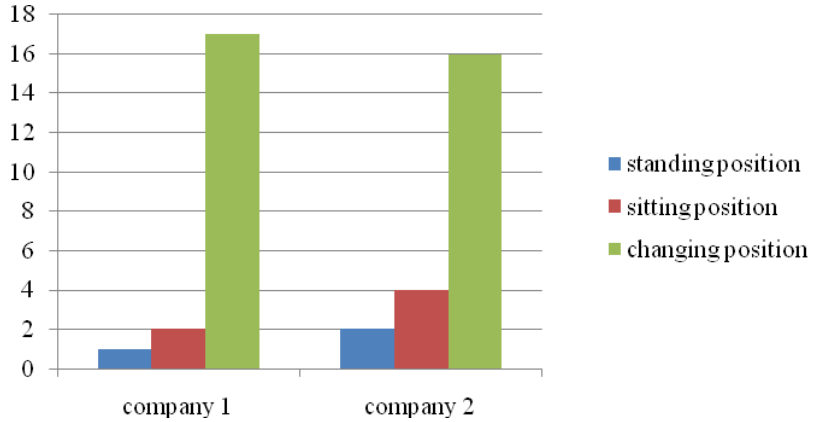


Fig. 2: Work position preferred by employees

Source: Own study

The vast majority of employees of both companies prefer alternating positions at work. Unfortunately, employees of the other company do not have the possibility to sit down at all while working, which increases their fatigue, backache and leg aches and causes less satisfaction from work. This is confirmed by their answers to the questionnaire.

Conclusions

Work management using ergonomic recommendations makes it possible to achieve very good results, improve employees satisfaction and reduce their health problems. By implementing practically cost-free ergonomic solutions to the work process, it is possible to increase the productivity of employees. This is clearly confirmed by the results obtained during the research. Companies wishing to obtain economic and social benefits at the same time should implement ergonomic solutions in every possible area of operation.

References

- Nakphet N., Chaikumarn M., Janwantanakul P. (2014), 'Effect of Different Types of Rest-Break Interventions on Neck and Shoulder Muscle Activity, Perceived Discomfort and Productivity in Symptomatic VDU Operators: A Randomized Controlled Trial', *International Journal of Occupational Safety and Ergonomics*, Vol. 20, No. 2, 339–353.
- Binczycki B. (2013), Ergonomics In Human Resources Management, 7th International Quality Conference, University of Kragujevac, Kragujevac.
- Imada A. S., Nagamachi M. (1995), 'Introduction to Participatory Ergonomics', *International Journal of Ergonomics*, no. 15, 309-310.
- Kalkis H., Roja Z. (2016), 'Strategic Model for Ergonomics Implementation In Operations Management', *Journal of Ergonomics*, no. 6(4), 35–38.

The Role of Finance in Ensuring Sustainable Economic Development

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Abstract

Recently, there has been discussion about the need to rethink finance for sustainable economic development—in particular, how to influence inclusive growth through finance. There is a widespread opinion that conventional finance is not suited to financing sustainable economic growth. Studies have indicated that sustainable finance provides effective financing for sustainable economic development. This article is one of the first to search for the answer to the question whether countries with more sustainable finance have more sustainable economic development. This study attempts to investigate if there is a relationship between sustainable finance and sustainable economic development and thus if sustainable finance ensures a better adjustment of the financial sphere to the needs of the real economy. This study uses the relative taxonomy method to analyze the level of development, both in sustainable economic development and sustainable finance, for 23 EU countries belonging to the OECD. For this purpose, the Eurostat dataset from 2016 was analysed. Twenty-four indicators representing sustainable finance (15) and sustainable economic development (9) were used. The study results show the diversity of EU countries belonging to the OECD in terms of the studied phenomenon. From both an economic and a financial perspective, the best position belongs to countries in Northern and Western Europe, with the exception of Belgium. The countries of Eastern and Southern Europe have different and much more poorly ranking positions.

Keywords: Sustainability, Finance, Economic Development, Relative Taxonomy Method

Introduction

Discussions about the role of finance in the economy and its impact on development has had a long history (Bagehot, *Lombard Street* 1873). Levine (2004) notes that countries with better operating banks and financial markets tend to grow faster. Khan and Senhadji (2000) made an overview of related work, and their conclusion was that the impact of financial development on growth is positive, although the size of the effect varies with different indicators of financial development and the methodology of the study. Also Loayza et al. (2018) reviewed papers published in the last 20 years concerning financial development, financial crises, and economic growth. The authors concluded that financial development can ensure the development of a crucial framework to propose policies linked to financial depth, diversity, and inclusion. The relationship between finance and sustainability has already been the subject of many papers.

In the context of finance versus sustainability, there are several research problems that are frequently discussed. The biggest concern is the issue of adjusting finance and designing financial systems for financing sustainable development. Pissano et al. (2012) reported a crucial gap between sustainable development and financial markets. The major issue relates to balancing sustainable development dimensions that are typically long-term focused with the typically short-term profits of conventional finance. Fullwiler (2015) argues that the developing scope of sustainable finance offers an opportunity

to create a more general theory of finance that takes into account the social and environmental pillars of sustainable development.

The current research debate usually refers to sustainability and finance (Ferreira et al. 2016) in the context of the following four factors: the institutional links in capital markets (Gray 2011), the impact of ESG (environmental, social and corporate governance) on financial performance (Nikolakis et al. 2012), the impact of investment (Hebb 2013) and socially responsible investment (Vandekerckhove and Leys 2012). Considering the relationship between social and environmental performance versus financial performance, the literature gives an unclear picture. Some studies have found evidence for a positive relationship (Dowell et al. 2000), whereas some report a negative relationship (Walley and Whitehead 1994), and others find a neutral linkages (Elsayed and Paton, 2005) between these areas. The only study provides a positive conclusion is Orlitzky et al. (2003).

Lastly, there is wide discussion about finance and economic development in the context of sustainability. Sestakova (2012) argues that the stability of the financial sector is an important precondition for sustainable economic development. At the same time, the financing in the Sustainable Development Report (2019) calls for making the global economy and global finance more sustainable. Anwar et al. (2011) found a stable long run relationship between financial sector indicators and sustainable economic development. The authors reported that the financial sector had a positive impact on sustainable economic development in both the short- and long-term. Although a positive relationship has been reported between finance and sustainable economic development, there is currently no in-depth study that explores sustainable finance's role in supporting sustainable economic development. The present study intends to cover this gap and to determine if the finance model matters in ensuring sustainable economic development. This paper assumes that the sustainable finance model enhances the degree to which the financial sphere fits into the real economy and provides a more efficient dissemination of the sustainability development process compared to conventional finance. The aim of this article is to show the differences between countries depending on the finance model they represent (sustainable or conventional) and to demonstrate the relationship between a country's financial model and sustainable economic development.

The paper is organized as follows: Section I discusses the research procedure, Section II presents the research results and discussion, and Section III presents conclusions.

Research Procedure

Selection of Diagnostic Indicators

In the paper two sets of diagnostic indicators were used. First one is related to the economic area of sustainable development. In this group the indicators applied by the European Commission to monitor the progress in the implementation of „The 2030 Agenda for Sustainable Development" in the European Union, were used. To this group also one indicator described the results in the area of competitive position (value of Foreign Direct Investment *per capita*, FDI *per capita*), was assigned. The paper considers the concept of sustainable economic development discussed by inter alia Barbier (1987). For the second one the indicators selected by authors according to the profound literature review and already presented in the previous research papers (Zioło et al., 2019 a, 2019b), were assigned. The indicators explaining sustainable finance scope were selected to reflect the three dimensional nature of sustainable finance, where: 2 indicators are related to the environmental pillar of sustainable development and sustainable finance ($x_{2.9S}$, $x_{2.10S}$); indicators $x_{2.3S} - x_{2.6S}$ are applied to describe the social pillar; and the rest of them are utilized to present the economic pillar. In the study we based on financial models proposed by Schoenmaker (2017). The selection of the indicators in sustainable finance scope was based on the related work: Apergis, Eleftheriou and Payne, (2013) (environmental pillar), Burchardt and Vizard (2007), Balcerzak (2020) (social pillar) and Čihák et al. 2012, Pietrzak (2019) (economic pillar). In the paper the results of 23 EU countries belonging to OECD were analysed. Table 1 contains a detailed list of indicators constituting the basis of empirical research presented in the paper.

Table 1: The research database divided into two groups of indicators described economic area of

sustainable development and sustainable finance

Symbol	Economic area of sustainable development
$x_{1.1S}$	real GDP *per capita*, chain linked volumes (2010=100), Euro *per capita*
$x_{1.2S}$	employment in high-and medium-high technology manufacturing sectors and knowledge-intensive service sectors, %of total employment
$x_{1.3D}$	involuntary temporary employment, % of employees aged 20 to 73
$x_{1.4S}$	R&D personnel by sector, % of active population
$x_{1.5S}$	employment rates of recent graduates, % of population aged 20 to 43
$x_{1.6S}$	purchasing power adjusted GDP *per capita* (in PPS EU28)
$x_{1.7S}$	Foreign Direct Investment (FDI) in million Dollars *per capita*
$x_{1.8S}$	energy productivity, Euro per kilogram of oil equivalent (KGOE)
$x_{1.9d}$	greenhouse gas emissions intensity of energy consumption (source: EEA and Eurostat), index (2000 = 100)
Symbol	**Sustainable finance**
$x_{2.1S}$	gross domestic expenditure on R&D, % of GDP
$x_{2.2D}$	Gini coefficient of equivalised disposable income, coefficient of 0 (maximal equality) to 100 (maximal inequality)
$x_{2.3S}$	general government expenditure on education, % of GDP
$x_{2.4S}$	general government expenditure on health % of GDP
$x_{2.5S}$	general government expenditure on social protection, % of GDP
$x_{2.6S}$	general government total expenditure on law courts, Euro per inhabitant
$x_{2.7D}$	general government gross debt, Percentage of gross domestic product (GDP)
$x_{2.8S}$	shares of labour taxes in total tax revenues, % of total taxes
$x_{2.9S}$	shares of environmental taxes in total tax revenues, % of total taxes
$x_{2.10S}$	environmental taxes, percentage of total revenues from taxes and social contributions (including imputed social contributions)
$x_{2.11D}$	consolidated banking leverage, domestic and foreign entities (asset-to-equity multiple)
$x_{2.12S}$	bank credit to the private sector as percent of GDP
$x_{2.13S}$	official development assistance as share of gross national income (source: OECD), % of gross national income (GNI)
$x_{2.14S}$	EU imports from developing countries, million EUR, Development Assistance Committee (DAC) in millions of Euro
$x_{2.15S}$	income from natural resources, percent of GDP

Source: Eurostat data base, where: S – Stimulant; D- Destimulant.

Statistical Methods

In the paper, to study the disparities between the selected EU countries belonging to the OECD, the relative taxonomy described in the work of Wydymus (2013) was used. The main advantage of this method is the possibility to analyse changes simultaneously in the assigned rankings not only due to the situation of individual countries, but also to the situation of all others. The detailed description and results of its applications can be also found in the paper of Cheba (2020). In the first step after the selection of diagnostic indicators, destimulant should be transformed into stimulants. For this purpose a quotient transformations can be used. It should be noted that relative taxonomy can also analyse attributes expressed in different units of measure. The research procedure is provided according the following steps:

Step 1. Relativization the values of diagnostic indicators

The selected indicators are relativized for each object *i* and for the given *t*-year against the other analysed *l*-object with use the following formula (Wydymus 2013):

$$d_{(l/i)jt} = x_{ljt}/x_{ijt}, \quad (1)$$

where:

d – relativized values of the indicators, i, $l = 1, \ldots, k$ – objects' numbers, $i \neq l$, $j = 1, \ldots, m$ – numbers of sub-indicators, $t = 1, \ldots, n$ – numbers of years.
The structure of the individual arrays for each j-feature and t-year can be presented in the following form:

$$D_{jt} = \begin{bmatrix} 1 & d_{(2/1)_{jt}} & \cdots & d_{(k/1)_{jt}} \\ d_{(1/2)_{jt}} & 1 & \cdots & d_{(k/2)_{jt}} \\ \cdots & \cdots & 1 & \cdots \\ d_{(1/k)_{jt}} & d_{(2/k)_{jt}} & \cdots & 1 \end{bmatrix} \quad (2)$$

The magnitudes d in matrix (2) are unchanged and assume values close to 1. If: $d > 1$, then this implies the relative advantage of the l-th country in terms of the analysed diagnostic X. Conversely, if: $d < 1$, the interpretation is reversed. It can also be expressed as a percentage:

$$\lambda_{l/j} = \left(d_{l/i} - 1\right) \cdot 100 \quad (3)$$

Step 2. Classification of the objects

Based on the matrices $\mathbf{D}_{jt}$, matrix Δ_{it} for each spatial i object at the t-year was constructed. This matrix adopts the following form for individual objects (Wydymus 2013):

$$\Delta_{1t} = \begin{bmatrix} d_{(1/2)_{1t}} & d_{(1/2)_{2t}} & \cdots & d_{(1/2)_{jt}} \\ d_{(1/3)_{1t}} & d_{(1/3)_{2t}} & \cdots & d_{(1/3)_{jt}} \\ \vdots & \vdots & \ddots & \vdots \\ d_{(1/k)_{1t}} & d_{(1/k)_{2t}} & \cdots & d_{(1/k)_{jt}} \end{bmatrix},$$

$$\Delta_{2t} = \begin{bmatrix} d_{(2/1)_{1t}} & d_{(2/1)_{2t}} & \cdots & d_{(2/1)_{jt}} \\ d_{(2/3)_{1t}} & d_{(2/3)_{2t}} & \cdots & d_{(2/3)_{jt}} \\ \vdots & \vdots & \ddots & \vdots \\ d_{(2/k)_{1t}} & d_{(2/k)_{2t}} & \cdots & d_{(2/k)_{jt}} \end{bmatrix},$$

$$\Delta_{jt} = \begin{bmatrix} d_{(k/1)_{1t}} & d_{(k/1)_{2t}} & \cdots & d_{(k/1)_{jt}} \\ d_{(k/2)_{1t}} & d_{(k/2)_{2t}} & \cdots & d_{(k/2)_{jt}} \\ \vdots & \vdots & \ddots & \vdots \\ d_{(k/k-1)_{1t}} & d_{(k/k-1)_{2t}} & \cdots & d_{(k/k-1)_{jt}} \end{bmatrix}.$$

Matrices Δ_{jt} are usually defined as k-1 observation vectors of j-feature objects. Based on the array of $\mathbf{D}_{jt}$ matrices, the EU Member States belonging to the OECD are classified. In this step, the whole set of diagnostic indicators X is taken into account. This means defining the following matrices (Wydymus 2013):

$$A = \begin{bmatrix} 0 & & \frac{1}{(k-1)} \\ & \cdots & \\ \frac{1}{((k-1)} & & 0 \end{bmatrix}, \quad (4)$$

and products $D_{jt} = A \cdot D_{jt}$**.** Elements on the main diagonal matrix $\mathbf{D}^*$ form a three-dimensional matrix $\mathbf{W}$ defined for all j indicators and periods t (Wydymus, 2013):

$$W = \begin{bmatrix} w_{11t} & w_{12t} & \cdots & w_{1mt} \\ w_{21t} & w_{22t} & \cdots & w_{2mt} \\ \cdots & \cdots & \cdots & \cdots \\ w_{k1t} & w_{k2t} & \ldots & w_{kmt} \end{bmatrix}, \quad (5)$$

Finally, the relative taxonomic measure of development determined by the $\mathbf{W}$ matrix is calculated based on the following formula:

$$S_{it} = \left[\sum 1/w_{ijt}\right]/m, \quad (6)$$

The value of this measure is close to 1. The obtained results can be interpreted as the relative position of the particular EU country belonging to the OECD relative to all other analysed countries. For objects with a similar level of development, the values generally hover around unity. The lower the value of the measure is the better the situation of the EU countries against the others.

Study Results and Discussion

Table 2 compares the results of ordering and classifying-EU Member States belonging to the OECD in economic area of sustainable development and sustainable finance in 2016. Relative measures were used to assess the situation of a given country relatively to all others.

Table 2: Comparison of results of EU countries belonging to OECD within economic area of sustainable development and sustainable finance in 2016

EU countries	Economic area of sustainable development			Sustainable finance		
	S_{eci}	Rank	Group	S_{fi}	Rank	Group
Austria	0.699	4	I	0.857	7	II
Belgium	0.775	8	II	1.310	23	IV
Czech Republic	1.107	12	III	1.057	13	III
Denmark	0.705	5	I	0.688	1	I
Estonia	1.233	19	III	0.944	8	II
Finland	0.987	11	II	0.840	4	I
France	0.901	10	II	1.109	17	III
Germany	0.811	9	II	0.982	10	II
Greece	1.512	22	IV	1.165	20	III
Hungary	1.149	15	III	1.133	18	III
Ireland	0.617	1	I	1.056	12	III
Italy	1.140	14	III	1.042	11	III
Latvia	1.276	21	III	1.302	22	IV
Lithuania	1.174	16	III	1.221	21	IV
Luxembourg	0.657	2	I	0.950	9	II
Netherlands	0.752	7	II	0.736	2	I
Poland	1.597	23	IV	1.091	16	III
Portugal	1.219	18	III	1.077	14	III
Slovakia	1.183	17	III	1.159	19	III
Slovenia	1.127	13	III	0.845	6	II
Spain	1.257	20	III	1.088	15	III
Sweden	0.720	6	I	0.779	3	I
United Kingdom	0.695	3	I	0.841	5	I

Source: own research

Table 2 shows that the positions taken by individual EU countries belonging to the OECD in the received rankings in most cases differed significantly. In terms of the economic situation, a development of such countries as: Ireland, Luxembourg and the United Kingdom were better than other countries. However, at the top of the ranking due to sustainable finances were: Denmark, the Netherlands and Sweden. It should be noted that in both areas, the top of the rankings included countries located in Northern and Western Europe. There is no country that would be developed at the same level in both areas. Two countries are the closest in this respect: the Czech Republic (12 position due to economic area and 13 due to financial) and Germany (9 position due to economic area and 10 due to financial). In the case of three countries, the differences in positions exceed 10 and the largest of them concerns Belgium (8 and 23 position respectively), Estonia (19 and 8 position respectively) and Ireland (1 and 12 position respectively). The ordering of countries in the ranking calculated on the basis of indicators describing

the economic dimension of sustainable development was primarily affected by such indicators as: $x_{1.1S}$ – real GDP *per capita*, chain linked volumes (2010=100), Euro *per capita,* $x_{1.2S}$ – employment in high-and medium-high technology manufacturing sectors and knowledge-intensive service sectors, %of total employment $x_{1.4S}$ - R&D personnel by sector, % of active population. The estimates of the Pearson correlation coefficients between these indicators and the results of the taxonomic measure of development were above 0.8. However, in the case of indicators used to calculate a ranking describing the situation of the studied countries in terms of sustainable finance, the highest Pearson correlation coefficient (r = -0.62) was obtained in the case of the $x_{2.1S}$ describing gross domestic expenditure on R&D as % of GDP.

Due to the fact that the rankings of countries in the studied areas are not the same and in some cases they differ quite significantly, to find out to what extent there is a compliance between the ordered objects, the Pearson and τ Kendall correlation coefficients were determined (Tables 3 and 4). In these cases the coefficient values indicate a moderate compliance of the linear ordering of countries, which confirms the significant discrepancies in the positions occupied by some countries.

Table 3: Matrix of Pearson coefficients for the results of ordering EU countries belonging to OECD in 2016

Area:	Economic area of sustainable development	Sustainable finance
Economic area of sustainable development	1.000	0.514
Sustainable finance	0.514	1.000

Source: own research

Table 4: Matrix of Kendall τ correlation coefficients for the results of ordering EU countries belonging to OECD in 2016

Area:	Economic area of sustainable development	Sustainable finance
Economic area of sustainable development	1.000	0.391
Sustainable finance	0.391	1.000

Source: own research

The mean values and standard deviation of relative taxonomic measures were the basis for grouping EU countries into four typological groups bringing together countries with a similar level of economic and financial development (Table 2, figures 1-2). The differences in the distribution of the EU Member States into typological groups due to the studied areas are not large, which confirms the value of the Kendall τ correlation coefficient (Table 5). Only for 2 EU countries (Belgium and Ireland) the distance between groups is 2, and for 10 countries no changes in typological groups were observed.

The analysis of typological groups showed a clear diversity of EU countries in terms of the studied phenomenon. For both the economic and financial area, the best situation concerns countries located in Northern and Western Europe, with the exception of Belgium, which takes the last position in the ranking of sustainable finances. Countries located in Eastern and Southern Europe (e.g. Greece, Spain, and Poland, Slovakia) are in a much worse situation.

Table 5: Matrix of Kendall τ correlation coefficients for the results of division of EU countries belonging to OECD into typological groups in 2016

Area:	Economic area of sustainable development	Sustainable finance
Economic area of sustainable development	1.000	0.474
Sustainable finance	0.474	1.000

Source: own research

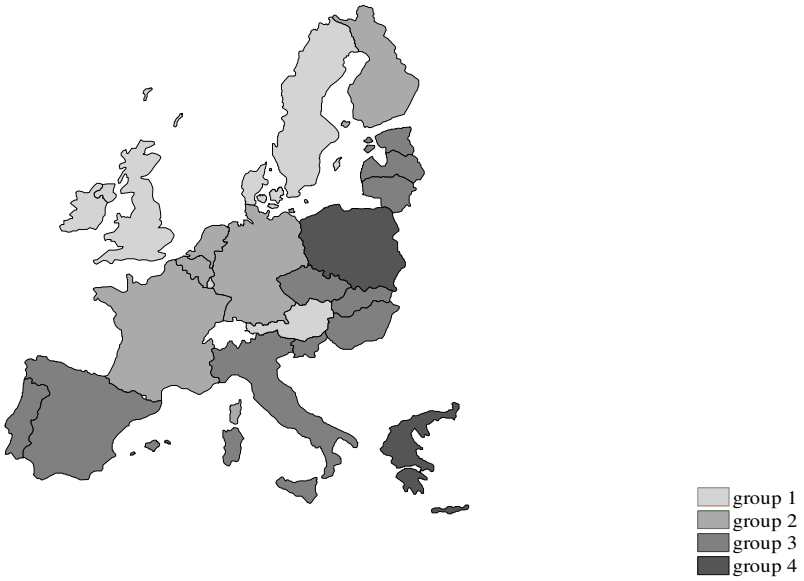

Fig. 1: The results of division of EU countries belonging to OECD into typological groups according to the results obtained in economic area of sustainable development

Source: own research

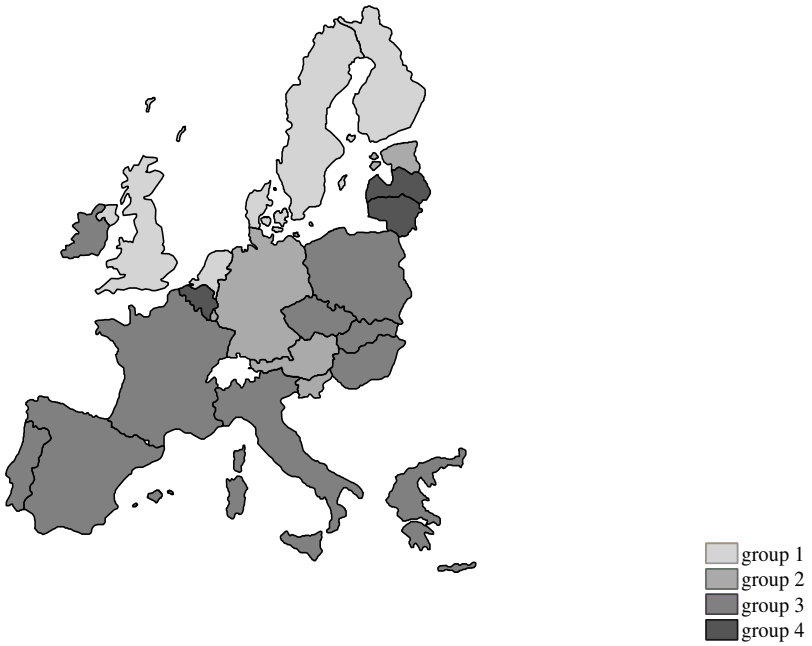

Fig. 2: The results of division of EU countries belonging to OECD into typological groups according to the results obtained in economic area of sustainable finance

Source: own research

The general results of the study show that the countries of Northern and Western Europe achieve better positions than Eastern and Southern Europe in their rankings for both sustainable finance and sustainable economic development. This is particularly apparent for Sweden, Denmark, and the United Kingdom (typological group I in both categories); Germany (typological group II in both categories); and the Czech Republic, Hungary, Italy, Portugal, Slovakia, and Spain (typological group III in both categories). In the case of other countries, the difference between the typological groups in both categories is not greater than one—e.g., countries from the 3rd typological group are in typological group IV in the second category and vice versa.

There is, therefore, a relationship between the sustainable finance model and sustainable economic development. The results of this study are problematized by the phenomenon of financialisation, which affects the ranking position of sustainable finance in highly developed countries that have problems with excessive leveraging in financial markets; hence, the financial stability of the countries considered in the rankings has an impact on their position in terms of sustainable finance. Financialisation is observed in developed countries, especially those with a well-developed capital market, such as countries located in Western Europe.

On the other hand, in the case of Central and Eastern European countries, environmental taxes are significant in assessing the sustainable finance model. This indicator, as one of the most important instruments for sustainable finance supporting positive changes in the utilisation of the environment by humans, plays a different role in Central and Eastern Europe than in Western and Northern Europe. In Central and Eastern Europe, tax rules are applied according such that the polluter pays higher taxes. In highly developed countries, environmental taxes are also paid by advanced entities to help protect the environment. This reflects their contribution to supporting environmental protection.

The results of this study show that sustainable economic development is related to the sustainable finance model, which is based on mixed instruments representing social and environmental pillars of sustainable development. In particular, instruments like environmental taxes or a redistribution policy based on transfers and inclusion-friendly expenditures play an important role. Factors that negatively affect sustainable economic growth include the excessive financial leverage used in developed financial markets and financial engineering conducive to the development of financialisation.

At the same time, an important factor positioning the Scandinavian countries (Northern Europe) so high in the sustainable finance model ranking is their effective redistribution systems that reduce income inequality and promote social inclusion. In the countries of Central and Eastern Europe, this system is less effective.

Our findings are in line with other relevant research that confirms a positive impact of finance on sustainable economic development. Paun et al. (2019) argue that credit expansion during and after the last financial crisis, which diminished economic growth, and banking sector were less effective in sustaining economic growth compared to capital markets. Finally, sustainable development is very strongly influenced by financial markets and institutions. Our results are also related to those presented by Gur (2017), who found that by providing external finance to R&D, technology-intensive industries became more important for sustainable economic growth. In sum, an evolving financial system is necessary to achieve sustainable growth.

Conclusion

The problem of adjusting the financial sphere to contemporary socio-economic realities has been widely discussed in the literature. The research notes that conventional finance does not take into account a three-dimensional perspective of development and sustainable growth, making it an ineffective financing model. It is increasingly suggested that a sustainable finance model is one that allows for the effective financing of a sustainable economy and sustainable development, but very few studies have attempted to prove this thesis empirically. The present article is one of the first in this field to try to determine the relationship between the sustainable finance model and sustainable economic development.

This study examined 23 EU countries belonging to the OECD in 2016 based on Eurostat data set. To analyse the disparities between the selected EU countries belonging to the OECD, the relative taxonomy method was used. An empirical analysis was conducted based on 24 indicators representing sustainable finance (15) and sustainable economic development (9). The research methodology of this study, however, faces numerous limitations, including data availability and completeness, particularly for sustainable finance. However, based on the available data, it is possible to draw preliminary conclusions that can be subjected to further in-depth analyses using qualitative methods.

The results of this study show that there is a relationship between the sustainable finance model and sustainable economic development. In the case of most developed countries located in Northern Europe, such as the Scandinavian countries, this relationship is particularly important. This study allowed us to identify four typological groups of countries in both sections of the sustainable finance model and sustainable economic development. The highest rated countries in terms of meeting the criteria of the sustainable finance model and sustainable economic development were assigned to the first typological group, while to the fourth group contains countries with the weakest positions in both these categories. Typological group II contains countries with scores above the mean value for all analysed objects, while the third typological group contains countries with results below the mean value. A similar situation concerns so called post-transformation countries (the Visegrad countries), which form a subgroup in the countries of Central and Eastern Europe. Notably, in the case of countries located in Northern and Western Europe and in Central and Eastern Europe, there are different factors that determine their ranking positions.

For the first aforementioned group, one of the most important factors is financialisation. This factor negatively affects the sustainable finance model. Importantly, in this group, environmental taxes and the budget redistribution system have a positive impact on the sustainable finance model.

In the second group, the main factors negatively affecting a country's ranking in the sustainable finance model are environmental taxes and the redistribution system. For the results of countries in this group, financialistaion is not as important as a factor that can be taken into account when formulating a more sustainable financial system.

This distinction is important because the countries located in Central and Eastern Europe have economies that are based on fossil fuels (coal), which contributes to excessive greenhouse gas emissions. For this group, ensuring environmental sustainability is very important, hence the significant role of environmental taxes in their financial systems. The second issue is social inclusion, which remains a challenge for this group of countries. Sustainable economic development, in turn, requires a green and inclusive approach for growth, which is not possible without a sustainable finance model. The relationships between variables, which were ignored in the study, encourage further in-depth analyses on the role of the market and public financial sustainable systems in ensuring sustainable economic development. This will also be a subject of the authors' future research.

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References

- Anwar, S., Shabir, G. and Zakir, H. (2011), 'Relationship between Financial Sector Development and Sustainable Economic Development: Time Series Analysis from Pakistan, *International Journal of Economics and Finance*, 3 (1), 262-270

- Apergis, N., Eleftheriou, S., and Payne, JE. (2013), 'The Relationship between International Financial Reporting Standards, Carbon Emissions, and R&D Expenditures: Evidence from European Manufacturing Firms,' *Ecological Economics*, 88, 57–66

- Balcerzak, AP. (2020), 'Quality of Institutions in the European Union Countries Applications of TOPSIS based on Entropy Measure for Objective Weighting,' *Acta Polytechnica Hungarica,* 17 (1), 101-122

- Barbier BE. (1987), 'The Concept of Sustainable Economic Development, *Environmental Conservation*,' 14 (2), 101-110

- Burchardt, T., and Vizard, P. (2007), 'Definition of Equality and Framework for Measurement: Final Recommendations of the Equalities Review Steering Group on Measurement,' *CASE paper*, 120, LSE, London.

- Cheba, K. (2020), 'The Applications of Dynamic Relative Taxonomy Methods to Assess the Effectiveness of Transnational Corporations Strategies,' *European Journal of International Management,*. in press, [Online], [Retrieved December 28, 2019], http://www.inderscience.com/info/ingeneral/forthcoming.php?jcode=ejim

- Čihák, M., Demirgüç-Kunt, A., Feyen, E., and Levine, R. (2012), 'Benchmarking Financial Systems Around the World,' *Policy Research Working paper*, 6175, 1-56

- Dowell, G., Hart, S. and Yeung, B. (2000), 'Do Corporate Global Environmental Standards Create or Destroy Market Value?.' *Management Science,* 46 (8), 1059-1074

- Elsayed, K., and Paton, D. (2005), 'The Impact of Environmental Performance on Firm Performance: Static and Dynamic Panel Data Evidence,' *Structural Change and Economic Dynamics*, 16(3), 395-412

- Ferreira, M., Rezende de Carvalho, C., Amorim, SB., Kimura, H., and de Moraes Barboza, FL. (2016), 'A Systematic Review of Literature about Finance and Sustainability,' *Journal of Sustainable Finance & Investment*, 6, 112-147

- 'Financing for Sustainable Development Report 2019,' [Online], [Retrieved December 28, 2019], https://developmentfinance.un.org/fsdr2019

- Fullwiler, ST. (2015), 'Sustainable Finance: Building a More General Theory of Finance,' *Binzagr Institute for Sustainable Prosperity*, Working Paper, 106, 1-22, [Online], [Retrived December 28, 2019], http://www.binzagr-institute.org/wp-contenr/uploads/2015/04/WP-106.pdf

- Gray, TR. (2011), 'Mapping a Corporate Governance Exchange: a Survey of Canadian Shareholder Resolutions 2000–2009,' *The Journal of Sustainable Finance & Investment*, 1 (1), 30–43

- Gur, N. (2017), 'Financial System and Sustainable Growth.' 1-14, In: Yülek M. (eds) Industrial Policy and Sustainable Growth. Sustainable Development. Springer, Singapore

- Loayza, N., Ouazad, A., and Rancière, R. (2018), 'Financial Development, Growth, and Crisis: Is There a Trade-Off?,' *National Bureau Of Economic Research Working Paper,* 24474, 1-42

- Levine, R. (2004), 'Finance and Growth: Theory and Evidence,' *National Bureau Of Economic Research Working Paper 10766*, 1-5

- Khan, M., and Senhadji, A. (2000), 'Financial Development and Economic Growth: An Overview,' 2000 (209), IMF Working Papers, 1-24, [Online], [Retrived December 28, 2019], http://dx.doi.org/10.5089/9781451874747.001

- Nikolakis, W., Cohen, DH., and Nelson, HW. (2012), 'What Matters for Socially Responsible Investment (SRI) in the Natural Resources Sectors? SRI Mutual Funds and Forestry in North America,' *The Journal of Sustainable Finance & Investment*, 2 (2), 136–151

- Orlitzky, M., Schmidt FL., and Rynes SL. (2003), 'Corporate Social and Financial Performance: a Meta Analysis,' *Organization Studies,* 24 (3), 403-441

- Paun, CV., Musetescu, RC., Topan, VM., and Danuletiu DC. (2019), 'The Impact of Financial Sector Development and Sophistication on Sustainable Economic Growth,' *Sustainability*, 11 (1713), 1-20, [Online], [Retrived December 28, 2019], doi:10.3390/su11061713

- Pisano, U., Martinuzzi, A., and Bruckner, B. (2012), 'The Financial Sector and Sustainable Development: Logics, Principles and Actors,' *ESDN Quarterly Report,* 27

- Pietrzak, MB. (2019), 'Modifiable Areal Unit Problem: the Issue of Determining the Relationship between Microparameters and a Macroparameter. *Oeconomia Copernicana*, 10 (3), 393-417

- Schoenmaker, D. (2017), 'Investing for The Common Good: A Sustainable Finance Framework,' *Bruegel Essay and Lecture Series*

- Sestakova, M. (2012), 'Financial Sector and Sustainable Economic Development.' Conference: Management Challenges in the 21st Century: 2012 "*Sustainability a Moving Target*?", At Bratislava. April 2012

- Walley, N., and Whitehead, B. (1994), 'It's not easy being green,' *Harvard Business Review*, 72 (3), 46-52

- Wydymus, S. (2013), 'Economic Development and the Level of Remuneration in European Union Countries - Taxonomic Analysis/ Rozwoj gospodarczy a poziom wynagrodzen w krajach Unii Europejskiej – analiza taksonomiczna,' *Zeszyty Naukowe Uniwersytetu Szczecinskiego*, 756, *Finanse, rynki finansowe, ubezpieczenia*, 57, 632-645, [Online], [Retrived December 28, 2019], http://www.wneiz.pl/frfu/numery/rok2013/frfu-nr-57-2013/3246-rozwoj-gospodarczy-a-poziom-wynagrodzen-w-krajach-unii-europejskiej-analiza-taksonomiczna

- Vandekerckhove, W., and Leys, J. (2012), 'Dear Sir, We are Not an NGO,' *The Journal of Sustainable Finance & Investment*, 2 (2), 152–161

- Zioło, M., Filipiak, M.Z., Bąk, K., and Cheba, K. (2019a), 'How to Design More Sustainable Financial Systems: The Roles of Environmental, Social, and Governance Factors in the Decision-Making Process,' *Sustainability*, 11 (20), 56041, 1-34, [Online], [Retrived December 28, 2019], https://doi.org/10.3390/su11205604

- Zioło, M., Filipiak, B.Z., Bąk, I., Cheba, K., Tîrca, D.M., and Novo-Corti, I. (2019b), 'Finance, Sustainability and Negative Externalities. An Overview of the European Context,' *Sustainability*, 11(15), 4249, 1-35, [Online], [Retrived December 28, 2019], https://doi.org/10.3390/su11154249

European Integration Economic Challenges, Financial Impacts, and Monitoring the Absorption of Ukraine's Identity

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Abstract

Being in a situation of the socio-economic system disintegration, Ukraine faces the problem of protecting its own identity against the background of the European integration course chosen by the government at the legislative level and enshrined in the Constitution of Ukraine. The situational Ukrainian problem is that if the government continues to focus on integration trends at an accelerated pace, skills, labor and human resources, which are significantly declining now in Ukraine, will lose their qualitative value, which will inevitably lead to a Ukrainian collapse economic system, but also significant issues of partner countries. *The aim of the article* is theoretical and applied aspects of reflecting the real state of integration economic challenges and their financial consequences for the country with a focus on monitoring the absorption of Ukraine's national identity. *Methods / approaches*: research methodology based on methods of correlation and comparative analysis; logical and heuristic; extrapolation; Feedback. Results: The study confirmed the fact that, despite global trends, Ukraine should question the legitimacy and rationality of the materialistic selfish principle in the economy. The Ukrainian platform of socio-economic strategic development, in activating the policy of national protectionism, as opposed to the populist movement, may become a new paradigm for the existence of national economic environments, which will replace the usual short-sightedness of thoughts and actions today. The authors worked out the determinants of determining the effectiveness of integration processes in the financial and economic sphere, analyzed the peculiarities of the Ukrainian integration direction of development, proposed the creation of appropriate conditions to stop the absorption of national identification and balanced development of the Ukrainian economy. *Conclusions.* The continued attraction to the integration of conventional and uncontrolled growth in the well-being of individual sections of the population leads to severe conflicts in the face of natural laws of the universe and human behavior. Economic laws, rigidly governed by the financial system and its speculative transactions, will further increase the difference in the well-being and income of the various social strata.

Keywords: Integration Challenges, Identity, Financial Implications, Economic Background, Monitoring.

Introduction

After experiencing the problem of the socio-economic system disintegration for the sixth year, Ukraine faces the problem of protecting its own identity against the background of the European integration course chosen by the state in the 21st century. The essence of national identity is set out in the so-called "Ukrainian National Idea" (Ukrainian National Idea, 2011), which, in the view of modern researchers (Vovkanych, 2015), expresses not only the own historical values of Ukraine people, which were formed at the beginning of the last millennium, but also modern values inherent not only for our country but also for other countries of the European Community and the rest the states in the entire civilized world.

The Ukrainian National Idea envisages three main strategic directions for the development of a state that should be cathedral, Ukrainian and worthy of the individual, the whole nation and humanity (Vovkanych, 2015). The notion of catholicity implies not only territorial integrity, but in the current conditions of European integration, it means the ability of the country population to jointly support effectively and promote their own state on the international arena as a competitive participant of economic activity, offering quality products for the international arena which is produced without loss of the social values system due to the accumulated social capital (inside and outside the country).

The second strategic component of identity – Ukrainian – in the context of economic development in the frame of European integration, presupposes the nation's self-sufficiency, its capacity for sustainable development on its own territory, which is at the same time a cozy home for many ethnic minorities, able to create favorable socio-economic conditions for their living, and quality of life. This strategic direction involves the formation of a sustainable image of Ukraine as a country with established values, which develops on the basis of cultural and historical heritage, taking into account innovative transformational instruments of the domestic economic system in accordance with the desired technological style, state interests and world trends.

The third strategic direction – a state which is worthy of man, nation and humanity – within the framework of European integration, provides equal stable socio-economic and environmental conditions for every citizen of the country, which is provided not only with material goods in accordance with European Union standards, but also with development opportunities for each personality, its full self-realization at the expense of accessible quality education, science, inclusive cultural environment, the presence of which makes it possible to fully reveal and realize their full potential.

Priority Integration Areas for Ukraine

In recent years, Ukraine, having identified for itself the course on European integration as the main priority of the country's development, gradually loses all three of the above mentioned components: catholicity as well as Ukrainian identity and worth towards its own citizens:

1. The complex economic indicator of the catholicity created by us, which generates the economic competitiveness of the country, is the gross domestic product per person. According to statistical sources in Ukraine, this indicator is recovering very slowly, but this trend is partly explained by the decrease in the number of permanent residents. On the other hand, in the rating among other countries of the world, including the countries of the European Union, the country gradually slips down: in 2013 according to the UN - 113 place (GDP per person - $ 4 ths.); in 2015, according to the World Bank - 127th place (GDP per person - $ 2.6 ths.); in 2018 - 131st place (GDP - $ 2.96 ths.). The situation of Ukraine as of 2018 among other European countries is presented in the figure. 1. The leader in for this indicator is Luxembourg, which is ranked first not only in Europe but also in the world. Ukraine, ranked 131st, has an indicator that is 38.6 times smaller than the leader country has.

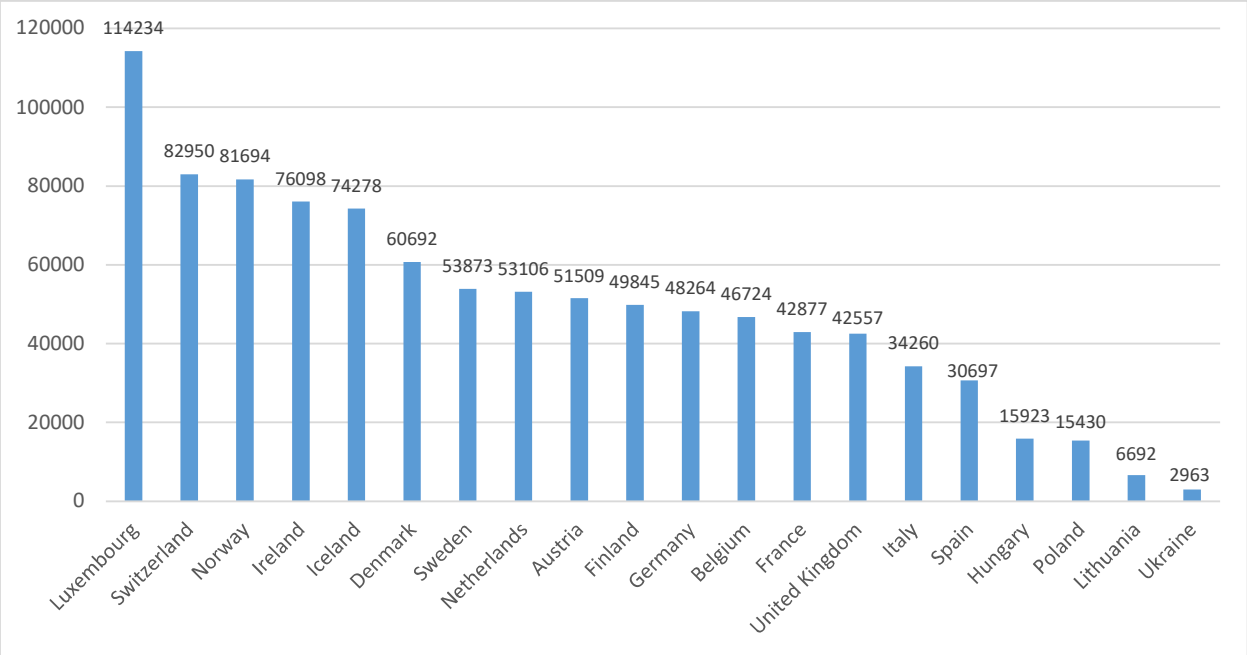

Fig. 1:GDP per capita in 2018, $ ths.

Source: list of countries by GDP, 2019

2. There are reports in the media with regular intervals that allegedly oppressing the rights and freedoms of ethnic minorities against the backdrop of the Ukrainian language. The problem of the invented oppression of the Russian-speaking population, including ethnic Ukrainians speaking Russian, is particularly acute. This part of population is reluctant to switch to the official language even in official communication (most often, this situation is observed with the elderly people in the eastern regions). On the other hand, in the same eastern regions of the country, during the implementation of the so-called "New Ukrainian School" in the general secondary education system, against a large proportion of the Russian-speaking population, there is a shortage of educational materials in the state language. As a result, these circumstances indirectly affect the Human Development Index, which led Ukraine down from 84 places in 2016 (Chorna, 2018) to 88 in 2018 (UNDP Ukraine, 2018).

3. Despite declaring poverty rates, de facto gap between rich and poor sections of the population is only growing. Confirmatory facts confirm the gap between the income of the rich and the poor. If in 2006 this gap was 1:10, in 2016 - 1:30, in 2017 - 1:40. While in EU countries, this figure is 1:5 (Worthy Life - 2017, 2018). Poverty of employees not only in the budget sector but also in entrepreneurship is becoming widespread (What Has Made the Human Rights, 2017)

Situational Ukrainian issues are that if the government continues to focus on integration trends at an accelerated pace, skills, labor and human resources, which are rapidly declining in Ukraine now, will lose their qualitative value, which will inevitably lead to a Ukrainian collapse economic system, but also significant issues of partner countries.

Results

Today, the world faces many challenges, which, with the expansion of integration processes, also involve Ukraine: the financial and economic crisis, climate change, the scarcity of fertile lands and the uncontrolled movement of migration flows. Moreover, the social situation in the world remains extremely unsatisfactory: about 4 billion people are living in poor economic conditions, they are at risk of disasters and natural disasters every day. According to the latest estimates of the Roman Club experts, more than 50 million people are forced to leave their homes and emigrate every year. In 2017, there were already 60 million refugees worldwide (Ulrich von Weizsäcker, 2019).

At the same time, certain societies have nevertheless achieved a considerable level of economic well-being, a scientific base and technological potential, which enables them to carry out the necessary conversions and transformations, but also to ensure the development of other population sections. However, no one is in a hurry to worry about someone's interests, not their own.

Based on this world experience, Ukraine has the opportunity to question the legitimacy and rationality of the materialistic selfishness principle (Likhonosova, 2013), which is one of the most powerful driving forces in the world today. The Ukrainian platform of socio-economic strategic development, in activating the policy of national protectionism, as opposed to the populist libertarian movement (Zagoda, 2019), may become a new paradigm for the existence of national economic environments, which will replace the usual short-sightedness of thoughts and actions today.

Leading economic experts (Feldman, 2020) emphasize that the directions of globalization have been and remain abstract, and at the same time they are becoming a threat to the part of countries that are unable to defend their economic interests and social values. What are the ways in which globalization can be discussed when the European Union leaves the United Kingdom (Brexit, 2020), when the United States chooses to develop in isolationism of a new generation, and the Russian Federation is consciously isolated (Feldman, 2020).

European expert on strategic business planning Godin R. (Godin, 2020) notes that the mood in the business environment around the world is quite alarming. The economic elite is considering a future with a great deal of pessimism that has not been there since the financial crisis of 2009. Already, the signs of a global split, growing geopolitical tensions and the threat of a new financial crisis can be noted.

Managing Director of the International Monetary Fund, Kristalin Georgiev, during a speech at the Peterson Institute for International Economics (Astafurova, 2020), said that the global economy risks returning to an era of Great Depression caused by inequality between different populations. According to the head of the IMF (Astafurova, 2020), over the next decade, problems such as climate change and increasing trade protectionism in each country can lead to social unrest, political turmoil and instability in the financial markets.

Some of the ways out from this situation and possible further development have already been outlined in the 2018 UN Sustainable Development Agenda 2030 (Transforming Our World, 2018), which outlines 17 Sustainable Development Goals to be achieved for the next 15 years. But without curbing the driving force of economic growth - destructive pure materialism - the fear of finding itself in 15 years in a world with even worse economic, food and environmental conditions than it is today is not without reason.

The main doctrines of development of Ukraine, which are adopted today and are actively debated in society, are (Challenges and Opportuninities, 2019; Ukraine 2030: Doctrine of the balanced development, 2017):

1) accelerating economic growth;
2) building a modern security system;
3) keeping the course for joining the Euro-Atlantic Union;
4) stopping mass labor external migration;
5) creation of the Ukrainian narrative in the humanitarian sphere;
6) further decentralization of regions and formation of their new young elite;
7) full energy and gas independence.

And so on, it depending on what priorities the global economy puts forward and what opportunities the Ukrainian economy has. The consequences of such development should not be forgotten. Each country identifies them based on their specificities and national characteristics of the accelerated search for stability.

However, there are well-defined challenges that are discussed and highlighted by the international community, which proposes to address them as part of 13 decisions (Maxton, 2017), which should be taken by the leading economically developed countries of the world, but all of them are mostly reduced to the main problems of humanity: as unemployment, growing property inequality and rapid climate change. An alternative to all this can only be a bold national policy aimed at overcoming the major challenges facing Ukraine today, such as: unemployment, inequality and mass impoverishment; investment deficit and neo-industrialization (Calinescu, Likhonosova, Zelenko, 2019); external energy and financial dependence (Calinescu, Likhonosova, 2019); depletion of natural resources and loss of human resources; large-scale shadow corruption and social inequality.

However, traditional classical approaches to the new convergence of economics and world society, offered by most recognized scholars (Friedman, 2017; Spence, 2017; Reinert, 2015; Soto, 2012), do not always work, even in those countries where they are already tightly tested, but on the contrary, give rise to new crisis phenomena that require finding specific (own) approaches to counteract the absorption of countries' identities.

Ukraine has at present its own path of European integration development, which has not been felt by any country in Europe and which can be characterized by the following trends:

1. Ukraine has been in a state of hybrid war for 6 years. In the wake of recent country developments during recent years, when a country cannot focus all its efforts on any integration or reorganization, when it is necessary to fight on two fronts (economic and political) - to gain its identity and lose every day its population in the war zone, protecting their independence. This state of affairs affect the deterioration of all those indicators that allow the country to come closer to European standards, but it does create the conditions for its unique measures to change the current situation. In such circumstances, the top priority should be the end the war, which has been a major factor in the change of political power in the country. 65% of those who voted for the change of president and power in Ukraine (Kramar, 2019a), consider that the termination of war is the main task and trend in the near future. Also it is the interesting fact that the level of trust to the new authorities in the territories located in the area of war (28 – 29 %%) is close to the level of influence on the population of those parties that are at any cost to end the war in the country (43–49 %%) (Kazanskiy, 2019).
2. Despite all Euro-optimistic sentiments (52% of the population), still a sufficient number of the population (34%) is not yet ready to say confidently about their desire to join the European Union (Vikhrov, 2019). And if we move from the West of Ukraine to the East, this opposition of the population towards the European economic integration increases to almost 55%. At the same time, the highest achievements that Ukrainians have to achieve in the context of European integration are high standards of living (38.1% of respondents indicated this); the fight against corruption (27%); free movement within the territories of different countries (26%); access to European education (21%) and only then comes the opportunity for economic growth in the country (18%).
3. The negative trend for the country is the labor migration of the population to the countries of the European Union (EU), which is the result of the critical state of the country economy. The most attractive countries for Ukrainians migration is Germany, where in 2019 migration has increased almost twice compared to other equally attractive countries such as Estonia, Lithuania, Slovakia, Poland and the Czech Republic, which have almost the same conditions for migrants (Kramar, 2019b). These countries are attracting Ukrainian migrants because, first of all, not only the developed industrial infrastructure, but also the taxation system, social protection of the population, health care, education, etc.
4. One of the demographic challenge components in Ukraine is the increased mortality rate compared to other countries in the world. Moreover, the age difference between mortality of men and women is almost 10 years (Ozerna, 2019). And the reason for this is not only the presence of hostilities on the territory of the country, but also negative social phenomena such as unrestricted use of alcohol, smoking against the background of increasing transport incidents, exceeding the limit of infectious, respiratory diseases, lack of a well-established system of preventive vaccinations, health insurance, etc.
5. However, the demographic situation in the country is the biggest challenge that is increasing every year. And, even the situation presented in the official statistics does not correspond to the real state of affairs, because only a real census, declared in 2020, can illuminate the real picture with both

the available labor resources in the country and the economically active population. However, the birth rate has almost doubled, despite the fact that the birth rate in Ukraine has been steadily increasing since 2008 (Kramar, 2019c), does not give any hope for improvement of demographic status.

6. Ukraine's energy and gas independence is another challenge that intensifies all economic transformations in the country. Electricity production by thermal power plants decreased by almost 17% compared to 2016. The main consumers of this electricity are mainly metallurgical enterprises, whose production has also dropped significantly (almost twice compared to 2013, although it has some tendency to return to the base level) (Kramar, 2019d), and they are the main export suppliers in Ukraine.

Discussion

Ukraine, as a country that is currently a direct subject of integration processes in many socio-political processes, including the financial and economic spheres, should be guided by several determinants to determine their effectiveness (Figure 2):

1. Fair competition. Competition in the financial and economic sphere is a dynamic process of rivalry between the subjects of interaction, which provide similar or interchangeable financial services and seek to secure a strong position in the market, which allows to secure high return on capital in the future. Fair competition is a market environment in which individual players conscientiously compete for the consumer, without being able to significantly influence the conditions of circulation of the goods.

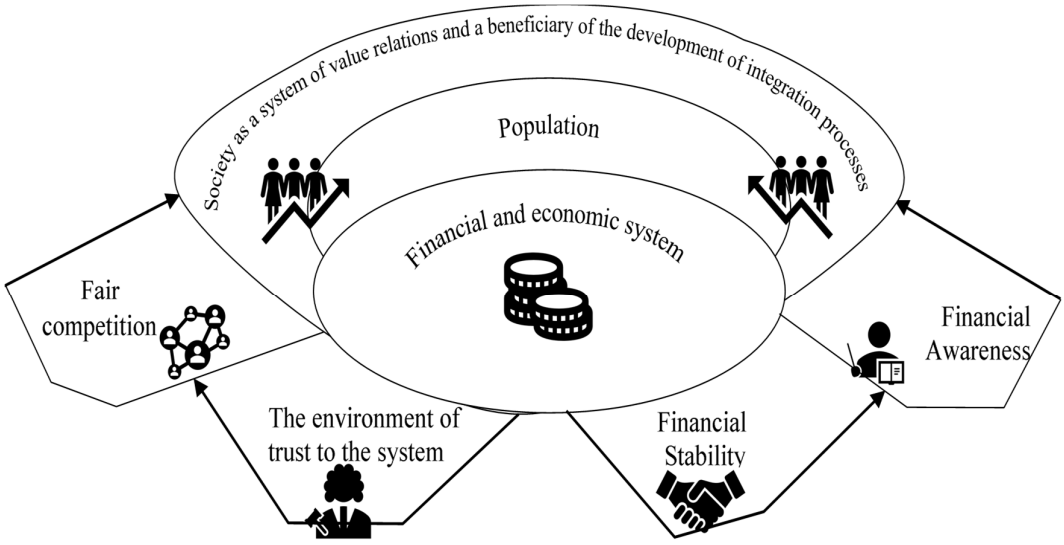

Fig. 2: Determinants for identification the effectiveness of integration processes in the financial and economic sphere

Source: developed by the authors

2. The environment of trust to the system. The financial and economic sphere as a system of relations between suppliers and buyers of financial services cannot function fully not only without economic but also without social capital, the most important component of which is trust. A developed trust environment reduces the transaction costs of the market to protect against fraudulent behavior and in the long run reduces the need for regulatory oversight.

3. Financial stability. Financial stability should be understood to mean the smooth and efficient implementation of integration processes, including the process of transforming savings into investment, its resilience to internal and external shocks. Ensuring financial stability reduces the costs of the economy from the realization of financial risks, increases the predictability of the cost of capital to

economic agents, ensures the continuity of services and prevents structural imbalances. Shock-protection, in turn, reduces the systemic risk premium inherent in the value of financial products, increasing the availability of financial services to the consumer.

4. Financial Awareness. Making financial services accessible to all members of society is a major socio-economic challenge. In general, financial awareness of the population expresses the ability to manage funds with minimal risks and maximum profit. That is, financial awareness combines a person's financial knowledge, skills and financial behavior to effectively manage their personal financial resources to make sound financial decisions. It is unfortunate, but at present, Ukrainians have a very low level of financial services use. 27% of citizens do not make savings at all, while those who practice savings more often defer them to the "foreseeable situation" (NBU Official Website, 2020). However, due to lack of awareness of financial institutions, every second person saves money at home while losing money on a daily basis. A significant distrust of financial institutions in every fourth Ukrainian is also characteristic because of their bitter experience with consumer credit institutions. At the same time, from those who had problems using the financial service, a small part defends their rights, files a complaint to the appropriate authorities and as a result loses trust in all financial institutions simply because of ignorance.

Indeed, most Ukrainians have a frankly passive attitude to creating their own well-being and have a philosophy of relying solely on their own. It turns out that 29% of the population of Ukraine do not have bank accounts. Most Ukrainians use only basic financial services, including (NBU Official Website, 2020): 1) payment of utility bills by banking services (72%); 2) use of bank account and plastic card (68%); 3) consumer credit (30%); 4) making payments through terminals of payment systems (38%); 5) currency exchange (31%) and more.

The National Bank made a significant contribution to financing the budget deficit of Ukraine by transferring UAH 47.6 billion of its revenues to the State Budget in 2019 (Danylyshyn, 2019). But it is worth noting that some of the National Bank of Ukraine's income is generated by the proceeds of domestic government bonds, which are in the National Bank's portfolio. In fact, the National Bank of Ukraine redeemed government bonds, helping to smooth the cash gaps of the state budget of Ukraine; instead, the Ministry of Finance of Ukraine provides high interest rates on domestic government bonds in favor of the National Bank, therefore, much of the proceeds received by the National Bank of Ukraine are transferred to the state. Some experts refer to this as the "cycle of debt in public finances" (Kovalchuk, 2019). In support of this argument, it can be noted that in the portfolio of the National Bank of Ukraine as of 1 January 2020, the bonds of the domestic government loan were concentrated at UAH 337 billion (NBU Official Website, 2020). Even a small portion of these funds, if involved in the implementation of special lending programs for the real sector of the economy, would be able to accelerate the pace of economic growth.

As of June 1, 2019, non-residents' investments in domestic government bonds stood at UAH 39.2 billion, up almost 6.5 times since the beginning of the year (Danylyshyn, 2019). Therefore, using the current favorable national currency rate, the National Bank of Ukraine should continue to buy foreign currency in the interbank market in order to increase its foreign exchange reserves.

Taking all this into account, the government should now focus on modernizing approaches to the country's monetary policy. It makes sense to take into account that under Article 116 of the Constitution of Ukraine (Constitution of Ukraine, 1996), the responsibility for the economic growth and development of the financial system rests with the Cabinet of Ministers of Ukraine. According to Article 99 of the Constitution of Ukraine, the National Bank is responsible for the stability of the national currency (Constitution of Ukraine, 1996). In view of this, it would be worthwhile to coordinate the actions of both bodies more actively. At the same time, the Cabinet of Ministers of Ukraine should address the issue of improving the quality and pace of economic growth, as well as the development of the financial system, based on the indicators of state-owned banks. In addition, given the integration requirements of the Ukrainian economy growth (chronic commodity downturns and lagging behind the global average), it will be quite difficult to ensure long-term stability of the hryvnia.

In addition, integration processes pose new challenges for Ukraine and require new management challenges: deep social inequality, military conflicts and civil wars, unemployment and mass migration.

C. Arsenault's study found that nearly half of fertile land has declined on Earth over the last 150 years (Arsenault, 2014), with about 90% of food resources being endangered. Climate stability and predictability are in grave danger. Moreover, some experts (Kolbert, 2014) point out that the planet is now undergoing a sixth mass extinction period in its history.

The trends of crisis in socio-economic and ecological systems are thoroughly described in the "imperative to action" (Rees, 2012). Susan Solomon points out that a person's ability to act often outstrips his or her ability to analyze. As a result of civilization, they absorb each other, causing problems not to be solved, but only to widen: increased consumption, increased inequality, the use of environmentally destructive technologies, uncontrolled migration, etc. However, the rapidly deteriorating biophysical situation is unlikely to be the starting point for the governments of countries seeking integration integrations that believe the resource economy can grow forever.

The nature of the crisis is not cyclical, but much worse - its spiral is expanding. To date, crisis phenomena are not limited to environmental catastrophes and "subsidence" of world currencies. The consequences of the social, cultural and moral crisis, the crisis of confidence and the dominant ideologies come to the fore. Billions of people tend to distrust their own governments. A worldwide survey by the Edelman Sociological Center states that 53% of the population in 28 countries believe that their systems are not up to the task; and only 15% believe the opposite (The Edelman Trust Barometer, 2017).

At worst, governments are responding to a populist attempt to improve their image, at best - trying to correct the symptoms of the crisis, not the cause. The problem is that the decision of the political elite around the world depends heavily on transnational corporations, international investors and donors of financial aid.

A prime example of this is, for example, Brexit. As noted by Fareed Zakaria, in most countries populism is in opposition, but is steadily gaining ground, in others, particularly in Hungary, it is now the main ideology and direction of government (Zakaria, 2016).

In addition, the trend of cautious attitudes towards "exponential technologies" is already being traced. There is a real danger of uncontrolled development and unethical use of technology and until society has come up with ways to counteract it. In addition, the limitless development of technologies and their fields of application demotivates decision-makers: if technologies are capable of solving all problems, there is no need to find complex, complex solutions that require lifestyle changes and exit from the comfort zone.

Conclusions

The current trends in the functioning of the social, humanitarian and financial-economic systems of Ukraine are far from the goals of sustainable development proclaimed by the UN in 2018. The continuing attraction to the integration of conventional and uncontrolled welfare growth of some sections of the population leads to severe conflicts with the collision with natural laws. Economic laws, rigidly governed by the financial system and its speculative operations, will further increase the difference in the well-being and income of different societies.

Based on the above, Ukraine should create conditions in the near future to stop absorption of national identification and balanced development of the economy, namely:

1. Conduct continuous monitoring and accounting of factors that do not allow us to move forward, such as tracking:

a) fair distribution through the national wealth budget by indicators that meet the EU average and, at the same time, signal the level of the shadow economy in the country (such as per capita income);

b) reforms in the social security and insurance systems, including the sources of filling the pension funds and the consequences of carrying out health insurance in terms of fertility, mortality and migration of the population leading to loss of human factor;

c) implementation of the state's investment policy on indicators that ensure national security and reduction of the country's external debts;

d) ensuring sufficient energy intensity of the state according to the parameters of competitiveness of the national economy.

2. Preventive financial, tax response and effective management of the state budget in accordance with the expectations of Ukrainian society and at the same time stimulate the development of the internal market in response to changes in the demand of the global economic environment.

3. Creation of legal and institutional bases for mobilization and modernization of national economy capacities in accordance with interests, cultural and scientific exclusivity of Ukraine with the purpose of implementation into the European system of state and economic management, adaptation to world trends of socio-economic development and formation of their personal identity in the system international division of labor.

References

- Arsenault, C. (2014). Only 60 years of farming left if soil degradation countries. *Scientific American*, 5 December.
- Astafurova, K. (2020). The head of the IMF saw the return of the world economy to the Great Depression. Available at: https://www.rbc.ru/economics/18/01/2020/5e22d45c9a7947ad7e9a4500?from=from_main (January 20, 2020)
- Brexit: 2020. Elizabeth II signed the Brexit Act. Now it will definitely take place on January 31, 2020. Available at https ://www.bbc.com/news-51227366 (January 24, 2020)
- Calinescu, T., Likhonosova, G. (2019) Modern technologies of coverage the system financial crisis and development of business entities. Fundamental and Applied Researches: Cjntrnporary Scientifical and Practical Solutions and Approaches. Interdisciplinary Prospects, Volume V. A Dushnsy, M. Makhmudov, M. Strenacikova (Eds.). Baku – Banska-Bystrica - Uzhhorod – Kherson: Prosvit, Volume V, 524 – 533
- Calinescu, T., Likhonosova, G., Zelenko, O. (2019). Neo-industrialization of the economy in diffusion conditions socio-economic environments. Fifteenth Scientific and Practical International Conference “International Transport Infrastructure, Industrial Centers and Corporate Logistics” (NTI-UkrSURT 2019) Kharkiv, Ukraine, June 6-8, 2019. S. Panchenko, G. Vatulia and V. Dykan (Eds.). Published by: EDP Sciences (London, United Kingdom; Paris, France), Volume 67, 6. Retrieved from: https://www.shs-conferences.org/articles/shsconf/abs/2019/08/contents/contents.html
- Challenges and Opportuninities (2019). The Ukrainian Week, 1 (131), January, p. 1.
- Chorna, N. P., Chornyi R. S., Shandruk S. K. (2018). Socio-Economic Development of Ukraine; New Challenges and Threats. Scientific bulletin of Polissia. № 1 (13), 100-107.
- Constitution of Ukraine: official edition (2019). Kyiv: Alerta, 112 p.
- Danilishin B. (2019). Surviving in the Age of Change: Financial Challenges and Directions for Transforming Ukraine's Monetary Policy. *The Mirror of the Week*, 1244, May 25–May 31. Available at: https://www.ukrinform.ua/rubric-economy/2711684-viziti-v-epohu-zmin-finansovi-vikliki-j-naprami-transformacii-monetarnoi-politiki-ukraini.html (January 15, 2020).
- Feldman, B. (2020) The end of globalization and the threat of a new crisis. Available at https://strana.ua/articles/245203-vsemirnyj-ekonomicheskij-forum-v-davose-koho-zhdut-i-kakaja-prohramma.html (January 22, 2020)
- Friedman, M., Friedman, R. (2017.) Capitalism and Freedom. Kuiv: Our format, 216 p.

- Godin, R. (2020). «Green New Deal»: comment transposer les propositions d'AOC en Europe. Available at https://www.mediapart.fr/journal/international/210120/green-new-deal-comment-transposer-les-propositions-d-aoc-en-europe (January 23, 2020)
- Human Development Index: Ukraine ranks 88th among 189 countries (2018). *UNDP Ukraine.* September, 14 Available at https://www.ua.undp.org/content/ukraine/uk/home/presscenter/pressreleases/2018/human-development-indices-where-does-ukraine-rank.html (January 23, 2020)
- Kazanskiy, D. (2019). A war of sention. The Ukrainian Week, 8 (138), August, 24–26.
- Kolbert, E. (2014). *The Sixth Extinction: An Unnatural History*. New York. Publisher: Henry Holt and Co., 336 p.
- Kovalchuk, A. M. (2019). Peculiarities of using public borrowings for repayment of public debt. Conceptual foundations of management and finance in the face of global instability: *VI International. Research Practice internet conf. "Actual Problems of Management and Finance in Modern Globalization Processes"*, March 14, 2019. Irpin: State fiscal University of Ukraine, 251–254.
- Kramar, O. (2019a). Dangerous road through the "best" intention. The Ukrainian Week, 8 (138), August, 36–38.
- Kramar, O. (2019b). A bedroom community for the EU? The Ukrainian Week, 1 (131), January, 24–25.
- Kramar, O. (2019c). The new underestimated threat. The Ukrainian Week, 9 (139), September, 38–39.
- Kramar, O. (2019d). To help Russia keep the ORDiLO? Ukrainian Week, 7 (137), July, 31–33.
- Likhonosova, G. S. (2013). National economic selfishness: facts and prejudices. *Time description of Economic Reforms*, 3(11), 6–10.
- List of countries by GDP (nominal) per capita (2019). *Wikipedia: The Free Encyclopedia*. Available at https://ru.wikipedia.org/wiki/Список_стран_по_ВВП_(номинал)_на_душу_населения (January 23, 2020)
- Maxton, G., Randers, J. (2017). Reinventing Prosperity. Managing Economic Growth tp Reduce Unemployment, Inequality and Climate Change. A Report of the Club of Rome. Kyiv: Pabulum, 320 p.
- Official site of the National Bank of Ukraine. Available at https://bank.gov.ua/ (January 22, 2020)
- Ozerna, D., Kosetskyi, A. (2019). "Yis death: Weak stronger sex". The Ukrainian Week, 9 (139), September, 34–36.
- Rees, W. E., Wackernagel, M. (2012). *Blue Planet Prize Laureates*. Japan: Japan Green Innovation, 14 p.
- Reinert, E. (2015). As rich countries were enriched… and why poor countries remain poor. Kyiv: Tempora, 444 p.
- Soto, H. (2012). The Mystery of Capital. Why capitalism Triumph in the West and Fails Everywhere Else. Kyiv: Nika-Centre, 232 p.
- Spence, M. (2017). New Convergent. Kyiv: Tempora, 352 p.
- The Edelman Trust Barometer (2017). CEO Credibility at Lowest Level Ever. Available at https://www.edelman.com/research/2017-edelman-trust-barometer (January 22, 2020)
- Transforming our world. The agenda for sustainable development by 2030. Available at https://www.ua.undp.org/content/ukraine/uk/home/library/sustainable-development-report/the-2030-agenda-for-sustainable-development.html (January 23, 2020)
- Ukraine 2030: Doctrine of the balanced development (2017). Lviv: Kalvaria, 168 p.
- Ukrainian National Idea as a Spiritually Intellectual Code for the Unity of the People: Ethnic, integration and civilization vectors. (2011). *Materials of round table. Edited by Professor V.S. Kravtsiva, Lviv: IRD NAS of Ukraine,* 62 p.
- Ulrich von Weizsäcker, E. Wijkman, A. (2019). *Come on! Capitalism, Short-termism, Population and the Destruction of the Planet*. A Report to the Club of Rome. Prepared for the Club of Rome's 50 th Anniversary in 2018. New York. Springer Science+Business Media LLC 2018, 232 p.
- Vikhrov, M. (2019). The anatomy of Euro-optimism. The Ukrainian Week, 1 (131), January, 20–22.

- Vovkanych, S. (2015). The Public Transformation of Ukrainian Ideal Values: New Calls and Threats. *Socio-economic problems of The Modern Period of Ukraine*. № 1 (111), pp. 144-151.
- What Has Made the Human Rights Situation in Ukraine Worse in 2017? (2017). *Up*. December, 10. Available at http://vgoru.org/index.php/prava-lyudini/item/24293-shcho-v-ukraini-pohirshuvalo-sytuatsiiu-z-pravamy-liudyny-u-2017Worthy Life – 2017. (2018). *Ukrainian Helsinki Human Rights Union*. June, 11. Available at https://helsinki.org.ua/hidnyj-riven-zhyttya-2017/ (January 23, 2020)
- Zaglada, L. (2019). Libertarianism in Ukraine. *Online Edition "Rakurs"*. Available at https://racurs.ua/2365-libertarianstvo-v-ukraine-ideologiya-na-skoruu-ruku-i-mamkiny-libertariancy.html (January 20, 2020) (January 23, 2020)
- Zakaria, F. (2016). Populism on the March. Why the West Is in Trouble. *Foreign Affairs*. Vol. 95, 6, 34–39.

The Importance and Role of Cooperation in The Development of the Agricultural Market

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Abstract

In the modern world, the process of the cooperative movement development, particularly in the agricultural sector, allows to increase the level of production and processing of agricultural products, as well as to earn greater profits for cooperative associations and farms. In developed countries there is a tendency of reducing the total number of farms by liquidating small ones while increasing large cooperative associations and enhancing their economic effectiveness. In view of the above, a comprehensive study of theoretical and practical aspects of agricultural cooperatives' development in the agrarian sector of the economy in the current economic conditions, as well as determining the directions of improving the efficiency of their activities is a genuine pressing problem, which has led to the choice of research topics. The aim of the article is to investigate the processes of cooperative activity in the field of agriculture and to determine its impact on the development of the agricultural sector of the economy. The role and importance of agricultural cooperatives in the development of the economy's agricultural sector is investigated in the article. The world, European and Ukrainian experience of using cooperative movement in the field of agriculture is analyzed. The processes of cooperation in the sphere of agrarian business of Ukraine are investigated. The level of influence and importance of cooperative associations in the structure of the economy's agrarian sector development is determined. During the research it was found that cooperative associations play a significant role in the development of agriculture, performing the functions of supply, sale, servicing, lending and make a major contribution to the regulation of inter–sectoral exchanges in the agro industrial business. It is established that the characteristic feature of the modern agricultural cooperative sector is the growth of vertical integration and the approach of an agricultural producer to a consumer but at the same time, there are new difficulties associated with increasing competition in the world markets and therefore it is necessary to look for innovative forms of agribusiness, particularly on a cooperative basis. The factors of assistance to the development of agricultural cooperation in Ukraine are identified and the factors that impede further integration into the agricultural sector of the economy are pointed out. As a result, the organization and formation of the agrarian sector of the Ukrainian economy on the basis of cooperation has a significant value as it allows to improve the level of production and processing of products, as well as to increase the profitability of agricultural producers and, as a consequence, allows to promote the development of the agricultural sector and the country as a whole.

Keywords: Economy, Cooperation, Agrarian Sector, Agricultural Cooperative, Development, Profit.

Problem Formulation

In the modern world, the process of the cooperative movement development, particularly in the agricultural sector, allows to increase the level of production and processing of agricultural products, as well as to earn greater profits for cooperative associations and farms. In developed countries there is a tendency of reducing the total number of farms by liquidating small ones while increasing large cooperative associations and enhancing their economic effectiveness.

In 2013, the Cabinet of Ministers of Ukraine developed and approved "The Strategy for the Development of the Agricultural Sector for the Period up to 2020", which outlines the strategic goals and indicators of agricultural development [1]. At the same time, in "The Concept of the State Target Program for the Development of the Agricultural Sector for the Period up to 2022", one of the main directions of achieving the strategic goals is the development of agricultural entrepreneurship and cooperation through the creation of favourable economic conditions for starting and organizing activities, including state support for the formation and improvement material and technical base of cooperative formations [2].

In view of the above, a comprehensive study of theoretical and practical aspects of agricultural cooperatives' development in the agrarian sector of the economy in the current economic conditions, as well as determining the directions of improving the efficiency of their activities is a genuine pressing problem, which has led to the choice of research topics.

Analysis of recent research and publications

The works of such well–known foreign and Ukrainian scientists are devoted to the study of the peculiarities of agricultural industry development: N. O. Mosiichuk [5], I. A Romanyuk [10], H. V. Finashyna [8] and others. Issues of development of the cooperation theory and cooperative movement occupy a prominent place in the works of O. O. Klokar [6], Yu. Ya. Luzan. [9], M. Y. Malik [9], O. V. Skydan [7], etc. However, the issue of defining the integration processes of the cooperative movement in the direction of development of economy's agricultural sector remains unexplored. Fragmentation of consideration of theoretical, methodological and practical processes of foundation and further activity of cooperative associations in the field of agriculture, insufficient coverage of issues of state influence on cooperation, imperfection of methods of economic policy implementation, low efficiency of actions on economic regulation of cooperative processes determines the necessity for the research in this field.

The aim of the article is to investigate the processes of cooperative activity in the field of agriculture and to determine its impact on the development of the agricultural sector of the economy.

Considering the aim of the article, **the main task** of the research is to conduct a comparative analysis of agricultural cooperatives' activities in the world and Ukraine.

The research methodology is based on the use of an empirical approach. In the process of research, the abstract–logical method (problem formulation and hypothesis, logical constructions, synthesis of generalizations and conclusions), statistical–economic method (processing of statistical indicators, comparison of data, etc.), monographic method (analysis of world and Ukrainian experience of cooperative movements' development and implementation in the agricultural sector).

Outline of the Main Research Material

In the world, cooperative formations play an important role in the development of agricultural production, performing the functions of supply, sale, servicing, crediting, making a major contribution to the regulation of inter–sectoral exchange in agro-industrial complex. Thus, in the USA, despite the decline in the number of agricultural cooperatives, their role in performing the above functions remains significant. By bringing together about 3 million people, they provide services worth about $ 116 billion. More than one and a half thousand cooperatives (50% of all cooperatives) are engaged in the sale of agricultural products, over one thousand (38%) of them perform the function of supply, providing agricultural producers with raw materials and equipment, more than four hundred (12%) of serving cooperatives give to rural trade producers' transportation, storage and other services [3].

Sales cooperatives are mostly widespread in vegetable, fruit, grain, fat and livestock sub–complexes. In Canada, sales, marketing, service cooperatives dominate. In 2018, their numbers and revenue were

$1.3 and $14.3 billion, respectively. The share of Canadian cooperatives in the markets of poultry and eggs is 57%, milk – 39, grain – 22% [4].

India, followed by the USA, France, Sweden, Germany, Morocco, Canada, has the leading position in number of acting agricultural cooperatives. In England about 40% of agricultural products are sold through cooperatives, the market share of cooperatives in the sale of milk is 90%, pork – 30%, potatoes and vegetables – 25%, cooperative share in the supply of fertilizers – 30%, seeds – 22%, plant protection products – 18%. The turnover of agrarian cooperatives in England is £ 4406 million. In Germany, marketing cooperatives are common in purchasing resources and selling products, but the most developed are credit cooperatives led by Raiffeisenbank. The share of the market occupied by German cooperatives varies by production area and is: in the processing and marketing of meat – 30%, milk and dairy products – 60%, fruits and vegetables – 60%, providing services to agricultural producers – 50–60%. The development of cooperative agrarian movement in such Scandinavian countries as Denmark, Norway, Finland and Sweden is also specific. In Sweden, the turnover of cooperative associations in 2018 amounted to EUR 12.6 million. Cooperative share in the milk markets exceeds 99%, pig and cattle meat – 88%, grain and seeds – 75% [3].

The first place in the number of acting agricultural cooperatives in the EU is in France, where more than 90% of farmers are members of agricultural cooperatives, through which 50% of agricultural products are sold. French agricultural cooperatives specialize in the purchase, sale, processing of products, as well as supplying agricultural producers with the means of production and sale services. Cooperatives for the common purchase and use of equipment have become most widespread. All agricultural cooperatives in France are united into national cooperative federations on a sectoral basis. This organizational hierarchy also extends to agricultural credit cooperatives, which are headed at the national level by the Credit-Agricole cooperative bank. Through cooperatives, the state pursues agrarian policy based on the use of a subsidy system. Thus, the construction of grain stores up to 10% is subsidized by the state, the state also guarantees the payment of the farmer's products through cooperatives at a minimum price in case of possible absence in its marketing. All cooperatives are non-profit organizations.

Studying the peculiarities of the cooperative movement development at the present stage, it should be noted that the increase in the activity size of agricultural cooperative associations by means of merger smaller ones, which before the unity, were local in nature. At the same time, more and more cooperatives are beginning to use innovative information technologies that help agricultural producers to implement computerized systems for managing production and marketing processes of agricultural products sales, supplying the necessary means of production, etc.

The vast majority of cooperative farmers use the opportunities of the Internet network in their businesses [5, p.25]. More and more trading operations in the agricultural markets are carried out through the e-business system. The widespread use of information technologies enables agricultural producers, especially small and medium-sized agribusinesses, to participate in biotechnology development, scientific research, open access to the use of new varieties and hybrids, animal breeds, new technologies and new fuels, etc. But such activity requires significant capital investments, which can be accessed only for cooperative and integration entities, which are able to concentrate significant funds and get economic effect from the scale of production, sales of products and services, marketing, logistics, scientific development, etc.

A characteristic feature of the modern agricultural cooperative sector is the increase in vertical integration, the convergence of an agricultural producer with a consumer, and, as a consequence, the strengthening of competitive advantages and the increase of agribusiness income [6]. But at the same time, it should be noted that there are new challenges associated with competition strengthening in world markets, and therefore one should look for innovative forms of agribusiness activity. The experience of cooperative associations' development around the world testifies to their universal adaptation to changing market conditions. The processes of globalization and integration that are currently taking place in the world's economy, did not sidestep agricultural cooperatives' activity [7]. Strengthening of competition compels agricultural cooperatives to achieve the level of the most

successful competitive organizational forms, expand the domestic market and export of agricultural products, lobby for protectionism [8, p.48]. Thus, modern agricultural cooperatives should consider in their activities the development of concentration and integration processes in the segments of the production and marketing chain, increasing demands of retail chains and end consumers to the quality of products and services, changing their preferences, international requirements for quality standards, etc. To support the competitiveness of agricultural producers-members of cooperative associations and their activities, agricultural cooperatives are forced to engage in functions that are not inherent to them, such as to expand sphere of their activities by providing services to non-cooperatives, to use venture capital, to enter securities market creating joint ventures and subsidiaries.

In many countries of Europe and the world, for the more successful operation of agricultural cooperatives, the conditions for their development are created by preferential, tax, credit and antitrust state policy. Such state support is conditioned by the social nature of the activities of non-profit agricultural cooperatives, creating new jobs and solving social problems of the rural population, cooperative formation facilitates the development of rural territories.

In the current system of agricultural cooperatives, there are agricultural consumer, processing, supplying, marketing, servicing, credit, insurance cooperatives, information and consulting centres [9, p.4; 10, p.13]. Their activity is regulated in particular by the Law of Ukraine "On Agricultural Cooperation" [11]. In practice, multifunctional cooperatives have become widespread, typically combining supplying and marketing functions, encompassing cross-industry exchange functions in the agro-industrial complex.

In Ukraine, agricultural cooperatives mainly combine small and medium-sized agribusiness enterprises (rural (farmer) and personal subsistence farms) of agricultural producers whose interest is determined by the functional principles of a cooperative.

The activities of agricultural producers can be carried out using various forms and types of cooperation from simple forms of relationships to complex integrated formations, from the production of raw materials to the sale of finished products.

At present, Ukraine's agricultural policy is focused on supporting the development of small and medium-sized businesses in rural areas, including farming and agricultural cooperatives. As at 01 January 2015, there were 1427 agricultural cooperatives registered in Ukraine, of which only 728 entities were active, at 01 January 2016 1627 agricultural cooperatives (817 entities were active), as at 01 January 2017. 1947 (558 entities actually operated). And as at 01 January 2018, there were registered 2014 cooperatives (997 manufacturing and 1017 servicing), by the beginning of 2019 there were 2069 cooperatives in Ukraine (996 manufacturing and 1073 servicing). That is, 55 cooperatives or 3% more. The most active cooperatives are in Kyiv (65), Cherkasy (55), Zaporizhia (49), Odesa (48), and Ivano-Frankivsk (47) regions. Sumy (60 vs. 24), Volyn (55 vs. 26), Khmelnitsky (60 vs. 34), and Zakarpattia (63 vs. 33) regions, which do not operate about half of the registered cooperatives, are the leaders of anti-rating in the proportion of inactive but officially registered cooperatives [12; thirteen; 14] (Table 1).

Analyzing the data in Table. 1 it can be said that the most widespread types of cooperative associations in Ukraine’s agricultural sector are multifunctional and multifaceted services (others). They are almost half of the total.

Among serving cooperatives the most widespread are the associations of agrarians for joint harvesting and dairy cooperatives. It should be noted that of the 735 operating agricultural service cooperatives: dairies 186 (+44), land cultivation and harvesting 162 (+16), meat 35 (–16), fruit and vegetable 113 (+34), grain 41 (+1) and other services 198 (+46). Associations for the joint cultivation of vegetables and fruits, cooperatives of meat direction and grain associations are also quite developed [14]. However, compared to other European countries, their number is small.

Table 1: Number of registered agricultural cooperatives in Ukraine as at 01 January 2019.*

Region	Number of agricultural cooperatives, a unit.							
				According to kind of activity, a unit.				
	Total	Registered	Acting	Processing, a unit.	Storing–marketing, a unit.	Supplying, a unit.	Others, a unit.	Multifunctional, a unit.
Vinnytsia	94	52	42	6	14	3	9	10
Volyn	81	55	26	0	8	10	2	6
Dnipropetrovsk	106	60	46	12	10	7	9	8
Zhytomyr	80	50	30	5	10	0	5	10
Zakarpattia	96	63	33	3	5	0	15	10
Zaporizhia	101	52	49	10	10	10	12	7
Ivano-Frankivsk	97	50	47	8	12	9	8	10
Kyiv	131	66	65	12	16	13	14	10
Kirovohrad	92	50	42	5	10	8	9	10
Lviv	87	49	38	14	8	0	6	10
Mykolaiv	88	50	38	5	6	8	8	11
Odessa	98	50	48	8	7	6	10	17
Poltava	92	46	46	4	6	6	16	14
Rivne	91	50	41	9	8	8	9	7
Sumy	84	60	24	0	9	0	10	5
Ternopil	87	42	45	8	10	10	8	9
Kharkiv	96	45	41	6	7	5	11	12
Kherson	92	52	40	5	11	10	8	6
Khmelnytsky	94	60	34	0	10	5	9	10
Cherkasy	117	62	55	9	16	5	10	15
Chernivtsi	86	46	40	11	7	0	12	10
Chernihiv	79	43	36	4	8	3	12	9
Total	**2069**	**1190**	**906**	**144**	**208**	**126**	**212**	**216**

** Source: compiled by the author according to the analysis of statistical sources [12; 13; 14]*

In our opinion, the main factors preventing the development of agricultural cooperation in Ukraine can be identified as:

- incomplete structural restructuring of the agrarian sphere;
- unsatisfactory material and technical equipment of cooperatives, especially in stock areas of agricultural production;
- unavailability of credit and poor financial support for the development of agricultural cooperation by the state.

Based on the research of scientists' works [5; 6; 7; 8; 9; 10] regarding the development and implementation of the cooperative movement, it is necessary to highlight the key factors that contribute to the development of agricultural cooperation (Fig. 1).

In our opinion, in order to strengthen the pace of agricultural cooperation development in Ukraine, it is necessary to increase state support and to improve the main directions of its use. Thus, we are considering the possibility of directing part of the budget funds to support the development of rural credit cooperative funds, in particular, directing 30% of the amount of credit resources intended for

agro-industrial complex entities, credit cooperatives to finance small and medium agribusiness and extending subsidies to offset part of interest rates on loans, received by agricultural credit cooperatives in commercial banks.

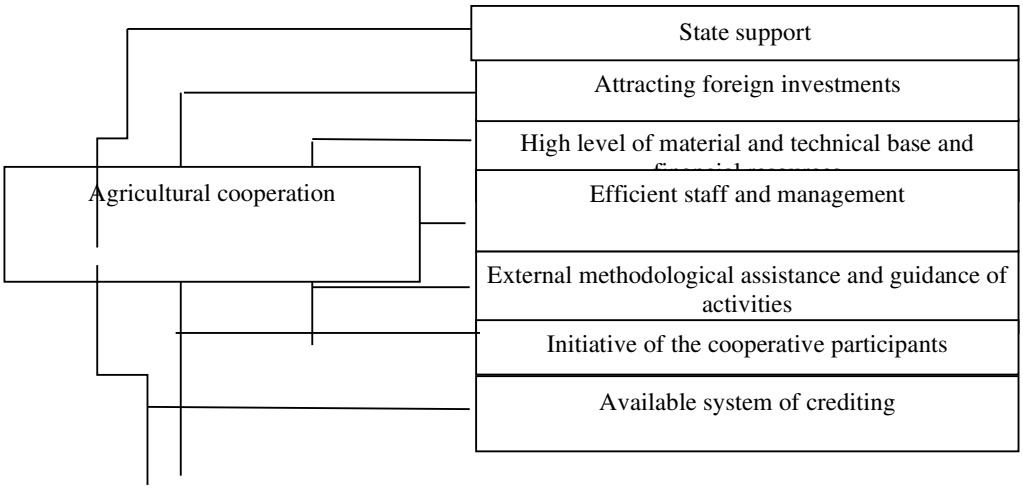

Fig. 1: Factors promoting the development of agricultural cooperation in Ukraine *

** Source: Created by the author based on the research.*

Also, in our opinion, the purchase of products (grain, milk, meat, vegetables, potatoes, fish) for government needs should be contracted directly through agricultural cooperatives at minimum prices, the level of which should ensure the profitability of agricultural production.

The prerequisite for the successful development and functioning of cooperatives is providing them with organizational, methodological and financial support, which will ensure the promotion of agricultural products of individual rural farms and agricultural producers to the organized agrarian market at stable prices, promoting the realization of economy's potential agricultural sector and increasing its competitiveness. Besides, one of the important factors for solving the problem of cooperative movement development in Ukraine is the implementation of the programs of cooperative movement development at regional and local levels and grant projects of the European Union.

In order to increase the motivation of Ukrainian agricultural cooperatives to enter the world markets, it is necessary to develop a mechanism of supporting export of domestic agri-food products, to introduce preferential taxation for newly established and export-oriented agricultural cooperatives. In order to improve state support, we also propose to bring it to a specific representative of small and medium-sized agribusiness through the system of agricultural cooperatives, differentiating it by region of the country depending on soil and climatic conditions and remoteness from sales markets.

Conclusions

Considering the conducted research, it should be concluded that the organization of economy's agricultural sector based on cooperation is a priority in the field of agriculture, the development of which is based on the consolidation and interaction of resources and capabilities of agricultural producers.

An important criterion for the modern agricultural cooperative sector is vertical integration and synergy with other industries, bringing a farmer closer to a consumer, and, as a consequence, enhancing competitive advantages and increasing income from agribusiness activity implementation. But at the same time, it should be noted that there are new challenges associated with increasing competition in world markets, and therefore should constantly search for innovative forms of

business. In our opinion, cooperative activity, in particular in the field of agricultural, is one of these innovative forms.

Increasing the role of agricultural cooperatives in the development of economy's agricultural sector can be facilitated by scientific substantiation and implementation of motivational mechanisms for involving agricultural producers and their partners in the agricultural business to create vertical economic systems, determining the role of the state in this process, ensuring the interaction of agrarian sector and financial side, as well as information component of the agricultural infrastructure.

References

1. Cabinet of Ministers of Ukraine (2013), "On approval of the Strategy for the development of the agricultural sector for the period up to 2020", available at: http: https://zakon.rada.gov.ua/laws/show/806–2013–%D1%80 (Accessed 28 January 2020).

2. Cabinet of Ministers of Ukraine (2015), "The concept of the state target program for the development of the agricultural sector for the period up to 2022", available at: http: https://zakon.rada.gov.ua/laws/show/1437–2015–%D1%80 (Accessed 25 January 2020).

3. "The International Cooperative Alliance", 2019. available at: https://www.ica.coop/en/eight–sectors–global–business–network (Accessed 26 January 2020).

4. Experience of Canada and the EU in the sphere of support policy of agricultural service cooperatives. Analytical research. 2019, available at: http://www.zerno.org.ua/download/file/53–dosvid–kanady–ta–krain–ies–u–sferi–polityky–z–pidtrymky–rozvytku–silskohospodarskykh–obsluhovuiuchykh–kooperatyviv (Accessed 25 January 2020).

5. Mosiichuk, N. O. (2018). "Current state of development of agricultural cooperation in Ukraine". *Bioekonomika i agrarnij biznes (Naukovij visnik NUBiP Ukrayini.* Vol. 284. pp. 24–33.

6. Klokar, O. O. (2013). "Agricultural cooperatives in Ukraine: a retrospective and prospective analysis of effective development". *Stalij rozvitok ekonomiki.* Vol.6. pp. 16–23.

7. Skydan, O.V. (2010). "Institutionalization of agricultural cooperatives' development in Ukraine". *Efektyvna ekonomika*, [Online], vol. 8, available at: http://nbuv.gov.ua/UJRN/efek_2010_7_6 (Accessed 26 January 2020).

8. Finashyna, H.V. (2011). "Economic assessment of the agricultural cooperation mechanism's perfection". *Visnyk Kharkivskoho NAU im. V.V. Dokuchaieva.* Vol. 5. pp. 47–52.

9. Malik, M.Y. and Luzan, Yu.Ya. (2010), "Problems of cooperation and integration relations in agro industrial complex". *Ekonomika APK*. Vol. 3. pp. 3–9.

10. Romanyuk, I.A. (2016). "Features of the reproduction process in the agrarian sector". *Ahrosvit,* Vol.11. pp.12–15.

11. The Verkhovna Rada of Ukraine (1997). The Law of Ukraine "On Agricultural Cooperation", available at: https://zakon.rada.gov.ua/laws/show/469/97–%D0%B2%D1%80 (Accessed 26 January 2020).

12. Ministry of Agrarian Policy and Food of Ukraine (2019), "Dynamics of registered agricultural cooperatives", available at: https://minagro.gov.ua/ua/ napryamki/fermerstvo–ta–kooperaciya/silskogospodarski–kooperativi (Accessed 26 January 2020).

12. Ministry of Agrarian Policy and Food of Ukraine (2019), "In Ukraine, a number of servicing cooperatives is growing", available at: https://minagro.gov.ua/ua/napryamki/fermerstvo–ta–kooperaciya/silskogospodarski–kooperativi (Accessed 26 January 2020).

13. Main Department of Statistics in Kyiv region (2019), "Key economic indicators of agricultural enterprises' activity", available at: http://kyivobl.ukrstat.gov.ua/content/p.php3?c=1127&lang=1(Accessed 26 January 2020).

Main Trends of Regional Development in the Context of the Paradigm of the "New Economy"

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Abstract

The relevance of the study is due to the problems of developing Russian cities to technological challenges. In this regard, this article is aimed at identifying the need to build an ideal model of the city. A leading approach to the study of this problem is a systematic method allowing to address the study of the green economy in the modern city as a whole, as well as to identify the diversity of causal connections and relationships taking place inside the studied system and its interaction with the external environment. In this paper, the environmental rating of regions is considered, and statistics on man-made and natural emergencies are given. It is concluded that an effective adaptation to technological challenges is the creation of a new institutional model for the development of a modern city. The materials of the article are of practical value for authorities at the regional level when making management decisions on the sustainable development of the region.

Keywords: eco city, technogenic challenge, stable development, city, green economy.

Introduction

In the context of a multi-crisis situation, the problem of development of modern Russian cities is the most noticeable. Currently, it is considered that urban agglomerations are the most important carriers of the "new economy", formed by the development of the complex services and technologies sector, as well as the ultra-fast growth of the consumer market. Indeed, the density of ties, the quality of life and the economy of modern cities make it possible to move to a new level of development of social and economic relations, which will include as a mandatory component interaction along the lines of: society-ecology-economy. The new paradigm of socio-economic development should put the security of the individual and society as a whole at the forefront in an environment of serious natural and technogenic challenges.

At present, traditional methods of developing modern cities are more negative than positive. The development of the "new economy" with its increased demands for connectivity within the city faces critical challenges. Thus, the explosive growth of motorization of the population and the inability of

urban transport systems to cope with traffic flows creates a contradiction between the standards of quality of life and the objective characteristics of urban space.

Methods

Recently, in modern cities, social, economic, and environmental problems have become more acute. Over the past forty years, the economic burden on natural complexes has increased dramatically, so the issue of protecting the environment from excessive anthropogenic pressure has been raised over the past twenty years. The UNO document on sustainable development "Agenda for the XXI century" justifies the need to develop new concepts of sustainable economic growth and prosperity.

The essence of environmental protection is to find a rational balance between the environmental needs of society in a clean, healthy and highly productive natural environment and the economic interests of society associated with meeting the material needs of people. There are now three main environmental concepts. The first is based on a return to lower standards of consumption and its maximum restriction. According to this concept, it is necessary to restrain the growth of consumption by establishing a balance between fertility and mortality - this is the concept of "zero growth", it originated on the basis of the world development models of G. Forrester and D. Meadows (Meadows et al., 1972). In the 70-s years the dynamic model of the ordinary American city according to the evolution was built by G.Forrester. Analyzing this dynamic model in the urban environment three main sub-systems can be defined city according to the evolution: population, buildings and enterprises.

The special peculiarity of this concept is Forrester`s suggestion about counter intuitive nature of these complex systems. These intuitive suggestions are reaction to causal relationships which are characterized for simple systems. While in complex systems, the true causes may be deeply hidden or distant in time, and, more often are rooted in the structure of the system itself, which is not immediately recognized. For this reason, in this situation, it is necessary to use algorithms when making decisions, rather than relying on intuitive judgments.

Thus, G. Forrester proposed a complex dynamic model with many forward and backward links between subsystems, which made it possible to predict the development of the city and analyze the impact of various programs of the city administration.

The disadvantage of this concept is the uneven development of the economy of different regions and their populations, since this is the expected exponential growth of the population in conditions of sufficient resources and in the absence of birth control.

D. Meadows proposed the "Growth Limits" model with feedback loops (Meadows et al., 1972). The main directions of this theory are industrialization, rapid population growth, increasing hunger, depletion of non-renewable resources, and environmental degradation.

In accordance to the concept of zero growth, humanity should stabilize the population, stop industrial growth, invest and develop only agriculture to increase food production and services, and in industry only compensate for the depreciation of funds.

Despite a number of weaknesses of the study D. Meadows, in particular the underestimation of the possibilities of scientific-technical progress, the progress of knowledge, this work was an attempt to assess the value of an ecological factor for world development, which shows the inevitability of global catastrophe while maintaining the trend of natural resource use and environmental degradation.

In 1992, a new work by D. Meadows "Beyond the limits to growth" appeared. The main theme of this work is formulated as follows: "there are limits to growth, but there are no limits to development" (Meadows et al., 1992). According to the researcher, the limits of growth are the limits

of the intensity of flows, i.e. the limits of the sources 'ability to ensure the flow of resources, and the drains' ability to absorb waste.

Going beyond the limits is understood as a violation of the stability of this ratio due to exceeding the potential capacity of the environment. The reason for the limits is that the population and capital in the world system are growing exponentially, and in this situation, the quantitatively growing economy destroys its resource base, after which it must collapse.

The second concept suggests economy development without any ecological restrictions; this policy will lead to nature degradation and mankind death. The third way is combination of ecological and economic wishes. Therefore, if we approach the solution of environmental problems from a more rational and utilitarian point of view, a complete rejection of the achievements and achievements of the modern scientific and technical revolution is not required, we need to direct the results of scientific activity to meet human needs while respecting the principles of sustainable development (Ogorodnikov and Ogorodnikov,1998).

Currently, indicators that take into account the impact of the economy on the natural environment are being actively developed. For example, a system of environmental and economic accounting aimed at accounting for the environmental factor in national statistics. This system describes the relationship between the state of the natural environment and the country's economy. This is a system of “green accounts”, in which the account for forest resources is kept in natural indicators, the concept of environmental debt and the concept of “natural capitalism” (Pakhomova, 2014).

The problems of development of small towns in the conditions of new economy discussed in this article are being researched by some scientists. Let`s make a review of some of them.

The method of measuring of eco-efficiency proposed by E. Passetti and A. Tenucci is to use clearly defined management accounting tools related to environmental and economic indicators. This will allow companies to use the concept of environmental management more widely (Passetti and Tenucci, 2016).

In the researches of L. Yang and X. Zhang analyze model id suggested. It combines technology, function of directing distance and a new bootstrapping approach for researches of dynamic tendencies of regional economy (Yang and Zhang, 2018).

As for M. Păunică and M. Mocanu stable city development focuses on the three dimensional measurement of economical, social and ecological aims (Păunică and Mocanu, 2017).

Based on the analysis of statistical data, the economic and mathematical model, as well as on the analysis of the UN experience in assessing the most rapidly disappearing and fastest-growing cities, a new institutional model for the development of a modern city should be developed.

Attempts to assess the “natural potential” allow us to specify the amount of environmental damage only partially, without taking into account the humanitarian component and the size of the total destruction of production factors. Meanwhile, the Organization for economic cooperation and development (OECD) forecasts that today's methods of production and consumption can destroy about 70% of flora and fauna by 2050 (Animitsa, 2007). In our opinion, it is appropriate to talk about the assessment of the complex natural and human potential of a modern city.

The environmental rating of the cities of LLC “Green patrol” (Ecological rating, 2020) allows for a comprehensive comparative assessment of positive and negative factors and trends in environmental, social and economic activities based on the criteria of environmental safety and balanced sustainable development of the regions of the Russian Federation.

Ecological city rating consists of 15 indicators, which cover three basic areas of monitoring in the regions of the Russian Federation:

- Eco-sphere – environmental protection;

- Socio-sphere – protection and improving of human and society environment;

- Techno-sphere – condition and industrial development according to the requirements of ecological safety.

In table 1 the assessment area and calculation components for the environmental rating are presented.

The environmental rating is formed on-line as information materials are received from various sources, including the media, government agencies, business entities and citizen initiative groups.

Table 1: The assessment area and calculation components of the project

<table>
<tr><th colspan="2">The assessment area</th><th colspan="2">Calculation components</th><th>Total regional rating</th></tr>
<tr><th>Sphere</th><th>Indicators</th><th colspan="2"></th><th></th></tr>
<tr><td rowspan="5">Eco-sphere</td><td>Atmosphere</td><td rowspan="4">Nature safety index</td><td rowspan="5">Σ
Free index</td><td rowspan="5">1.
2.
3.
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N</td></tr>
<tr><td>Water resources</td></tr>
<tr><td>Soil</td></tr>
<tr><td>Bioresources</td></tr>
<tr><td>Biodifferentiation</td><td></td></tr>
<tr><td rowspan="5">Socio-sphere</td><td>Authority and law</td><td rowspan="5">Social – ecological index</td><td rowspan="5"></td><td rowspan="5"></td></tr>
<tr><td>Civil society</td></tr>
<tr><td>Education and culture</td></tr>
<tr><td>Human environment</td></tr>
<tr><td>Informative and psychological climate</td></tr>
<tr><td rowspan="5">Techno-sphere</td><td>Industrial environment</td><td rowspan="5">Industrial-ecological index</td><td rowspan="5"></td><td rowspan="5"></td></tr>
<tr><td>Science and technology</td></tr>
<tr><td>Business responsibility</td></tr>
<tr><td>Industrial waste</td></tr>
<tr><td>Goods and services</td></tr>
</table>

The rating is calculated on the basis of a single mathematical model and software for all subjects of the Russian Federation.

Results and Discussion

The rating compares the number of man-made accidents in the regions, natural fires, floods, deterioration of the sanitary and epidemiological situation, indicators of the quality of the urban environment, the number of innovations, business participation in solving environmental problems, etc.

The rating of the Rostov region in the environmental rating of cities is presented in table 2.

Table 2 : The rating of the Rostov region in the environmental rating of cities for 2013-2017

Year	Nature safety index	Industrial-ecological index	Social –ecological index	Total index	Place in rating
2013	+ 39 / - 61	+ 60 / -40	+ 50 / - 50	+ 49 / - 51	13
2014	+ 38 / - 62	+ 49 / - 51	+ 62 / - 38	+ 50 / - 50	14
2015	+ 39 / - 61	+ 50 / - 50	+ 62 / - 38	+ 51 / - 49	9
2016	+ 37 / - 63	+ 49 / - 51	+ 68 / - 32	+ 53 / - 47	11
2017	+ 38 / - 62	+ 51 / - 42	+ 68 / - 32	+ 54 / - 46	17
2018	+ 38 / - 62	+ 51 / - 42	+ 71 / - 29	+ 55 / - 45	25
for 9 month 2019	+ 41 / -59	+ 53 / - 47	+ 72 / - 28	+ 58 / - 42	31

Note: compiled by authors on the basis of data http://greenpatrol.ru/ru/regiony/rostovskaya-oblast

From the above table 2, we can conclude that in 2019, the Rostov region significantly worsened its position in the environmental rating compared to 2013 and ranks 31st. This indicates that the Rostov region does not pay enough attention to environmental problems, as well as to solving issues to improve the environmental situation.

From table 2, it can be seen that the environmental index is quite low in comparison with other indices during the analyzed period. But the region occupies a very high position in the social and environmental index.

Because the rapid development of complex technological systems introduced into economic circulation has caused both the development of the modern city and the increase in the risk of various man-made accidents and catastrophes.

Data from The United Nations (UN) shows that man-made disasters rank third among all types of disasters in terms of the number of deaths. In the first place there are hydro meteorological disasters, floods and tsunamis, in the second – geological (earthquakes, mudslides, volcanic eruptions, etc.) (Mizutori and Guha-Sapir, 2017).

One of the most striking examples of a man-made environmental disaster is the accident at “the Fukushima-1” nuclear power plant in Japan, caused by natural disasters and currently threatening the scale of an environmental disaster of a global nature. The irrational placement of nuclear power plant blocks, as well as the use of buildings built before the 1980s in the nuclear power industry, despite the innovative technological equipment of Japan, calls into question the further development of nuclear power throughout the world, which refocuses the attention of mankind on safe energy sources that are created by wind farms and solar panels.

As a result of the “Fukushima effect”, many States began to devote more time to the organization of human and social security. One example is the preparation of the German leadership for a possible disaster at the Belgian “Tiange” nuclear power plant after warnings from experts about the possibility of an emergency situation at the plant. This indicates that the country's leadership is taking measures to ensure the safety of its citizens.

The “Fukushima effect” thus confirmed that the survival and development of mankind requires a transition to a “green” economy – that is, a system of economic activities related to the production, distribution, exchange and consumption of goods and services that lead to increased human well-being in the long term, without exposing future generations to significant environmental risks or environmental deficits.

Thus, we can conclude that despite the contrast of man-made disasters with natural disasters, we can see a consistent pattern of increasing man-made disasters against the background of increasing

natural disasters. One of the reasons is the rapid technical development of society and the human factor, which is manifested in the errors of employees, engineering calculations, and ineffective assistance from rescue services.

Figure 1 shows the dynamics of natural and man-made disasters in Russia in 2005-2017.

The above figure shows that by 2017 there is a significant decrease in man-made and natural emergencies. From the graph, you can see that the level of man-made disasters significantly exceeded natural and bio-social emergencies in 2005-2008.

Thus, it can be concluded that an effective adaptation to technological challenges is the creation of a new institutional model for the development of a modern city.

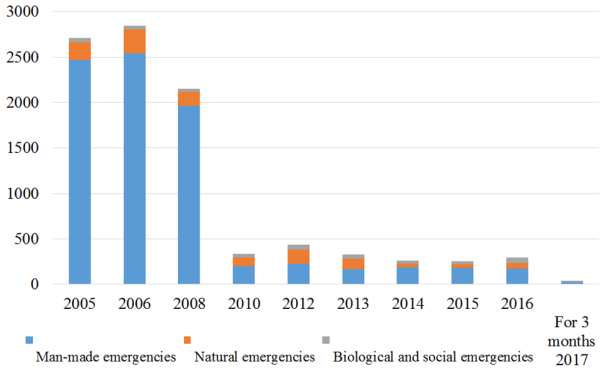

Fig. 1: The dynamics of natural and man-made disasters in Russia in 2005-2017.

Note: compiled by the authors based on data from the Ministry of emergency situations of Russia http://www.mchs.gov.ru/activities/stats/CHrezvichajnie_situacii

According to the Polish scientist T. Tolwinski, in the middle of the XX century, there was a crisis of cities (Aliyeva et al., 2014), which forced a new look at the future ecological and economic model of urban economy.

In modern Economics, a new field of research is emerging that deals with the relationship between natural ecosystems and socio-economic systems in the broadest sense. The green economy can solve the current human problems, as well as the problems of building an “eco-city”.

In our opinion, an eco-city should be understood as a natural-adapted model of a city that has an economically productive and socially effective functioning environment based on the greening of life.

For many years, the idea of an eco-city was only proclaimed and not implemented. At the “Global Forum-94”, the first real eco-city project in Sweden, created in accordance with the provisions of the sustainable development strategy, was presented. At the beginning of the XXI century, the global forum “Habitat-II” adopted the concept of creating an eco-city (United Nations, 1996). Table 3 shows the main goals of creating an environmentally friendly city.

Table 3: The main goals of creating of eco-city [compiled by the authors based on research materials based on the document of the UN Conference on human settlements (Habitat-II) (United Nations, 1996)

The main goals of creating of eco-city	
For population	**For environment**
1. Improving the quality of life of the population	1. Restoration of the biosphere
2. Formation of the ecological outlook of the population	2. Increasing the area of green spaces in the city
3. Ensuring the health and safety of residents.	3. Reducing pollution from the city
4. Achieving energy savings and housing efficiency in general.	4. Use of renewable energy and reduction of consumption of non-renewable energy, non-renewable materials
5. Improving the aesthetic qualities of the city. Perception of the city as a natural component of the natural environment, its inclusion in the ecosystem	5. Maintaining an ecological balance between developed and natural areas

The main task to be solved when creating an eco-city should be its organic inclusion in the course of natural processes of this territory. Here, conditions must be created for the normal implementation of the most important social functions in the family, collective, and society. Finally, an eco-city should become a generator of cultural processes that take place in the urban economy.

The modern practice of creating Eco-city has been developing since the beginning of the 60s of the XX century. Basically, it is widely distributed in Europe, North America, and Australia. However, European countries, especially Sweden and Denmark, were the most active in the field of environmental construction. Germany, Belgium and Norway are participating in this process. In General, almost all European States have joined the process of greening their cities. Currently, there are 6 eco-cities in the European Union: Malmo (Sweden), Dublin (Ireland), Tallinn (Estonia), Hillerod (Denmark), Hamburg (Germany), and Augustenborg (Denmark) (Cherkesova et al., 2016).

As an example of a holistic Eco-city, in which the principles of social and architectural ecology are fully implemented, we can cite the city of Malmo. One of the main tasks of reconstructing the city of Malmo into an eco-city was to reduce emissions of pollutants into the air from stationary sources. This goal is achieved through the use of new construction technologies, the development of public transport, the transition of car owners to hybrid transport and electric cars, and the promotion of alternative energy and energy-saving technologies.

At present, the city of Malmo is the third largest industrial city in Sweden. In this regard, the city government decided to use only renewable energy sources (solar panels, wind turbines, heat pumps, and biogas for generating electricity, heat and fuel for cars).

In the Russian Federation, the process has not yet gone beyond the design and construction of individual eco-houses. Experience in this area is being developed, and organizational and financial resources are being accumulated. However, in Russia, the development of urban greening is still mainly carried out by the efforts of scientists.

In Russia and the CIS countries, which have a fairly significant reserve of environmental, natural and territorial resources, the process has also not yet found support from government agencies; it is being developed through the efforts of individuals and organizations. Theoretical issues of ecologization and methods of its implementation at a large urban planning level are actively discussed in the scientific press and at various conferences. But practical activities in this area have not yet reached the urban planning level.

Conclusion

The "green" economy is now the focus of attention of States around the world. Investments in energy-efficient technologies and natural infrastructure are becoming more attractive and profitable. In the crisis year of 2009, the June meeting of the OECD Council at the Ministerial level was not coincidentally adopted the Declaration on "green growth", which recognizes that the promotion of environmentally oriented investments can help both raise and create the necessary infrastructure for the functioning of a new model of city development. This will help ensure sustainable economic growth, social welfare of the population, and environmental health (Animitsa, 2007).

From all of the above, it can be concluded that creating environmentally friendly conditions in cities is a complex process. In the modern world, it is the ecological economy that should help solve the problems of the social ecology of cities. This means that the formation of the city model as a stable functioning socio-economic system is associated with the need to develop and solve a number of complex problems.

References

1. Aliyeva, N.Z., Buryakova, O.S., Kalinina, N.A. (2014), 'Transformation of human consciousness in the age of technogenic globalization: phenomena and trends,' *Journal of World Applied Sciences Journal*, 30(11), 1510-1514.
2. Animitsa, E. G. (2007), 'The Median region,' Ekaterinburg, URGEU.
3. Cherkesova, E.Y., Breusova, E.A., Savchishkina, E.P., Demidova, N.E. (2016), 'Competitiveness of the human capital as strategic resource of innovational economy,' *Journal of Advanced Research in Law and Economic*, VII (7(21)), 1662-1667.
4. Ecological rating of cities of LLC "Green patrol" (2020) [Online], https://greenpatrol.ru/ru
5. Landry, C. (2000), 'The creative city : a toolkit for urban innovators,' London, Earthscan.
6. Meadows, D. H., Meadows, D. L., Randers, J. (1992), 'Beyond the limits to growth,' Context, 32(10).
7. Meadows, D. H., Meadows, D. L., Randers, J., Behrens, W. W. (1972), 'The limits to growth,' New York.
8. Mizutori, M., Guha-Sapir, D. (2017), 'Economic Losses, Poverty and Disasters 1998–2017,' United Nations Office for Disaster Risk Reduction [Online], https://www.unisdr.org/2016/iddr/IDDR2018_Economic%20Losses.pdf
9. Ogorodnikov, I. A., Ogorodnikov, V. A. (1998), 'On the road to sustainable development: eco (materials),' Moscow, Socio-ecological union.
10. Pakhomova, A.I., Buriakov, S.A., Vasenev, S.L., Gornostaeva, Z.V., Kornienko, M.V. (2014), 'Localization of the urban workforce reproduction of the modern city,' *Asian Social Science*, (15), 255-260.
11. Passetti, E., Tenucci, A. (2016), 'Eco-efficiency measurement and the influence of organisational factors: evidence from large Italian companies,' *Journal of Cleaner production*, 122, 228-239.
12. Păunică, M., Mocanu, M. (2017), 'Green controlling–concept and practice,' *Proceedings of the International Conference on Business Excellence*, 11(1), 1137-1145.
13. United Nations (1996), Report of the United Nations Conference on Human Settlements (Habitat II). New York, UN [Online], https://www.un.org/ruleoflaw/wp-content/uploads/2015/10/istanbuldeclaration.pdf.
14. Vodenko, K.V., Cherkesova, E.Y., Shvachkina, L.A., Fateeva, S.V., Erosheva, I.Y. (2016), 'The specifics of the socio-cultural determination of the current economic activity,' *International Journal of Economics and Financial Issues*, 6(S1), 206-210.
15. Yang, L., Zhang, X. (2018), 'Assessing regional eco-efficiency from the perspective of resource, environmental and economic performance in China: A bootstrapping approach in global data envelopment analysis,' *Journal of cleaner production*, 173, 100-111.

The Influence of Bad Debt Reserves on Financial Health of Organization

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Abstract

The current financial instability and a threat of a deepening international crisis mean that many companies often face inability of their debtors to pay for the services or goods on time, which in the end hurts financial indicators and management effectiveness of the organization. If an organization avoids regular assessment of its accounts receivable, account them without reserves, the financial result of such a company becomes rigged. Our research reveals the advantages and disadvantages of bad debt reserves, studies the problems of these reserves financing, establish the difference in the use of the reserve in bookkeeping and tax accounting. Accounts receivable are the most important part of a company's working capital; liquidity, margins and investment attractiveness of the company depends on it. This is why the results of our research will help companies to put correct focuses when analyzing its activities.

Keywords: Bad Debt Reserves, Accounts Receivable, Financial Result, Data Reliability

Introduction

Reliable information about the company's activities, accounting objects is one of the key goals of modern accounting (Alessi, 2010). A good method of attaining this goal is creation of bad debt reserves (Beber, 2015). Bad debts, i.e. the debts, which were not redeemed by the deadline specified in an agreement or other documents and are not guaranteed, dwarf financial activities and trigger losses. Debt collateralization helps a company minimize its financial losses from bad debtors by presenting a comprehensive picture of economic development of the company, optimize losses by reducing the profit tax and improve company's operations on the whole (Petrov, et. al., 2019; Korableva, et. al. 2019). To attain this goal, we need timely control over accounts receivable and the use of reserves if necessary to cover them to use the funds of the company rationally.

Theoretical Background

A debt for the goods or services is acknowledged doubtful, when it is repaid after a deadline or there is a high probability of nonpayment. A bad debt reserve is created to receive true information about the receivables in such cases to estimate the debt (Celerier, 2017; Bykanova et. al., 2018). Changes in the reserves will be reflected as part of profit and losses. If after the end of a reporting year, which follows the year of this reserve creation (Glubokova, et. al. 2019, Deputatova, et. al., 2018) the funds allocated to the reserve are not spent, they are accounted as a financial result as of the end of the year in accordance with Provision on Bookkeeping and Accounts in the Russian Federation approved by a Russian Federation Finance Ministry order dated July 29, 1998, № 34. At that, the bad debt reserve cannot exceed 10% of revenue of the reporting period in accordance with article 249 of the Russian Federation Tax Code (Fig. 1).

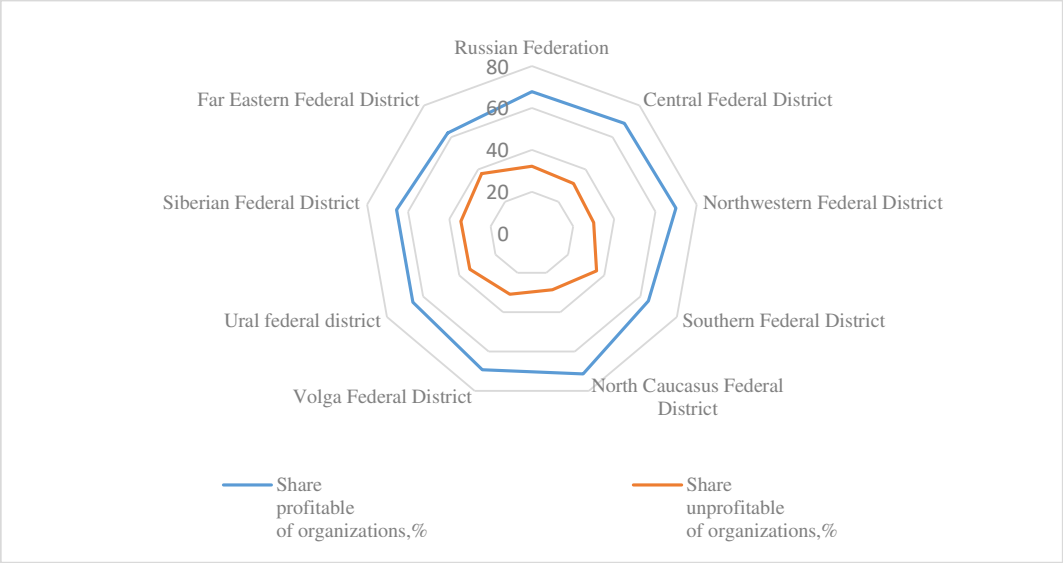

Fig. 1: Comparative characteristics of profitable and loss-making organizations as of January 2020

A company has the right to account its monetary assets as bad debt reserves only on debt on normal operations, which used to be profitable. Russian Accounting Standards 9 / 99 Revenue of Organizations sets the reserve on each bad debt according to the possibility of debt repayment and solvency of the debtor (Dubovik, et. al., 2018; Akhmadeev, et. al., 2019). The bad debt reserve can be restored, i.e. included in other revenue if stocktaking reveals an excess or the debtor redeemed the debt with a payment exceeding the volume of the debt. The methodology of bad debt reserves creation in bookkeeping differs radically from the methodology in fiscal accounting, which makes their simultaneous use wrong. Bookkeeping focuses on the economic value of the facts and conditions of business operations, while fiscal accounting focuses on legislation (Benazzoli, 2016; Ekimova, et. al., 2017).

Besides, there are other significant differences of the two types of accounting (Prodanova, et. al. 2018). Under bookkeeping, a reserve is obligatory and should be reflected among other spending items on the debt side of account 91 and the credit side of account 63, while in fiscal accounting an organization decides on its own whether to create the reserve or not and if the decision is in favour of its creation accounts it as non-operating expenses (Golubtsova, et. al. 2019; Petrov, et. al. 2019). The repayment dates also differ: bookkeeping deems bad both overdue and future debt, while for fiscal accounting only overdue debt matters. When faced with overdue receivables, organizations spend bad debt reserves because of the lack of current funds and receive some economic profits. After debt stocktaking organizations increase the reserves in line with the term of bad debts – for the debt 90 days overdue for the whole sum of it, from 45 to 90 days for 50% of the discovered debt. No increase is done for the debt up to 45 days overdue (Morozova, et. al. 2019).

Thus, the organizations can reduce their profit tax. Clients, customers and other debtors unable to pay their due entail overdue accounts receivable and thus reduce the tax obligations of the company to the budget by the size of the tax on the profit it failed to receive. The organization also diminishes its tax burden for the whole taxation period and saves its current assets needed for production and improves financial stability when the market is unstable. The organization also has the right to shift the reserve to the next taxation period, if the reserve was not fully spent to cover losses of the reporting period. Reserves accounting allows companies to adjust financial reports. Assets and liabilities of the company are often adjusted by the estimated values to make information reliable. In the case of receivables, the estimated value is a bad debt reserve, that's why receivables are accounted less the reserve (Kosolapova, et. al. 2019). In the current conditions the volume of a potentially bad debt in the capital

of an organization can account for its significant part and become fatal for effective management. But a debt, which is discovered and written off timely, helps the company create a true picture of its financial standing.

However, a bad debt reserve can reduce economic benefits. By creating a bad debt reserve for the whole volume of receivables in the wake of depriving a supplier of its reliable counteragent status, the organization can incur solid losses. If the overdue debt accounts for more than 20% of the annual company's turnover, the reserve and debt write off for the bankrupt companies will reduce the taxable profit and other payments to the budget, dilute investment attractiveness as a result such economic indicators as equity to total assets and equity plus long-term debt to total assets ratio will decrease. Thus, annual losses of a company with a 30 bln rbl turnover will amount to about 1 bln rbls.

Discussion

When creating a bad debt reserve, the accountant should realize the aim of its creation setting aside the fact that it is obligatory under accounting rules. One the one hand, it aims at providing all users with reliable information about the state of affairs in the company (Morozova, et. al. 2019). However, unlike the balance sheet, which only reflects accounts receivable less the reserve, an explanatory note can contain more information: about the time of delay, the size of debt, etc.

One the other hand, a bad debt reserve will be of no use for the organizations with poor current asset and leverage management (Kosolapova, et. al. 2019). A bad debt reserve will be most beneficiary for the organizations with sufficient annual turnovers to cushion the blow of bad debts. Insolvent clients and other debtors of more or less stable organizations only affect their development insignificantly (Kolesnichenko, et. al. 2018). By using its reserve, the company can avoid significant losses in any accounting period and write off the debt to other expenses before its due date.

The key advantage of the reserve is the reduction of tax obligations to the budget, optimization of the profit tax. By creating a reserve in fiscal accounting, an organization saves its current assets, because the tax payment shifts to a later date. At that, a bad debt reserve can be good, when spending is to be done at the end of the year, otherwise the taxable profit will not fall (Barasinska, 2012). The organization will also boost its benefits, if uncollectable debt, debts barred by limitation or the terminated obligation exceeds the reserve, because the difference will be accounted as overhead costs.

Conclusion

The influence of bad debt reserves cannot be assessed negatively now. Despite the risks of a profit slump, we should note that the bulk of organizations derive economic profits from the reserve. By impacting accounting indicators, the reserve helps companies carry out a healthy financial analysis, discover the areas requiring close control and thus increase the quality of receivables management, which in the end will improve the company's margins (Fig. 2).

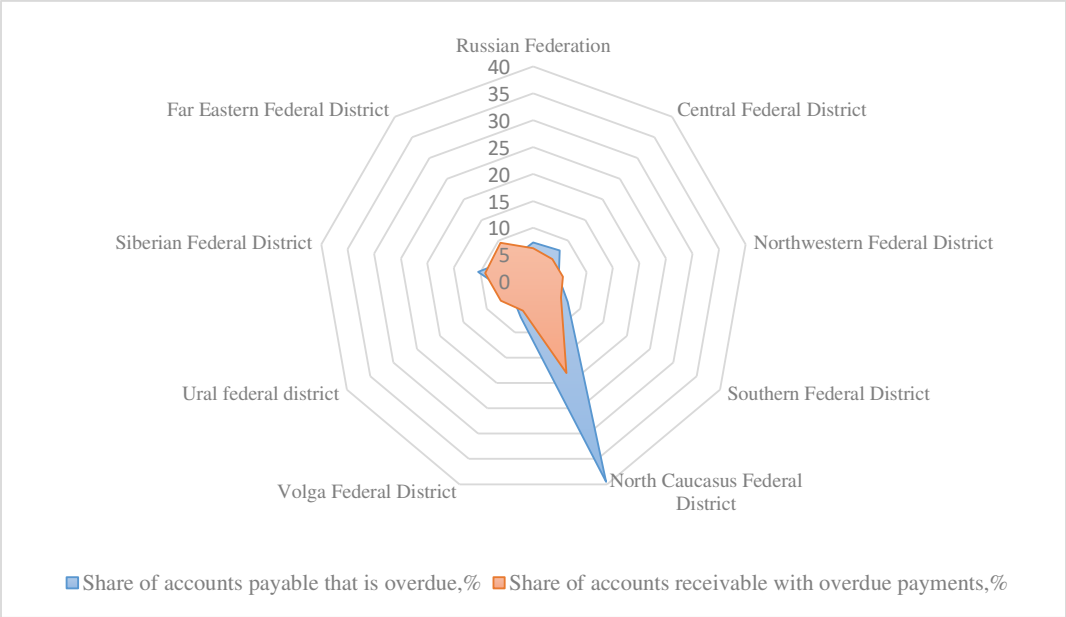

Fig. 2: Comparison of company accounts receivable and payable indicators as of January 2020

The organization will have significant difficulty in staying competitive among companies with solvent debtors. We should also keep in mind that a balance sheet with excessive reserves can be harmful for a company in some cases, for instance, when it wants to receive a loan, because it inflates or reduces the grand total. However, accounting should provide its internal and external users with only reliable information about the financial state of a company. Optimization of taxation, as another advantage of a bad debt reserve, helps companies to lessen their tax burden and tax penalties legally, by helping them spend the saved amount for current needs. An organization can increase its margins and thus its competitiveness during market instability and crises, which would kill its peers. Thus, all organizations should see a bad debt reserve as an excellent possibility to improve their financial standing if bad debts from insolvent debtors appear.

References

- Akhmadeev, R., Morozova, T., Voronkova, O. and Sitnov. A. (2019), 'Targets determination model for VAT risks mitigation at B2B marketplaces,' *Entrepreneurship and Sustainability Issues*, 7(2), 1197-1216.
- Alessi, L., Barigozzi, M. and Capasso, M. (2010), 'Improved penalization for determining the number of factors in approximate factor models, ' *Statistical Probability Letter*, 80(23), 1806–1813.
- Barasinska, N., Schäfer, D. and Stephan, A. (2012), 'Individual risk attitudes and the composition of financial portfolios: evidence from german household portfolios,' *Quarterly Review of Economics and Finance*, 52(1), 1–14.
- Beber, A., Brandt, M.W. and Luisi, M. (2015), 'Distilling the macroeconomic news flow,' *Finance Economist*, 117(3), 489–507.
- Benazzoli, C. and Persio, L.D. (2016), 'Default contagion in financial networks,' *International Journal of Mathematics and Computers in Simulation*, 10, 112–117.
- Bykanova, O.A., Akhmadeev, R.G., Glubokova, N.Y. and Kravchuk, I.S. (2018), 'The global market of roundwood: Financial aspects,' *Bulgarian Journal of Agricultural Science*, 24 (1), 8-16.
- Celerier, C. and Vallee, B. (2017), 'Catering to Investors Through Security Design: Headline Rate and Complexity,' *Quarterly Journal of Economics*, 132(3), 1469–1508.

- Deputatova, Y.Yu., Pshenitsyna, Y.I., Ilyashenko, S.B., Baskakov, V.A. and Zvereva, A.O. (2018), 'Consumer behavior in the context of global economic transformations,' *European Research Studies Journal*, 21 (2), 95-109.
- Ekimova, K.V., Bolvachev, A.I., Dokhoyan, Z.M., Danko, T.P., Zarova, E.V., Shemetkova, O.L. and Sekerin, V.D. (2016), ' Improvement of the methods for assessing the value of diversified companies in view of modification of the herfindahl-hirschman model,' *Journal of Internet Banking and Commerce*, 21 (4), 14.
- Dubovik, M.V., Novikova, E.S. and Sigarev, A.V. (2018), 'The role of information communications technology in the development of companies' business strategies: The Russian experience,' *International Journal of Civil Engineering and Technology*, 9 (10), 1131-1139
- Ekimova, K., Nikeriasova, V., Hvostenko, O. and Ivanova, Y. (2017), 'Mortgage lending as a financial management tool,' *Espacios*, 38 (49), 34-38.
- Glasserman, P. and Young, H.P. (2015), 'How likely is contagion in financial networks,' *Bank Finance*, 50, 383–399.
- Glubokova, N.Y., Egorova, L.I. and Sokur, V.S. (2019), 'Tax control of small enterprises: Russian and foreign experience, ' Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 3354-3358.
- Golubtsova, E.V. and Zvereva, A.O. (2019), ' Development of Tax Attractiveness of Russia's Special Administrative Areas with Fair Tax Competition, 'Proceedings of the 34th International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Management of Innovations through Sustainable Economic Competitive Advantage Vision 2025, 2023-2028
- Kolesnichenko, E., Ozerov, I., Safonova, N. and Malitskaya, V. (2018), 'Digitalization of management as the way of increasing the social and labor activity of young people,' Proceedings of 32nd International Business Information Management Association Conference, IBIMA 2018 - Vision 2020: Sustainable economic development and application of innovation management from regional expansion to global growth, 2955-2964.
- Korableva, O., Durand, T., Kalimullina, O. and Stepanova, I. (2019), 'Studying user satisfaction with the MOOC platform interfaces using the example of coursera and open education platforms,' Paper presented at the ACM International Conference Proceeding Series, 26-30.
- Golubtsova, E.V. and Zvereva, A.O. (2019), ' Expediency of parallel import legalization in Russian Federation,' Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 782-787.
- Kosolapova, M.V., Muravitskaya, N.K., Tolmachev, M.N., Melnikova, L.A. and Petrov, A.M. (2019). 'Technology for solving the problems related to the implementation of the concept of preserving capital in accounting and statistics,' *International Journal of Recent Technology and Engineering*, 8 (3), 789-792.
- Morozova, T.V., Akhmadeev, R.G., Bykanova, O.A. and Philippova, N.V. (2019), 'Harmonizing the valuation standards of the EEU agricultiral companies,' *International Journal of Recent Technology and Engineering*, 8 (1), 2167-2177.
- Petrov, A.M., Kosolapova, M.V., Yshanov, I.G., Muravitskaya, N.K. and Nurmuhamedova, N. (2019), 'The Economic Significance of Statistical Research Activities of Representative Offices of Companies Abroad,' *International Journal of Innovative Technology and Exploring Engineering*, 8 (10), 2713-2722.
- Pfeffer, F. T., Danziger, S., and Schoeni, R. F. (2013), 'Wealth disparities before and after the Great Recession,' *The annals of the American Academy of Political and Social Science*, 650(1), 98–123.
- Petrov, A.M., Putihin, Y.E., Poluleh, M.V., Yurasova, I.O. and Erohina, V.N. (2019), 'Accountant Modeling Technology and Statistics in the Context of the New Educational Concept,' *International Journal of Innovative Technology and Exploring Engineering*,8 (12).
- Prodanova, N.A., Plaskova, N.S., Popova, L.V., Maslova, I.A., Dmitrieva, I.M., Sitnikova, V.A. and Kharakoz, J.K. (2018), 'Corporate reporting of the future: On the path towards new through the analysis of today,' *Eurasian Journal of Analytical Chemistry*, 13 (4), 296-303.

- Petrov, A.M., Nikiforova, E.V., Kiseleva, N.P., Grishkina, S.N. and Lihtarova, O.V. (2019), 'Creation of the reporting on sustainable development of companies based on socioeconomic measurement statistics,' International Journal of Recent Technology and Engineering, 8 (2), July 2019, 4005-4012
- Sotnikova, L.V., Polenova, S.N., Mislavskaya, N.A., Petrov, A.M. and Basova, M.M. (2019), 'Sustainable development, macro and micro level: Russian and foreign model,' *International Journal of Recent Technology and Engineering*, 8 (2), 4524-4532.
- Ustyuzhanina, E.V., Komarova, I.P., Novikova, E.S. and Sigarev, A.V. (2018), 'The phenomenon of the sharing economy: Development problems and prospects in the context of the digital revolution,' *Espacios*, 39 (16), 22-28.

The Impact of Retirement Age Increasing on Demographic Processes in Russia and its Arctic Territories

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Abstract

The paper deals with the assessment of the impact of the retirement age increasing on demographic processes in Russia and its Arctic territories. The aim of the research is the consideration of the question whether the effect of the change in the retirement age for Russia on the whole and the Russian Arctic in particular is justified from the standpoint of demographics. There are the following objectives: 1) to assess the number of able-bodied population of Russia taking into account changes in retirement age; 2) to evaluate medical and demographic reserves and the validity of the retirement age increasing for the Russian Arctic's population. The trivariant long-term forecast of the number of the able-bodied population that points out the feasibility of the retirement age increasing for Russia on the whole from the standpoint of economic demands has been formulated. It has been determined that Russia is characterized by steady growth in life expectancy, which is the basis of retirement age increasing. The indicators of the retirement age in Russia which will be fixed by 2028 as a whole conform to European standards. The comparison of actual values of average age of death of the Russian Arctic's population with the retirement age and trends research points out the baselessness of pension age increase for the residents of Arctic regions. These areas are characterized by low medical and demographic reserves insufficient to increase the retirement age.

Keywords: Russia, The Arctic, Retirement Age Increasing; Demographic Processes.

Introduction

The problem solving of population ageing in terms of ensuring the balanced functioning of any pension systems leads, in particular, to retirement age increasing (Chai and Kim, 2018; Attanasio et al, 2016) . The relevance and value of considering the effect of retirement age increasing on economic and social processes naturally lead to active research in all countries of the world (Amaglobeli et al, 2019; Staveley-O'Carroll and Staveley-O'Carroll, 2017).

In modern world practice, the average normal retirement age is 61.7 years for men and 60.5 years for women, but the retirement age in different regions of the world is different. Thus, the average retirement age in Europe (including Russia) is 64.4 years for men and 63.1 years for women; in America - 62.7 and 61.6; in Asia and the Pacific, 60.2 and 58.3; in Africa, 59.7 years for men and 59.1 years for women.

The research of the impact of retirement age increasing on the economy and social processes is a relatively new line of research for Russia. This is due to the fact that until 2019 (beginning of the rising of the retirement age in Russia), the retirement age in Russia has remained unchanged since 1932. In Russia, in accordance with the Federal law of 03.10.2018 No. 350-FZ "On amendments to certain legislative acts of the Russian Federation on the issues of assignment and payment of pensions", a phased ten-year period of the retirement age increasing began. As a result, by 2028 the retirement age for Russia's residents will be increased by 5 years (60 years for women and 65 for men).

The relevance of considering of the impact of retirement age increasing on social, economic and demographic processes in Russia is determined not only by the novelty of such a problem, which determines the scientific interest and special social acuteness focus of the problem (Mao et al, 2019). Its urgency is generated by the specific character of Russia's socio-economic space as well, i.e. the availability of a number of territorial problems and problems of Russia's socio-economic development which are caused by the factor of uneven development, differences in economic specializations of Russia's vast territory, interregional differences in medical-demographic characteristics of the population. Thus, in Russia there exists a special regional aspect of the impact of retirement age increasing on social and economic processes in Russia's specific territories. So, for the Russian Arctic's population a number of privileges and preferences, including age retirement benefits are provided in order to encourage people to remain in these areas. These benefits also take into account the negative impact of the specific "Arctic" factors on the state of human health. Thus, with these benefits some problems can be solved: firstly, the problem of "empty space"; secondly, the problem of availability of labor resources necessary for the realization of ambitious goals of natural resources development in the Russian Arctic; thirdly, government social purpose i.e. negative influence of the Arctic on humans (Korchak et al, 2019; Larchenko L.V. et al, 2016; Skufina et al, 2015) . Before 2019 (the year of retirement age increasing) the Arctic's inhabitants retired 5 years earlier than people in other Russia's territories (women at 50, men at 55 years). However, the regional aspect of the influence of the retirement age change on social and economic processes in the Russian Arctic is virtually unexplored.

A relatively small number of the research concerning regional aspects of the problem of the retirement age increasing, including the authors' research can be grouped into three thematic areas. Firstly, the effect on economic production factors is examined. Using groundwork of the world of science (Staveley-O'Carroll and Staveley-O'Carroll, 2017; Bongaarts, 2015; Ushakov et al, 2017), it is possible to forecast the impact of retirement age increasing on the labor market, demographic characteristics of the population and GRP production. The conclusions are drawn on the link between retirement age increasing (which increases able-bodied population), and opportunities for social and economic development of the country as a whole and individual regions, in particular Arctic ones (Samarina et al, 2018; Skufina et al, 2019b). Secondly, the problems of economic growth. In this case, the research is based, as a rule, on well-developed approaches of economic-mathematical modeling corrected to qualitative assessment of the factors and conditions of economic growth of certain countries and regions (Baranov and Skufina, 2018; Chakraborty, 2004; Li et al, 2007; Mitchell, 1993)). It has been ascertained that the retirement age increasing in Russia will have a positive impact on the economic growth of Russia and its regions (Baranov et al, 2018; Skufina et al, 2019a). Thirdly, in this research it has been proved that special attention should be paid to the impact of regional specificity on the Arctic's economic development, migration processes and medical-demographic characteristics of the population. There is a contradiction – on the one hand, there is a growing need for able-bodied population of the Arctic in connection with the necessity of the realization of large projects concerning development of transport infrastructure, projects of exploitation of natural resources. On the other hand, there is an outflow of employable population in

the Arctic (Samarina et al, 2019). At the same time pension benefits of the Arctic inhabitants are a factor which has a positive influence on citizens' decision not to leave the Russian Arctic's territory until their retirement age.

Before 2019 (the year of retirement age increasing) the Arctic's inhabitants retired 5 years earlier than people in other Russia's territories (women at 50, men at 55 years). In the new conditions according to pension law, the Arctic's inhabitants will also retire 5 years earlier than people in other areas of Russia, but now this period is increased in proportion to other residents. In such a way, women working in the Arctic territory will retire at 55 and men at 60 years. But is this proportional change in retirement age, taking into account the Arctic's negative impact on medical and demographic state well-founded ? How will the retirement age increasing affect Russia's labor force as a whole? All these and related problems have not been completely solved yet regarding their scientific and practical significance.

The aim of the paper is the examination of the following question: whether the effect of the retirement age change for Russia and the Russian Arctic in particular, in the context of demographics is justified?

Tasks:

- to assess the number of able-bodied population of Russia taking into account changes in retirement age;

- to evaluate medical-demographic reserves and the validity of retirement age increasing for the Russian Arctic's population.

Methodological prerequisites and results of impact evaluation of retirement age increasing on able-bodied population in Russia

Among lots of demographic characteristics, the object of attention we have chosen is the able-bodied population. This is due to two factors. Firstly, the retirement age increasing extends the period of working age population, thus increasing the working-age population size in the country. That is, from the standpoint of assessing the impact of retirement age changes this indicator directly depends on the changes in the retirement age. Secondly, the changes in the able-bodied population have direct influence on economic growth. Therefore, this indicator largely characterizes the feasibility of retirement age increasing from the standpoint of the development of national production factors.

The data of the Federal Service of State Statistics concerning population size, age and sex composition, mortality, fertility and other demographic indicators form the information base of the able-bodied population forecast.

Table 1 presents the authors' predictive estimates concerning the growth of able-bodied population in Russia caused by the retirement age increasing. The forecast methodology is based on the use of the official forecast of able-bodied population size, which was compiled by the Federal State Statistics Service of the Russian Federation in 2017. The methodology of our forecast is to impose on this forecast the fact of an increase in the retirement age, taking into account the age and sex structure of the population. The forecast of the Federal State Statistics Service for the period up to 2036 is made in three versions. Accordingly, our forecast is made in three versions as well.

Table 1: The forecast of able-bodied population (thousand people) taking into account the retirement age increasing

Years	Forecast according to the "old" scheme of retirement (55 years for women, 60 for men) (thousand people)			Forecast according to the "new" scheme of retirement (60 years for women, 65 for men) (thousand people)		
	Low	***Medium***	***High***	***Low***	***Medium***	***High***
2019	82187	82240	82274	82187	82240	82274
2023	78462	79250	79947	82052	82872	83602
2028	77072	78958	80561	85397	87485	89278
2029	77038	79161	80955	85331	87685	89695
2034	76118	79481	82130	87790	91656	94795
2036	75046	79039	82208	87070	91662	95410

The forecast was prepared in three variants for the period up to 2036. For comparison, there is a forecast of the Federal Service of State Statistics of the Russian Federation, compiled for the preservation of an "old" scheme of the retirement (the left part of the table 1).

The analysis of forecasting results indicates the following important facts: in case, if there was not retirement age increasing (saving working age for women 16-54 years, men 16-59 years, retirement, respectively 55 and 60 years), further decline in the working age population in all three options would be projected. Thus, the retirement age increasing from 2019 (the retirement age is 60 years for women, 65 for men) has halted a steady trend of decline in the able-bodied population in Russia.

Thus, from a purely economic position, it should be determined that the retirement age increasing had a positive impact on the able-bodied population in Russia. It is a necessary and expedient option for the economic development of the country.

Methodical prerequisites and results of the assessment of medical-demographic reserves and the reasonableness of the retirement age increasing for the Russian Arctic's population

The major factor in the justification of retirement age increasing in all countries of the world is the availability of sustainable global growth in life expectancy. It should also be noted, at least two positive factors, objectively characterized global trend of retirement age increasing: firstly, there is a steady increase of healthy life, and secondly, there is a global trend of increasing lag between retirement age increasing and life expectancy increasing, including healthy life) (Barr and Diamond, 2009; Holzmann, 2013).

A survey of the literature concerning changes in pension law, allows us to establish the following: the basis of the decision on the possibility of increasing the age of eligibility for awarding of insurance old-age pensions in most countries is primarily the sustainability of the positive changes in indicators of lifetime. Therefore, this indicator will be the main one in the feasibility analysis of the retirement age increasing for Russia on the whole and its Arctic territories in particular.

The information base of the research contains data of Federal State Statistics Service of the Russian Federation, the International Social Security Association (International Social Security Association – ISSA), Social Security Administration (US Social Security Administration – SSA) and World Health Organization – WHO).

The research has shown that scheduled in Russia age of eligibility for a pension (65 years for men and 60 women) as a whole corresponds to the average age of retirement in Europe – 64.4 years for men and 63.1 years for women (calculated by the authors according to the data from 44 countries

presented in the analytical report prepared by the ISSA and SSA).

For regions of the Russian Federation's Arctic zone pensionable age is 60 years for men and 55 for women (compared to 55 years and 50 which had place before 2019). A comparison of life expectancy of the Arctic regions' population (tab. 2) with the retirement age shows that before the pension reform, lifetime after retirement age of the Arctic's inhabitants as a whole corresponded to the indices of the European average male population and was higher for female one.

Table 2: Life expectancy for Russia and the Russian Arctic's regions, 2008-2017 (based on the materials from the Date of the Federal State Statistics (Date of the Federal..., 2018)

Russian Arctic's regions	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
life expectancy (men), years										
Murmansk Region	60,7	61,2	62,7	63,0	63,9	65,1	64,0	64,5	65,7	66,5
Nenets Autonomous Area	56,1	59,3	59,1	60,6	62,0	60,2	64,7	65,2	63,9	65,9
Yamal-Nenets Autonomous Area	66,0	67,8	65,6	65,6	66,3	66,5	67,0	66,9	67,1	69,0
Chukotka Autonomous Area	56,3	53,7	52,7	57,5	56,6	58,6	58,8	59,3	59,7	60,3
Russia	*61,8*	*62,8*	*63,1*	*64,0*	*64,6*	*65,1*	*65,3*	*65,9*	*66,5*	*67,5*
life expectancy (women), years										
Murmansk Region	72,7	73,0	73,9	74,6	75,3	75,3	75,7	75,7	75,6	76,3
Nenets Autonomous Area	71,9	71,3	71,4	73,5	75,9	75,2	76,2	76,9	78,4	77,2
Yamal-Nenets Autonomous Area	74,7	75,5	74,6	74,9	75,1	75,9	76,9	76,4	77,0	77,9
Chukotka Autonomous Area	64,2	64,6	63,6	66,3	64,9	66,4	66,6	69,7	69,6	71,7
Russia	*74,2*	*74,7*	*74,9*	*75,6*	*75,9*	*76,3*	*76,5*	*76,7*	*77,1*	*77,6*

In the Russian Arctic's regions until the beginning of pension reform, the average life expectancy after retirement age was 10.4 years for men and 25.8 for women (the difference between life expectancy and age of retirement on average for Europe is +12.5 years for men and 19 years for women). In the Murmansk region lifetime after retirement age was 11.5 years for men and 26.3 years for women; in the Nenets Autonomous district - 10.9 years and 27.2 years, respectively; in the Yamalo-Nenets Autonomous district – 14 years for men and 27.9 years for women; in the Chukotka Autonomous area - 21.7 years for women. Chukotka Autonomous Okrug is stood out among the above-listed regions. The difference between life expectancy and retirement age for men in Chukotka was 2.4 times lower than in European countries, and was only 5.3 years.

After increasing the age of eligibility for awarding of insurance old-age pensions to 5 years life expectancy after retirement age (while maintaining the existing level of lifetime) will reduce for the Arctic zone's regions and is expected to average 5.4 years for men and 20.7 years for women (with a minimum value in the Chukotka Autonomous district +0.3 years for males).

When considering the compliance of two indicators – life expectancy (tab. 2) and the average age of the deceased (tab. 3) in Russia and Arctic regions it has been revealed the divergence of their values. For Russia on the whole, the deviation of the value of the prognostic index of life expectancy from the actual average age of death in the period 2008-2016 was slight, in the range of exceeding the prognostic index above the actual one to 0.1-0.2 years. For the Russian Arctic's regions such

deviation was considerable. So, in the Murmansk region the actual age of the death for men in 2011, 2014, 2016, were on average 7.1 years lower than life expectancy; in the Nenets Autonomous district in 2011-2016 – 9.5 years (men) and 19.5 years (women); in the Chukotka Autonomous district the real age of the death for men in the period 2008-2014, the average was 4.9 years lower than life expectancy, women – 10.9 years in the period 2011-2016, the only exception is the Yamalo-Nenets Autonomous Okrug, where the divergence values of these indicators exceeded the national average, but it is not as critical as in other regions of the Arctic zone of the Russian Federation.

Table 3: The average age of death for Russia and the Russian Arctic's regions, 2008-2016

Russian Arctic's regions	2008	2009	2010	2011	2012	2013	2014	2016
average age of death (men) years								
Murmansk Region	60,7	61,2	62,7	56,9	63,9	65,1	56,8	57,6
Nenets Autonomous Area	56,0	59,3	59,0	51,0	47,1	54,4	54,6	57,1
Yamal-Nenets Autonomous Area	66,0	67,8	65,5	65,9	66,1	66,3	64,5	66,9
Chukotka Autonomous Area	51,1	48,2	52,7	51,5	52,8	53,9	54,8	59,7
Russia	*61,8*	*62,7*	*63,1*	*64,0*	*64,5*	*65,1*	*65,2*	*66,4*
average age of death (women), years								
Murmansk Region	72,6	73,0	73,9	74,6	75,3	75,2	75,7	49,0
Nenets Autonomous Area	71,6	70,8	71,1	72,9	47,6	74,6	45,2	41,3
Yamal-Nenets Autonomous Area	74,5	75,2	74,5	75,0	51,7	75,6	76,4	76,7
Chukotka Autonomous Area	64,2	64,6	63,5	55,4	57,2	54,3	56,2	56,4
Russia	*74,1*	*74,6*	*74,8*	*75,5*	*75,7*	*76,2*	*76,4*	*76,9*

The comparison of actual values of average age of the death of the Arctic regions' inhabitants with the age of retirement has shown that in 2016 the life expectancy after retirement age of the average male resident of the Nenets Autonomous district was 2.1 years, in Murmansk Region – 2.6 years, the Chukotka Autonomous district – 4.7 years; only in Yamalo-Nenets Autonomous district, this index corresponded both to the national average value, and the European one - 11.9 years. The actual lifetime after retirement age of an average woman, living in Yamalo-Nenets Autonomous district was 26.7 years; in the Chukotka Autonomous district - 6.4 years, whereas in the Murmansk Region and the Nenets Autonomous district in 2016, women on average did not live to the retirement age and died prematurely (1 and 8.7 years, respectively). By 2016, in comparison with 2008, there was a significant reduction in the number of actual lived years (with the exception of the Yamalo-Nenets Autonomous district). We can assume that in the long term, in conditions of retirement age increasing only men and women living in the Yamal-Nenets Autonomous Okrug will be able to live to the age of retirement.

Conclusions

The carried out research made it possible to draw the following conclusions:

1. The research of world practice of the retirement age establishing has shown that the retirement age increase corresponds to the global trends. The reasons of retirement age increasing to 65 years for men and 60 for women in Russia were sustainable positive changes in the indices of lifetime.

2. The comparison of the indices of life expectancy of the Russian Arctic's inhabitants with the age

of retirement (until 2019) has shown that the residual life corresponded to the values of the European average male populations and higher than ones for women. However, the comparison of actual values of average age of death of the Russian Arctic regions' inhabitants with the age of retirement shows a downward trend in the number of actual lived years, and the groundlessness of the retirement age increasing for the Arctic regions' residents. With the exception of the Yamalo-Nenets Autonomous district, the values of the new retirement age for the Arctic's residents (60 years - men, 55 - women) will exceed average lifetime.

3. Thus, the retirement age increase without significant policy changes in the health system of the Russian Arctic, will not allow achieving significant economic effect. Thus, in case of legislative implementation of important changes in the pension system in Russia it is advisable to take into consideration regional specificity, in particular regions of the Arctic.

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References

- Amaglobeli, D., Chai, H., Dabla-Norris, E., Dybczak, K., Soto, M. and Tieman, A. (2019), The Future of Saving : The Role of Pension System Design in an Aging World. USA: Intern. Monet. fund.
- Attanasio, O., Bonfatti, A., Kitao, S. and Weber, G. (2016), 'Global demographic trends: consumption, saving, and international capital flows', Handbook of the Economics of Population Aging., 1, 179-235.
- Baranov, S. V. and Skufina, T. P. (2018), 'Opportunities to promote economic growth in Russia at a rate not lower than the world average', Economic and Social Changes: Facts, Trends, Forecast, 11 (5), 49-60.
- Baranov, S., Skufina, T. and Samarina, V. (2018), 'Regional Environment for Gross Domestic Product Formation (The Case of Russia Northern Regions)', Advanced Science Letters, 24 (9), 6335-6338.
- Barr, N. and Diamond, P. (2009), 'Reforming Pensions: Principles, Analytical Errors and Policy Directions', Intern. Soc. Secur. Rev., 62 (2), 5-29.
- Bongaarts, J. (2015), Pensions at a Glance 2015: OECD and G20 Indicators. Paris: OECD Publ.
- Chai, H. and Kim, J. I. (2018), Demographics, Pension Systems and the Saving-Investment Balance. USA: Intern. Monet. Fund.
- Chakraborty, S. (2004), 'Endogenous lifetime and economic growth', J. of Econ. Theory, 116 (1), 119-137.
- Date of the Federal State Statistics: Regions of Russia. Socio-economic indicators. (2018), [Online] [Retrieved February 07, 2020], http://www.gks.ru.
- Holzmann, R. (2013), 'Global Pension Systems and Their Reform: Worldwide Drivers, Trends and Challenges', Intern. Soc. Security Rev., 66 (2), 1-29.
- Korchak, E. A., Serova, N. A., Emelyanova, E. E. and Yakovchuk, A. A. (2019), 'Human

capital of the Arctic: problems and development prospects', IOP Conf. Series: Earth and Environmental Science, 302, 012078.

- Larchenko, L. V., Kolesnikov, R. A., Tumanova, G. P. and Kibenko, V. A. (2016), 'Economic Problems of Exploring Hydrocarbons in Russian Northern Provinces in the Context of International Interests', Intern. J. of Energy Econ. and Policy (IJEEP), 6 (3), 529-536.

- Li, H., Zhang, J. and Zhang, J. (2007), 'Effects of longevity and dependency rates on saving and growth: Evidence from a panel of cross countries', J. of Devel. Econ., 84 (1), 138-154.

- Mao, H., Ostaszewski, K. M. and Wen, Z. (2019), 'The Retirement Decision with Consideration of Part-Time Work After Retirement', J. of Insur. Iss., 42(1), 86-112.

- Mitchell, O. S. (1993), 'Retirement Systems in Developed and Developing Countries: Institutional Features, Economic Effects, and Lessons for Economies in Transition', Nat. Bureau of Econ. Res., 4424.

- Samarina, V., Samarin, A., Skufina, T. and Baranov, S. (2019), 'The Population Settlement in Russia's Arctic Zone: Facts and Trends', IOP Conf. Series: Earth and Environmental Science, 302, (1).

- Samarina, V. P., Skufina, T. P. and Samarin, A. V. (2018), 'Russia's North Regions as Frontier Territories: Demographic Indicators and Management Features', Europ. Research Studies J., l, XXI (3), 705-716.

- Skufina, T., Baranov, S., Samarina, V. and Korchak, E. (2019a), 'Increasing GDP production in the Russian Federation and raising the retirement age: is there a connection? ', AD ALTA: J. of interdisciplinary research, 9 (1), VI, 69-72.

- Skufina, T., Baranov, S. and Samarina, V. (2019b), 'Modeling the Production of GRP Regions of the North of Russia', Solovev D. (eds) Smart Technologies and Innovations in Design for Control of Technological Processes and Objects: Economy and Production, FarEastCon 2018, Smart Innovation, Systems and Technologies, 139, 173-179.

- Skufina, T. P., Samarina, V. P., Krachunov, H. and Savon, D. Yu. (2015), Problems of Russia's Arctic Development in the Context of Optimization of the Mineral Raw Materials Complex Use // Eurasian Mining, № 2, p.18-21

- Staveley-O'Carroll, J. and Staveley-O'Carroll, O. M. (2017), 'Impact of pension system structure on international financial capital allocation', Europ. Econ. Rev., 95, 1-22.

- Ushakov, D., Elokhova, I. and Kharchenko, I. (2017), 'Tax instruments in public regulation of population employment: The factors of today's efficiency', Intern. J. of Ecol. Econ. and Statist., 38 (2), 161-168.

Corporate Governance in The Small and Medium Enterprises (SMES) As Performance Enhancer

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Abstract

Although the number of Palestinian SMEs has been grown last few decades, they face a lot of challenges. The low performance compared to other counterparts around the world is the first of these challenges. Therefore, this paper aims to provide concise description of SMEs in Palestine with an analysis for the current challenges they face. Moreover, the study aims to explore the need of SMEs to embrace a corporate governance (CG) code to elevate their performance and the different advantages and disadvantages of the implementation of their practices. The study found that there is a wide believe that CG code introduces new strategic perspectives through the use of external directors who will add value over the improvement of entrepreneurial activities and increase the competitiveness of SMEs. This is particularly important, as a considerable portion of entrepreneurs in context of Palestine initiated business without a former technical experience. Further challenges such as funding constraint and managerial lack of proficiency in the sector of Palestinians SMEs could be coped with the use of a sound structure of CG in place. There is a wide body of knowledge supports the embracing of CG practices within SMEs at premature phase, in order to have a smooth progress when these SMEs grow in the market.

Keywords: SMEs, Corporate Governance, SMEs Performance; SMEs in Palestine.

Introduction

During last few decades, the corporate governance (thereafter; CG) became an interesting and debatable dominated policy agenda in the most of developed countries. It progressively heating its path to the top priorities of the policy schedule in many governments around the world. The financial crises (eg.1997 Asian crisis, and 2008 US crisis) resulted in the collapse of multinational corporations and impacted many other economies around the world, beyond the corporations themselves. This makes CG a catchphrase in the development debate among practitioners and academic researchers.

Emerging markets, of which Palestine is no exemption, are progressively accolade the concept of CG, as this concept has the ability to influence positively on the sustainable growth. It is believed that well CG breeds a confidence for an investor. Currently, companies are working on enhancing their CG practices in order to rise their values and promote the bottom line. CG is seen as followed structure to direct and run the affairs of the firms toward improving business operations and firm's accountability with the final aim of obtaining a long-run stockholders' value, while taking into the considerations the interests of all other stakeholders. In addition, CG delineates to the structure and strategies to be implemented in place to assure a suitable running of company bodies (Adonu, 2017). As argued by (Claessens, Djankov, Fan, & Lang, 2002) keeping a good CG framework could benefit the companies by increase access to funds, reduce costs of fund, promote good performance and provide more appropriate value for all of stakeholders.

The topic of CG has been a growing realm of management studies particularly among listed big companies. However, studies relate CG to SMEs gained substantial attention in the developed countries (Abor & Adjasi, 2007). SMEs around the world do not strictly comply with CG codes; nevertheless, such SMEs do believe that such CG codes should also been applied by them. Accordingly, the aim of this article is to provide concise description of SMEs in Palestine with an analysis for the current challenges they face. Moreover, the study aims to explore the need of SMEs to embrace a corporate governance (CG) code to elevate their performance and the different advantages and disadvantages of the implementation of their practices. The argument will be provided based on some reasoning of the benefits of adopting CG practices as opposed to some scholars who placed less importance of embracing CG practices for SMEs. Furthermore, the study will provide some insights on the lack of use of CG practices among SMEs.

Small and Medium Enterprises (SMEs)

The literature did not have an agreement over a certain definition for SMEs, as various authors provided various definitions (Bundaleska & Dimitrova, Makedonka Nikolovska, 2012). However, it is generally related to some criteria such as magnitude, number of employees, capital… etc. (Abor & Adjasi, 2007; Asunka, 2017). OECD defines SMEs as "non-subsidiary, independent firms which employ less than a given number of employees".

The number of employees can vary from a country to another. For instance, it is commonly known that the medium enterprises are those which employ less than 200 employees, however it is 250 in the European Union and 500 in US. Firms which employee less than these numbers fall under the category of "Small firms", while micro-enterprises employ a maximum of 5 to 10 workers.

A new definition for SMEs came into force in the European Union by the beginning of 2005, it takes the financial ceilings into consideration. Hence, SMEs are those which have number of employees between 50 and 249 with turnovers do not exceed EUR 50 million. With this new definition, the small enterprises are which have number of employees between 10 to 49 and with an annual turnover does not exceed EUR 10 million. Micro firms are defined with a number of employees of less than 10 and an annual turnover that does not exceed EUR 2 million. Alternatively, the classification can be done according to the balance sheet, as it should not exceed EUR 43 million EUR for medium size enterprises, EUR 10 million EUR for small size firms and EUR 2 million EUR for micro size enterprises (OECD).

Governments of many countries have undertaken steps to promote and support the establishment and the growth of SMEs, since these SMEs are the backbone of the economic development. SMEs sector is deemed to be the largest in terms of employing workers at some of the developed industrial economies (Carsamer, 2009). Small Businesses are evident in many sectors, such as in commerce, education, health, manufacturing and other service industries (Adonu, 2017).

A Glance about SMEs in Palestine

The Palestinian Monetary Authority defined Small Enterprises as those with less than 25 employees and with annual sales of less than USD 7 million (The Portland Trust, 2013).

A survey conducted on the Palestinian economy found that 97% of the firms are classified as SMEs and they currently employs 65% of the total workforce in Palestine. Two thirds of the sole proprietorship Palestinian enterprises are located in the West bank and the third are located in Gaza (PCBS, p.21). Above 85% of all establishments in Palestine are owned by sole individuals, which means that SMEs dominates the Palestinian economy (S. S. Sultan, 2014). In the West Bank, there are 88,4421 national establishments. In Gaza Strip, the number of these national operating establishments are 42,853 (PCBS, p.19). Only 137 enterprises in Palestine employ over than 100 workers, majority of them are located in West Bank (100 companies) and the other 37 are located in Gaza. The majority of SMEs in Palestine employ less than 9 employees (The Portland Trust, 2013). The entrepreneurship in Palestine is mainly initiated based on the individual or family savings with little support from the official agencies.

Similar to other economics, SMEs in Palestine play a vital role in the process of economic development, as they reduce the government burden on creating jobs and therefore reduce government expenditures. SMEs are considered the safety valve against political instability arises from deteriorating political conditions in the country. SMEs Establishment can be an efficient strategy to mitigate unemployment and reduce the government expenditure (Abuznaid & Doole, 1999, p.1).

The main incentive for Palestinian start-up business varies from one to another, as majority of them start their businesses motivated by their prior experiences and savings, other entrepreneurs start their businesses to find job and to invest savings (Sabri, 2008).

SMEs growth in Palestine is obstructed by a number of challenges, mainly are: limited funding chances; weakness of legal environment; tighten resources for expansion and lack of skillful employees. Moreover, it faces many challenges related to marketing aspects, such as: weakness of marketing capabilities and limited access to markets; weak distribution network; limited marketing polices and a high percent of inactive capacity as most of business companies have no brand names for their products. The Palestinian SMEs lack of ability competition in both local and international markets is another challenge they face, as they are not able to reduce their costs of production and enhance the products quality, whether it is commodities and services to meet favored requirements by customers. Finally, the majority of Palestinian SMEs are family firms which encounter conflicts in management (Sultan, 2014).

Family business is dominated in Palestine, as 96% of Palestinian SMEs are considered family firms, Over 70% of them are located in the west bank. Varying interests among family members can complicate the management process through arise tension which often leads to disputes and management operation could tangle with the family relationships which may cause inefficiency of management (Abuznaid, 2014). For Palestinian family businesses, the main sources of insider disputes are distributing profit, withdrawing profits without former agreement and differences in managing style. These conflicts often cause to liquidation or may to dividing the firm among family members (Nidal, 2010).

In Palestine, family firms struggle to perform well compared to non-family firms. Further, Palestinian family companies are centralized and their owners of to keep the affairs in privacy, which cause a lack of sharing information about their businesses, this leads to slowing down the responses of SMEs towards the threats and opportunities in the external environment. Moreover, family businesses discourage the possibility of staff promotion in the firms. Therefore, such practices lead to the loss of chance to make a better informed decisions or even contributing in making a creative idea which could affect development of business (S. Sultan, de Waal, & Goedegebuure, 2017). The lack of experience is another challenge face Palestinian family businesses, as 26% of them start their own business without former technical experience (Abuznaid, 2014). Most importantly, the Israeli occupation policies and procedures restrict the movement of individuals and raw material in or out of Palestine even among Palestinian cities (Atyani & Sarah, 2009; Nidal, 2010). This further restricts the growth of such sector and limits its activities significantly.

Corporate Governance

The CG has been initiated by number of the international organizations. In 1999, the OECD has developed the principles of CG to support the framework of organization. Since that date, those principles shaped the basis of the CG in both OECD and non-OECD states alike. These principles have been adopted as one of the 12 key criterion for sound financial system by the Financial Stability Forum (OECD, 2004). CG is critically important matter in the services industry. Scholars defined the CG from different perspectives. Table no. 1 shows some of these definitions.

Table 1: definitions for CG

Definition	Author (s)
"Corporate governance is concerned with ways of bringing the interests (of investors and managers) into line and ensuring that firms are run for the benefit of investors".	Mayer,1997
"CG is concerned with the relationship between the internal governance mechanisms of corporations and society's conception of the scope of corporate accountability"	Deakin and Hughes,1997
"CG is the process and structure used to direct and manage the business affairs of the company towards enhancing business prosperity and corporate accountability with the ultimate objective of realizing long-term shareholder value, whilst taking into account the interest of other stakeholders"	Keasey et al., 1997

Thus, CG is all about that firm is managed well and in line of the interest of stockholders (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2007; Mayer, 1997). The rapid progress of CG and its' structures indicate how important is such concept to the business entities, governments and communities as well (Ho, 2005). Hence, the relationship between CG and firms performance is an interested topic for investigation (Brennan & Solomon, 2008). Accordingly, well devised CG practices are essential for companies to access funds from the stock market and to maximize its market value. These practices assist firms to reduce inefficiencies and at the same time boost firms' profits.

CG and the internal operations of the company

CG could affect a wide range of internal operations of the company, which are strategic direction; financial anticipations; transparency and stockholder's activism. Strategic direction determines the company's long-run direction. CG requires the placement of board members which should bring in skilled members into the enterprise which foster the entrepreneurial direction of the company. Furthermore, appointing such members in the company might cause in more attention to be given to the research & development and the innovation. The choice of governance mechanisms actually does affect firms' ability to change their strategy (Brunninge, Nordqvist, & Wiklund, 2007).

Managers prefer projects that have immediate results, as their performance is subjected to how well these projects perform. This could result on some impeding on the entrepreneurial success. On another hand, some managers do not share the profit with other employees upon the success of selected project, this may reflects an environment whereby corporate governance is not well practiced (Abor & Adjasi, 2007).

The transparency has been touched at the initiation of CG and through its' reform as well. The transparency has been assured through the followings: i) There are clear guidelines for disclosure of all activities of the board of directors; ii) The audit committee at levels of external and internal is a requirement for sound CG (Brennan & Solomon, 2008) and iii) all CG procedures sought to control managers' misbehaviors and frauds as well as regule the activities of over keen auditors to control in value creating activities.

CG and SMEs

CG has been traditionally related to larger firms where there is probability of having agency conflicts. These conflicts arise as a consequence of separation of ownership and the management of firms, which lead to have different interests among parties. In other words, the agency problems arise within company if there is a conflict between stockholders and the management (Hart, 1995). This may refer that CG is not applicable to SMEs where there is less probability of occurrence of such agency conflicts. SMEs are, usually, developed by only a single person who is the owner and the manager at the same time. SMEs incline to have a less pronounced separation of ownership and managing compared to big enterprises (Adonu, 2017). As they have few staff who are, in generally, relatives to the owner. Hence, there is almost non-existence of the separation between the ownership and management, this eliminates the need for the CG in the SMEs operations.

The non-need for the CG by SMEs can be shown again when there is no accountability for SMEs by the public as these firms do not rely on public funds. Most of the single proprietorship ventures may not need to comply with standards of the disclosure. Moreover, there is no agency conflict in SMEs as a result of: i) the absence of the wealth maximization goal for this type of ventures and ii) there is ignorance for the results of firm's activities, these results usually lead to conflict between different parties of the venture. Thence, conflicts do not exist and therefore no need for CG to resolve such issues.

Despite such arguments, there is an international interest for the implementation of CG in SMEs as the CG guidelines are applicable for SMEs. "The ongoing tendency toward improving board functions within publicly listed firms will extend to SMEs by mimicry and institutional pressures" (Corbetta & Salvato, 2004). There are lots of areas where CG could be applied in SMEs. For example, board size and characteristics of board members can be an area of inquiry. In a sense of how does the board size and board member characteristics can impact the performance of the enterprise and the extent of the difference between SME and an established corporation. Other areas of inquiries can include the effect of CEO duality of SMEs and family ownership on SMEs financial performance (Abor & Adjasi, 2007).

Benefits of CG for SMEs

Some scholars claimed that the merits of CG may entice SMEs to adopt, particularly growing entrepreneurial companies which have the prospects growth and trend to extend beyond their states of survival (Abor & Adjasi, 2007; Clarke & Klettner, 2014). The advantages of CG to listed companies could be implemented to SMEs as well. Simply, the implementation of CG practices can help SMEs to grow rapidly. The growth of entrepreneurial companies requires access to necessary resources which can be obtained via the existence of effective board of directors that characterized by high independence as in the situation of listed companies (Adams, Hermalin, & Weisbach., 2010).

Chen (2008) analysed the impact of CG on listed companies, he pointed out that good strategies impact the firm performance and external board members confront policies and strategies by managers of firms. Therefore, the implementation of the same on SMEs may enable to have such members and lead to take best decisions for the firm.

As referred earlier, obtaining funds is one of the major hindrance face Palestinian SME sector to grow. Hence, the incorporation of CG into SMEs sector could highly minimize such restriction, as the external board members may come up with ideas to entice funds. Further, they may foster the enterprise's creativity and innovation by provide suggestions during the process of decision-making. A sever example of this is "Small Enterprise Agency" in Japan which achieved great growth via the utilization of non-executive directors more actively than big companies (Abor & Adjasi, 2007). On another hand, the growth of the entrepreneurial companies requires implementation of good governance practices and professional managers. This may starts by the separation of ownership and management (Fleming, Heaney, & McCosker, 2005).

To have good performance, motivations would be offered to professional directors to encourage them to do their best. Additionally, to have good performance a governance unit must be evident and distinguished. For example, internal audit unit and accounting control unit will have been laid in place

to assist in evaluating the performance of such directors. The absence of such feature resulted in dreadful implications on SMEs in Palestine, where SMEs are managed by less qualified people, mostly family members and a single proprietor. Hence, the implementation of CG is a constitute room for the composition of the board that encompass outside directors who are not necessarily related to the owners and therefore deduce more independent sound practices of managing the firm and gaining profits (Adams et al., 2010).

In Palestine, SMEs growth is a tremendous challenge. Many reasons can be provided, but poor managerial skills by entrepreneurs is evident. In this case, the CG structure introduced within SMEs business process could tackle this problem by introduce more expertise and further enhance the internal procedure of the business. Introducing CG structure will free up proprietor operator from working duties, hence the separation between management and ownership control could be possible in the SMEs. CG paves the path for potential future growth. Sometimes company sought to obtain new finance, this oblige much work to be done pre confidently going to the stock market and requires some time for the SME to be completely listed in the stock market. During this time, the CG adoption and implementation become critical for SMEs to enhance their potential growth (Adonu, 2017). Thus, harmonious trajectory record of sound governance will highly help when that time comes. Thence, the implementation of CG structure at premature phase will lead to obtain experience and cultivate discipline in the management of the company. This is significant, as the external bodies such as the stock market authority and other lending institutes need to assure good managing practices are followed by SMEs. CG permits such companies to smoothly been prepared for future initial public offering (IPOs). For instance, in Palestine, early implementation of CG would prepare SMEs sufficiently even pre they get listed in Palestine Exchange Stock Market. The presence of a board of directors for instance will prompt fast growth strategies in SMEs for quick profit; at some point this will require the company to seek for more finance, thus, going public will be of added value to them. Therefore, the transmission from a small to medium and eventually to big firms will be smoothly supported through an efficient CG which ensure active company control system.

In same token, sound CG practices help SMEs to enhance their chances of access finance from both financial institutions and other angel investors. This is an expected result of proper book keeping, good accounting practices and the disclosure of information which convey the trust among all the relevant stakeholders. In the same line, SMEs will have a healthier growth and be obliged to firm's effectiveness because of the existence outside supervisory parties. In addition, applying the sound CG principles minimizes the problems related to asymmetric information and makes such firms low in risk for investing.

Disadvantages of CG for SMEs

Although the benefits which SMEs can be gained on the implementation of CG practices, its' disadvantages should be taken into consideration as well. Implementation of the CG will imply extra auditing rules, reward and candidacy committees. Furthermore, the implementation of CG will require an additional recruitment of directors as it will add to the management complexity of SMEs at an early stage. The recruitment of additional directors will require a complex reward system and appointment of external directors based on some regulation in the country. accordingly, the implementation of CG into operations of SMEs will rise operational costs in the form of high cost of start-up which may dissuade many from initiating business. This issue can be solved by the policy-makers through providing their services as volunteers for SMEs, especially in the start-up stage.

It is worth here to refer to the perspective of the stakeholder theory on CG. The proponents of this theory postulate that stockholders are only a part of the significant stakeholder group. Thus, CG tools must consider and integrate all of other stakeholders. As this may assist in enhancing CG through promoting stakeholders' interests with the firm's interests. Furthermore, such integration can assist to boost CG tools. In fact, although it is argued that all stakeholders may have a common interest in SMEs business. However, such common interest does not necessarily result in a unified owner's interest. As individuals, there is a likelihood of free-ride problem to occur or individuals evade work efforts despite the joint interest (Heath & Norman, 2004; Norman, 2004).

Conclusion

The significance of the CG cannot be overlooked since it forms the organizational climate for the inside activities of the firm. CG in Palestine can highly help the SMEs sector through implanting sound managing practices, powerful insider auditing committee and largely chance for growth. Applying CG in Palestinian SMEs can brings new strategic sights by outside independent directors which may improve entrepreneurship and competitiveness of Palestinian SMEs. Applying principles of CG properly in entrepreneurial companies cannot form a threat of value creation. Thus, it is significant for companies to have commitments on value creation.

Sound governance tools in SMEs are probably to cause boards to put much needed pressure on performance improvement via assuring that the interests of the company are served. In the situation of SMEs, members of board bring into company new experiences and knowledge on funding choices obtainable and strategies to source such funds, therefore it can deal with the credit handcuff issues as well. Sometimes, firm who are willing to have external finance realize that a lot of effort needs to be done pre confidently going to the financial market. Recording history of sound governance will highly help it for that. SMEs need to take into consideration the role of all stakeholders by a bottom-up approach where, for instance, the perspectives of unions (e.g. in the situation of employees) are explicitly put in the meetings of board. Also, it should be pointed out that sound governance maybe does not guarantee firm success. However, non-well governance maybe is an indicative of a firm non-success. More significantly, rising the trust of current owners and possible new ones is a worth aim.

Limitation, implications and future studies

The limitations and of the study is the debate fundamentally concentrate on CG in the context of Palestinian SMEs. Therefore, the current study offers conceptual views on the application of CG among SMEs particularly in Palestine. Thus, future studies could empirically examine the impact of CG on these issues whether in the context of Palestine or in other business environment, in order to provide evidence about how could the implementation of sound CG reduce funding constraint and managerial lack of proficiency and enhance management practices within SMEs.

References

- Abdelkarim, N.-, & Abusharbeh, M. T. (2016). The Impact of Compliance with Codes of Corporate Governance on Quality of Disclosure: Comparative Study between Palestine and Jordan. *International Journal of Economics and Finance*, *8*(9), 215. https://doi.org/10.5539/ijef.v8n9p215.
- Abor, J. (2007). Corporate governance and financing decisions of Ghanaian listed firms. *Corporate Governance*, 7 (1). http://doi.org/10.1108/14720700710727131
- Abor, J., & Adjasi, C. K. d. (2007). Corporate governance and the small and medium enterprises sector: Theory and implications. *Corporate Governance: The International Journal of Business in Society*, *7*(2), 111–122. https://doi.org/10.1108/14720700710739769
- Adams, R. B., Hermalin, B. E., & Weisbach., M. S. (2010). The Role of Boards of Directors In Corporate Governance: A Conceptual Framework and Survey. *Journal of Economic Literature*, *57*(5), 998–1001.
- Adonu, G. C. (2017). Corporate Governance in Small and Medium Scale Enterprises: Any Relevance? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2839684
- Asunka, B. A. (2017). A Case for Regulating Corporate Governance for SMEs in Ghana. *International Journal of Business and Management*, *12*(4), 168. https://doi.org/10.5539/ijbm.v12n4p168
- Atyani, N., & Sarah, A. H. A. (2009). Problems of Micro, Small and Medium Enterpriises in Pallestiine. *Palestine Economic Policy Research Institute*.
- Bottazzi, L., Da Rin, M., & Hellmann, T. (2007). Who are the active investors? Evidence from Venture Capital. In *Working Paper DSE, No. 611*. https://doi.org/http://dx.doi.org/10.6092/unibo/amsacta/4641
- Brennan, N. M., & Solomon, J. (2008). Corporate Governance, Accountability and Mechanisms of Accountability: An Overview. *Accounting, Auditing & Accountability*

Journal, 21(7), 885–906.

- Brunninge, O., Nordqvist, M., & Wiklund, J. (2007). Corporate governance and strategic change in SMEs: The effects of ownership, board composition and top management teams. *Small Business Economics*, *29*(3), 295–308. https://doi.org/10.1007/s11187-006-9021-2
- Bundaleska, E., & Dimitrova, Makedonka Nikolovska, Z. (2012). Corporate Governance and Small Medium Businesses. *MPRA Paper No. 41971*, (41971). Retrieved from https://mpra.ub.uni-muenchen.de/41971/
- Carsamer, E. (2009). *Access To Credit by SMEs in Ghana: Does the type of business matter? Social Science Today*. Winneba: Jim Waler Light and Salt Publishers.
- Chen, D. (2008). The Monitoring and Advisory Functions of Corporate Boards: Theory and Evidence. *SSRN Electronic Journal*, (410). https://doi.org/10.2139/ssrn.1327066
- Claessens, S., Djankov, S., Fan, J. P. H., & Lang, L. H. P. (2002). Disentangling the Incentive and Entrenchment Effects of Large Shareholdings. *Journal of Finance*, *LVII*(6), 2741–2771. https://doi.org/10.1111/1540-6261.00511
- Clarke, T., & Klettner, A. (2014). Governance Issues for SMEs. *Journal of Law and Governance*, *4*(4), 23–41. https://doi.org/10.15209/jbsge.v4i4.169
- Corbetta, G. and Salvato, C.A. (2004), ''Boards of directors in Italian family businesses'', Family Business Review, Vol. XVII No. 2, pp. 119-34.
- Fleming, G., Heaney, R., & McCosker, R. (2005). Agency costs and ownership structure in Australia. *Pacific Basin Finance Journal*, *13*(1), 29–52. https://doi.org/10.1016/j.pacfin.2004.04.001
- Freeman, R. E., & McVea, J. (2000). A Stakeholder Approach to Strategic Management. In *Working Paper No. 01-02*. https://doi.org/10.1002/jctb.619
- Friedman, M. (1970). The Social Responsibility of Business is to Increase its Profits. *New York Times Magazine*, 32–33. https://doi.org/10.7150/jgen.24929
- Hart, O. (1995). Corporate Governance : Some Theory and Implications. *The Economic Journal*, *105*(430), 678–689.
- Heath, J., & Norman, W. (2004). Stakeholder theory, corporate governance and public management: What can the history of state-run enterprises teach us in the post-Enron era? *Journal of Business Ethics*, *53*(3), 247–265. https://doi.org/10.1023/B:BUSI.0000039418.75103.ed
- Ho, C.K. (2005), "Corporate governance and corporate competitiveness: an international analysis",
- Corporate Governance: An International Review, Vol. 13 No. 2, pp. 211-253.
- Keasey, K., Thompson, S. and Wright, M. (1997), ''Introduction: the corporate governance problem – competing diagnoses and solutions'', in Keasey, K., Thompson, S. and Wright, M. (Eds), Corporate Governance: Economic and Financial Issues, Oxford University Press, Oxford, pp. 1-17.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (2007). Investor protection and corporate governance. *Corporate Governance and Corporate Finance: A European Perspective*, 91–110. https://doi.org/10.4324/9780203940136
- Mayer, C. (1997). Corporate governance, competition, and performance. *Journal of Law and Society*, *24*(1), 152–176. https://doi.org/10.1111/1467-6478.00041
- Nidal, R. S. (2010). MSMEs in Palestine ; Challenges and Potential. *Palestine Economic Policy Research Institute*.
- Norman, W. (2004). What can the Stakeholder Theory Learn from Enron? *Zeitschrift Für Wirtschafts- Und Unternehmensethik*, *5*(3), 326–336. https://doi.org/10.5771/1439-880x-2004-3-326
- OECD, O. (2004). OECD principles of corporate governance. *Contaduría y Administración,* 109–117. https://doi.org/10.1007/978-4-431-30920-8_10
- Ofoeda, I. (2017), "Corporate governance and non-bank financial institutions profitability", International Journal of Law and Management, Vol. 59 No. 6, pp. 854-875. https://doi.org/10.1108/IJLMA-05-2016-0052
- Sabri, N. R. (2008). Small Businesses and Entrepreneurs in Palestine. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1278057

- Shleifer, A. and Vishny, R. (1997), ''A survey of corporate governance'', Journal of Finance, Vol. 52 No. 2, pp. 737-83.
- Sultan, S., de Waal, A., & Goedegebuure, R. (2017). Analyzing organizational performance of family and non-family businesses using the HPO framework. *Journal of Family Business Management*, *7*(3), 242–255. https://doi.org/10.1108/JFBM-07-2017-0021
- Sultan, S. S. (2014). Enhancing the competitiveness of palestinian SMEs through clustering. *EuroMed Journal of Business*, *9*(2), 164–174. https://doi.org/10.1108/EMJB-03-2012-0004
- The Portland Trust. (2013). *Palestinian Economic Bulletin*. Retrieved from https://portlandtrust.org/sites/default/files/peb/issue80_may_2013.pdf

The Role of The Information Flow Management System in Creating Organizational Knowledge

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Abstract

The emerging information society and knowledge-based economy are characterised by fast flow and a large amount of information provided and processed by organisations. Modern organisations wishing to develop and increase their position on the market need to develop and implement knowledge creation systems in the organisation based on information flow management systems. Efficiently functioning information systems provide the right quality of raw material - data to create new and better knowledge. Errors made in managing the flow of information cause difficulties in the creation and dissemination of knowledge, and often even prevent the generation and transfer of knowledge. The purpose of the study is to present the role of information flow management in creating organisational knowledge. The article analyses the literature and relationships that connect the efficient flow of information with knowledge creation processes. Own research has been used to illustrate the assumptions of the concept. The theoretical model of an intelligent decision-making system for information flow management was analysed, at the same time indicating the conditions for its implementation.

Keywords: Information, Knowledge, Decision-Making System for Information Flow Management

Introduction

A characteristic feature of modern society is globalisation processes that commonly occur, leading not only to the blurring of state borders, but also organisational boundaries. Such changes make it necessary to change the management model. The classic post Tylorism approach is replaced by new tendencies characterized by a different language, organizational culture, management methods and modern communication-based structures, modern IT and information solutions.

The consequence of the emergence of the information society is the development of a knowledge-based economy characterized by: virtualization of the organization's activities; selling not services and products, but the knowledge contained therein; predominance of virtual processes; blurring the boundaries between the organization and the environment, and changing the traditional static and object-oriented approach to the process approach to the organization. Nogalski and Kowalczyk claim that a product becomes a medium carrying a load of knowledge of a company, the more valuable it is, the more knowledge it will be able to contain (Nogalski, Kowalczyk, 2004, pp. 156-157). Gaining competitive advantage and development of an organizations in such an economy are possible mainly due to efficient knowledge management, and especially the processes of its creation.

The factor conditioning the transformation of classic economic systems into a knowledge-based economy is the development of methods and techniques for processing and managing information. Effective and quick processing of information enables the creation of knowledge which is the basic resource and source of competitive advantage of modern organizations.

Decisions regarding information systems arise much controversy both among decision makers and employees who are to be direct users of the systems. In addition to efficiency (related to effects and costs), usability should be considered, in which the system's operation should be assessed from the side of the effects obtained. It is necessary to take into account potential barriers. Thus, potential and actual utility should be assessed.

The paper attempts to present the role of information flow management in creating organizational knowledge. The theoretical foundations and dependencies combining efficient information flow with knowledge creation processes were analysed, and own research was used to illustrate the assumptions of the concept.

The process of creating knowledge in the organization

The information revolution we are witnessing affects competition on the market in three basic ways: (Porter, 2001)

- changes the structure of the sector and at the same time changes the competition rules;
- creates a competitive advantage by enabling companies to achieve better results than those obtained by their competitors;
- leads to the creation of completely new fields of activity, often based on the company's current operations.

Thus, strategic analysis activities are not only the domain of large organizations. Everyone, including small businesses, must think strategically, despite the turbulent and dynamic market often changing the entrepreneur's long-term “plans” (Aymen, Alhamzah & Bilal, 2019).

When dealing with an increasing amount of information coming from outside the organization as well as inside information, it is necessary to manage it properly. The first element is researching and identifying information needs. Comprehensive, systemic approaches that bring new quality to the information system are crucial to the quality of the process. Methodologies derived from the analysis and design of IT systems are most commonly used then, i.e.: (Agus, Isa, Farid, Permono, 2015) product research, total study, study of critical success factors, key indicators system, information ownership research (business information characterization study), economic process model (business process model), enterprise activity matrix (information control net model).

The cited preasumptions condition the development of various types of organizations, such as: learning, intelligent, network or virtual. Their development is directed at the increase of innovation, entrepreneurship and competitiveness through constant raising of the level of knowledge and excellent intellectual capital. It is pointed out that the most important thing for the organization is to have highly educated employees who, equipped with knowledge and the ability to use it to design modern systems, technologies, production organization and provision of services guarantee the best satisfaction of contractors' needs translating into the economic situation of the organization and its position on market. Efficient use and development of intellectual potential requires the implementation and development of IT networks, intelligent systems creating Intranet and Extranet in these organizations as basic tools for creating and propagating knowledge in an organization (Rajiani, Ismail, 2019).

Knowledge management has had many ambiguous definitions, whose common feature is to indicate the objectives of the management process, in which processes related to the flow of information play a large role. Among the goals Grudzewski and Hejduk (2004) mention:

- knowledge creation,
- valuable and useless knowledge identification,
- knowledge storage,
- promotion and use of knowledge,
- reducing the risk of knowledge loss,
- increasing the organization's advantage.

The first of these goals should be considered as particularly important. The intellectual potential of the organization and, consequently, the effective implementation of organizational goals depend on the quality of its implementation.

The process of creating knowledge is based on the "interaction of two types of knowledge: explicit (formal) and hidden (silent)." It can be presented in four phases (Perechuda, 2005, pp. 124-126).

- linear,
- cascade,
- wave,
- fractal - design.

The first phase is characterized by gradual learning of the organization. In the psychological sphere, managers assume the possibility of independent and individual mastery of the complexity of their own organization. The flow of information and creation of knowledge is carried out by trial and error. This phase is characteristic for small Polish companies.

Polish companies have reached the second phase, in which the strategic game paradigm between the organization and the environment is characteristic. Organizational learning is implemented by the method of rapid increase in knowledge. This knowledge is collected in a planned and organized way, and information management is the basis for its codification.

The third phase characterizes supranational organizations that play the role of integrators in the network. These organizations create large amounts of explicit knowledge - for members of the integrator's organization and at the same time classified - for business partners. A pot of explicit knowledge, necessary for efficient cooperation in the network, is cyclically transferred to the subcontractors. The integrator's information systems precisely assign knowledge access rights to individual subcontractors in such a way as to ensure stable network operation.

The fourth phase is referred to as the network-fractal model. A characteristic feature is the disappearance of the coordinator, dispersion of co-operators. Cooperating organizations have full organizational and legal independence, they simultaneously run many projects in which they play the role of controlling or subcontracting companies (Susanto, Meiryani, 2019). Business processes in this phase shorten, often penetrate and intersect in the information space. Promotion of knowledge is characterized by concentration in some areas and a lack in others - insularity of knowledge.

Currently, the knowledge creation model used by network organizations is considered the most optimal. It assumes that implicit knowledge arises in research and development teams within the organization and that explicit knowledge is widely available on the web. In this situation, the organization acting as the coordinator has full control over the processes of creating knowledge, and the organizations cooperating with the network have only fragments of knowledge, often they do not even know the coordinator's main goal. Cooperating organizations gain access to the minimum amount of knowledge necessary to carry out the task assigned to them. In this way, the coordinator protects his knowledge, maintains key competences, controls the directions of knowledge development carried out by his own research teams, strongly determines the organizations forming the network, thus ensuring a financial, technological and human advantage. In addition, the organization acting as a coordinator efficiently acquires a large amount of classified knowledge of its partners. Creating knowledge in this type of organization requires efficient and effective management of information and its flow. This management must be supported by the latest computer technologies and highly specialized management systems.

Virtual organizations are now considered the highest form of development of network organizations. A characteristic feature of these organizations is the transfer of the entire knowledge creation process to a virtual level. Both public and silent viewers are created through the internet. This change in the space for creating knowledge raises additional problems. It is relatively easy to impersonate known brands, it is difficult to identify and authenticate partners. Identifying the organizational structure and

management system becomes difficult. Combining key competences and resources necessary to implement projects also raises problems. A prerequisite for generating knowledge in such organizations is having an information management system whose task will be to intelligently acquire, verify and provide knowledge creation sites. In addition, the information management system must ensure effective communication and automatic coding of the created knowledge.

Information Flow Management as A Knowledge Management Tool

The knowledge management process in modern organizations is inseparable from information management. At present, chaos and information overload are common. The excess of information blends and overwhelms organizations, minds of managers, designers and experts, effectively hindering and sometimes even preventing the generation of knowledge (Ungerman, Dedkova, Gurinova, 2018; Ivanová, Masárová, 2016; Zygmunt, 2017; Sachpazidu-Wójcicka, 2017; Ruchkina, Melnichuk, Frumina, Mentel, 2017). Searching for information necessary to solve difficult problems is particularly time-consuming and often creates frustration, especially when the sources of information are poorly organized and access to them is difficult due to the lack of proper infrastructure. When analyzing publicly available sources of information, it should be stated that they store huge amounts of unstructured knowledge and information, stored in a way that hinders access and usage (Kuś, Pypłacz, 2019).

In the era of information overload, it is important to ensure a sufficiently high level of information quality. Information quality management is understood as all actions aimed at providing end users with useful information, i.e. about features that meet their expectations, at a specific place and time. Low quality of information can cost a company a loss of 10 to even 50% of sales turnover (Fitri, Nugraha, Hakimah, Manihuruk, 2019; Grabara, Cehlar, Dabylova, 2019). Therefore, having information resources is necessary, but another indispensable element is their effective management, and thus: (Ostoj, 2009)

- building information resources in an enterprise in such a way that its greatest potential
- usefulness can be achieved in current and subsequent decisions (expenditure on this resource, i.e. its generation, processing, storage, protection);
- caring for the quality of information resources determined by their adequacy to the
- processes reflected and adaptation to decision-making competences of specific positions;
- protection of the resource against unauthorized persons;
- resource completeness assessed from both the company's current and future needs;
- determining the effects of information management;
- measurability of the information resource and / or its services;
- measurability of effects achieved through the use of this resource.

Taking care of the right quality of information, one should strive to create appropriate conditions that enable obtaining, analyzing, processing, sending information both within the organization as well as at the level of organization - the environment. Organizing the right conditions over time allows to build an efficiently operating information system in the enterprise, the purpose of which is ongoing monitoring of incoming and outgoing information, verifying, updating, distributing to individual levels of management, and storing them for later historical verification.

The facts presented above clearly indicate the need to build efficient information flow management systems (IFMS) in the first place. The basis for the construction of such a system is the development of a knowledge management policy on which the information flow management policy is based.

The team of experts analyzing the mission and goals of the organization, information sources, directions of its flow, knowledge map and knowledge transformation algorithms build initial assumptions for the IFMS policy, whose main assumptions are: (Borisova, Demkina, Mikhailova, Zieliński, 2019; Shakeel, Karim, Khan, 2020)

- setting standards for information flow management,
- coordination of information flow management centers,
- definition of procedures and guidelines regarding the flow of information and knowledge
- allocation between individual organizational units,
- developing procedures for applying and updating knowledge for an intelligent
- information flow management system,
- defining information and knowledge security standards.

Based on a predefined policy, an intelligent decision-making system for information flow management (Yazdani, Chatterjee, Pamucar, Chakraborty, 2020) is built. This is the author's original solution. The scheme of operation of this system is shown in Figure 1.

The core of the system is the coordinating and requesting module, whose task is to coordinate the work of other modules and make decisions. The decisions are made in accordance with the work patterns written in the sets of procedures (Susanto, Meiryani, 2019), functions and methods. When choosing a solution, the system uses the knowledge contained in the knowledge base, constant and variable information available in the system and forecasts generated by the forecasting module. The decisions taken are translated into the language of the orders by the executive module and sent to the appropriate information flow management points. Changes triggered by decisions are observed by the monitoring module, analyzed and used to build the system's knowledge base. The system supports managers in decision-making process.

In emergency situations, initiating decision procedures is triggered by the observation module. Information on the observed irregularities in the flow of information is transferred to the decision-making module, where emergency decisions are made based on the knowledge and implemented procedures. The main purpose of the monitoring module is to control the ongoing operation of integrators and provide information necessary for efficient management of information flow.

A special element in the decision system (Rizk, Elragal, 2020) is the evaluation module. Its task is to evaluate the knowledge acquired by the system and to eliminate irrelevant information managers generated by the system. The introduction of such a system element is related to the amount of information processed by the system and related activities. The module does not permanently delete reports, it only filters them, and actions regarding knowledge evaluation rely on appropriate flagging. The decision on the final removal of elements from the knowledge base or reports is always made by the information flow management system manager.

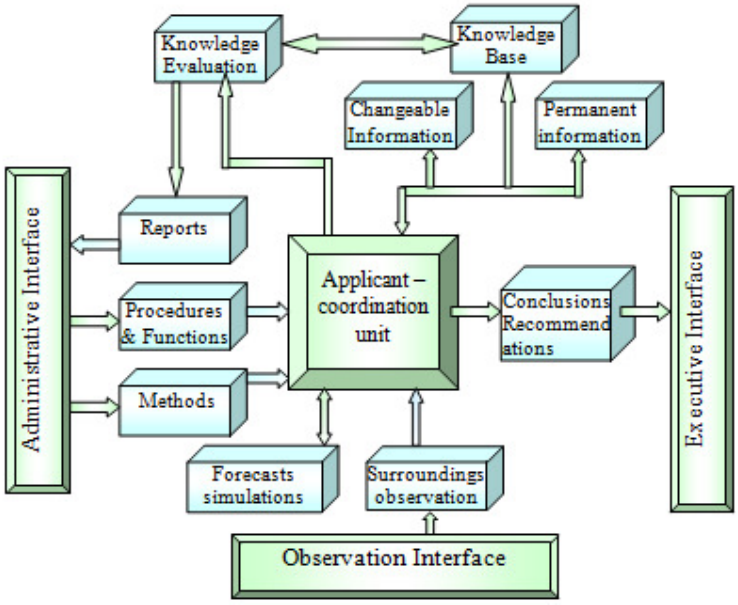

Figure 1: Functional diagram of the Intelligent Information Integrator Management System
Source: Own study.

Decision Making System Managing Information Flow is the implementation of an expert system making decisions without human control (Yazdani, Chatterjee, Pamucar, Chakraborty, 2020). The modular structure of the system ensures efficient operation and facilitates its development.

Decision Making System Managing Information Flow (Susanto, Meiryani 2019) communicates with the environment through three interfaces: administrative, observation and executive. The administrative coupling is used by managers of the information flow management system to update a set of procedures, functions and methods. It enables control of the system operation, using the knowledge base and the forecasting module. It also serves as a tool to verify policies that are being developed. The executive interface is used by the system to control the flow of information in the organization. With its help, the system sends orders to integrators setting priorities and routes for information transfer and knowledge allocation. The observation interface is intended for controlling integrators' work, collecting data from information demand analyses, requests for access to organization's knowledge, updating the organization's knowledge map, detecting errors and damages.

The original structure of the system knowledge base and the knowledge map of the organization is made up of a team of specialists. Then, using the system modules, the system knowledge base and organization knowledge map are updated and developed. An important element of the knowledge base building process is the system learning process. Well-chosen learning procedures enable rapid evaluation of knowledge, which in turn, increases the quality of the management process and the effectiveness of the flow of information and knowledge in the organization.

Forecasting and reporting modules are complementary elements of the system. They are used by the requesting module to verify decision variants and to inform about actions taken by the system. These elements can also be used in the planning and designing process of developing the information flow management system. They allow for checking and verifying planned solutions before their implementation. With a sufficiently high level of knowledge, the applicant module of the system will be able to propose the necessary changes in the information flow management system in the form of multi-variant solutions.

Conclusion

The formation of the information society as well as the emergence of increasingly new communication solutions forces changes in the organization's ways of operating. This process has significantly accelerated in recent years. Lack of thoughtful solutions results in incurring unnecessary costs for computerization, which, with limited resources, makes the organization inefficient. At the same time, profound changes in the structure and processes of the organization caused by globalization and integration require reaching for ever more perfect management methods. It is necessary to efficiently create knowledge, evaluate it and allocate it constantly. The proposed solution is one of the possible ways to improve the functioning of the organization.

Wide access to knowledge intensifies competition on the market, the problem now is not the access to knowledge, but its effective creation based on precise information. The introduction of solutions improving access to knowledge is a key factor in the success of the organization.

The use of an information flow management system can support the knowledge creation process and improve the use of its resources. The possibility of effective knowledge creation guaranteed by an efficient information flow management system will give a chance to achieve competitive advantage and further development.

References

- Aymen, A., Alhamzah, A. and Bilal, E. (2019), 'A multi-level study of influence financial knowledge management small and medium enterprises', *Polish Journal of Management Studies,* 19(1), 21-31.

- Agus, A. A., Isa, M., Farid, M. F. and Permono, S. P. (2015), 'An assessment of SME competitiveness in Indonesia, *Journal of Competitiveness*, 7(2), 60-74.

- Fitri, H., Nugraha, A.T., Hakimah, Y. and Manihuruk, C. (2019), 'Strategic management of organizational knowledge and competency through intellectual capital', *Polish Journal of Management Studies,* 19(1), 132-141.

- Grabara, J., Cehlar, M. and Dabylova, M. (2019), 'Human factor as an important element of success in the implementation of new management solutions', *Polish Journal of Management Studies,* 20(2), 225-235.

- Grudzewski, W.M., Hejduk, I.K. (2004) Zarządzanie wiedzą w przedsiębiorstwach, Wydawnictwo Difin S.A., Warszawa.

- Ivanová, E., & Masárová, J. (2016). Assessment of innovation performance of Slovak regions. *Journal of International Studies*, 9(2), 207-218.

- Kuś, A. and Pypłacz, P. (2019) 'The Importance of Information Management in the Context of Industry 4.0: Evidence from the Kuyavian-Pomeranian Forbes Diamonds', *Social Sciences*. Multidisciplinary Digital Publishing Institute, 8(6), doi: 10.3390/socsci8060169.

- Louizi Ép Feki, D. (2019) 'Organizational control via ERP system in Tunisia: The State of art and progress', *IBIMA Business Review,* 2019.

- Nogalski, B., Kowalczyk, A. (2004), Strategia oparta na wiedzy jako kierunek zarządzania strategicznego, [at] Krytyczna analiza szkół i kierunków zarządzania strategicznego. Nowe koncepcje zarządzanie, Krupski, R. (Ed.), Wałbrzyska Wyższa Szkoła Zarządzania i Przedsiębiorczości, Wałbrzych.

- Ostoj, J. (2009), Efektywność gospodarowania zasobem informacji w przedsiębiorstwie-determinanty i problemy pomiary, [at] Rachunkowość i finanse podmiotów gospodarczych w erze informacji, Caputa, W. (Ed.), Wydawnictwa Fachowe CeDeWu.pl, Warsaw.

- Perechuda, K. (2005) Zarządzanie wiedzą w przedsiębiorstwie, PWN, Warsaw.

- Porter, E.M. (2001) Porter about competition, Polskie Wydawnictwo Ekonomiczne, Warsaw.

- Rajiani, I. and Ismail, N. (2019), 'Management innovation in balancing technology innovation to harness universities performance in the era of community 4.0', *Polish Journal of Management Studies*, 19(1), 309-321.

- Rizk, A. and Elragal, A. (2020), 'Data science: developing theoretical contributions in information systems via text analytics', *Journal of Big Data,* 7(1).

- Ruchkina, G., Melnichuk, M., Frumina, S., amd Mentel, G. (2017), Small and medium enterprises in the context of regional development and innovations. *Journal of International Studies*, 10(4), 259-271.

- Sachpazidu-Wójcicka, K. (2017) Innovation as a determinant of the competitiveness of Polish enterprises, *Oeconomia Copernicana*, 8(2), 287-299.

- Shakeel, M.H., Karim, A. and Khan, I. (2020) 'A multi-cascaded model with data augmentation for enhanced paraphrase detection in short texts', *Information Processing and Management,* 57(3).

- Susanto, A. and Meiryani (2019), 'Database management system', *International Journal of Scientific and Technology Research,* 8(6), 309-312.

- Ungerman, O., Dedkova, J. and Gurinova, K. (2018), The impact of marketing innovation on the competitiveness of enterprises in the context of industry 4.0. *Journal of Competitiveness*, 10(2), 132-148.

- Yazdani, M., Chatterjee, P., Pamucar, D. and Chakraborty, S. (2020) 'Development of an integrated decision making model for location selection of logistics centers in the Spanish autonomous communities', *Expert Systems with Applications,* 148.

- Zygmunt, A. (2017) 'Innovation activities of Polish firms. Multivariate analysis of the moderate innovator countries', *Oeconomia Copernicana*, 8(4), 505-521.

Explore the Influence of Internet Rumors on Purchase Decisions

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Abstract

People have the desire to prolong life, compare with others, live comfortably, lose love, enjoy food and drink, and avoid suffering and danger. These innate desires are the most attractive. When you can realize these human beings, instinctual desires can also control those emotional motivations that drive people, and they are beyond control. Human beings are affected by information. Among the products that are about to be discontinued or are in short supply, causing community topics to continue to follow and follow the trend of buying, this research intends to change individuals from positive, negative, rumor characteristics, rumor intensity, source credibility, and interfering with the middle factors (including the level of involvement, emotional identity, risk avoidance, political party tendencies) to explore the impact of online rumors on consumer purchasing behavior in a more in-depth manner, using questionnaires, collect data and provide research results for corporate product marketing or government future planning for reference.

Keywords: Rumor, Consumer purchase decisions, Emotional identity, Rumor transmission.

Introduction

Fear marketing is a marketing technique, and rumors are the oldest media. In the past, rumors were mostly spread through newspapers or word of mouth, but the development of their spread was quite limited. Recently, rumors came out. The message flow is large and fast, and the content is all-encompassing. Whether in reality or in the online world, rumors always make people unclear about authenticity.

Words of mouth, social media rendering, and mass media appeared. These did not eliminate the rumors, but only upgraded the rumors more professionally. It is difficult to distinguish between true and false. So it is easy to be spread out. The mysterious and magical things are more difficult to get rid of, and the rumor is to make people believe, so it is generally not just a situation that makes people happy or relaxed. Therefore, it is difficult for people to use subconscious to distinguish hypocrisy.

The falseness of rumors is even more questioned. For example, in a research study by the experimental rumors of Allport & Postman, (1947), rumors can only go wrong. In the process of spreading, whether it is from its original intention or retelling, rumors are often farther and farther away from the truth, reflecting a distortion of reality. Sometimes, everyone is extra cautious in the process of passing the message, but in the process of retelling, more or less some of their own emotions and ideas are gradually distorted. The rumor may start with an unconfirmed report, a friend's personal experience, or a discussion in the message area of the villagers, but the motive for spreading the rumor online may be to increase the consumerism of sales internet rumors create topicality, but it is also likely to be just a prank, and consumer internet rumors have positive or negative effects through the product, even hurting the reputation of the store or affecting consumers' willingness to buy.

"COVID-19. " is discussed animatedly. The first and most direct impact is that masks and alcohol are sold out. The news reports mention which masks are effective defenses and which are ineffective. Even masks can represent life. "Toilet Paper Chaos" was in February 2018, because major news media reported that the sales channel RT-Mart was notified that the price of toilet paper will increase by up to 30%, which will cause panic among the people. The resurgence of "Toilet Paper Chaos 2.0"

this time, with the increasing impact of the epidemic, the pulp has been portrayed as a shortage problem by online rumors. This time, what is more serious is that it is no longer unique phenomenon in Taiwan. From Japan and Hong Kong in Asia, Sydney in Australia, the United Kingdom in Europe, and as far as the United States. Unexpectedly, from masks to alcohol, toilet paper is not a necessity for epidemic prevention. The Guardian wrote that if they suddenly saw a pack of toilet paper in the supermarket, they wanted to buy it quickly. In addition to being a temporary anomaly, this behavior can also have some scientifically reasonable explanations. Fear is one of the eight principles of humanity. The main innate desire of human beings, so long as you can use this in your own products and services, if your products and services can provide a suitable solution for a panic situation. As long as it does not violate morality, if only it can provide a truly effective solution, as long as the things you sell can effectively eliminate fear, you can easily sell and profit from it. Use, persuade and contagion. So if you use the fear in your heart to sell a certain product or service immediately, it means that this product or service has the characteristics of solving panic. If not, no matter how much fear you try to cause in people's hearts, it's not contagious, is it?

Discuss from consumer behaviors to understand the factors that influence consumer buying decisions, consumer snapping behaviors, herd behaviors, information verification behaviors, and distribution behaviors, highlighting the scarcity of products or services. Today is a common marketing technique, but past research more pointed out the significance of price strategy and promotion strategy, less talked about whether the information released by fear marketing is true, or the verification method of the true and false identification after the outflow of information, so in such a variety of theories, collecting theory and summarize the method.

The purpose of this study is to collect the Internet rumors of "Toilet Paper Chaos 2.0" on the website and test the strength and characteristics of the message, the credibility of the source, and add intermediary personal factors to verify which have a positive impact on consumer purchase decisions? Collect the interviewees' opinions and data in the form of questionnaires, and then provide the research results for enterprise product marketing and future planning for reference.

Based on the research motivation and background, the research objectives are as follows:

1) Discuss how consumers' buying behavior and communication behavior are affected by rumors. The influences include: the positive and negative strength, credibility and characteristics of rumors.

2) Discuss whether the personal characteristics of consumers (the degree of risk avoidance, the degree of involvement, and the relationship with information sources) will interfere with the effects of rumors.

Literature Review

Rumors

Rumor is a social phenomenon and a political phenomenon. There are many "unconfirmed" or hesitant rumors in the mind of the rumors involved, many of which have panic effects and negative connotations. In the book "Rumor" by the French scholar Kapferer, (1990) that if the rumor is hypocritical, the public will not be attracted to the matter. The reason why some people believe that rumors are because they are often proved to be true at the end, and rumors are often considered to be tangible can be spread; the rumor may be false or correct, but it may also be a mistake from the original intention after the actual message passed from word to word. Rumors belonged to the research scope of psychology in the past. The definition of rumors is briefly described in Table1.

Table 1: Rumor Definition

Time	Academic	Definition
1944	Knapp	Rumors are a special social model, and statements related to immediate facts are widely disseminated without formal confirmation.
1947	Allport & Postman	When an incident affects the masses, it is to make people believe that rumors are usually passed on by word of mouth during interpersonal communication, but there is no actual evidence to confirm.
1951	Peterson & Gist	Rumors are issues about issues, events, or things that interest the public, and events that have not been explained.
1955	Schachter & Burdict	Rumors are unreliable, and they use secrets that gradually spread or spread to covertly communicate and distort communication between people.
1976	Rosnow	The rumor is a mass exchange of information, reflecting individual hypotheses about an unproven social phenomenon.
1990	Kapferer	Rumors are the most primitive mass media. Information that has existed in society but has not been officially publicly proven or officially classified as repelling the rumor is not specific to the government, but includes companies, manufacturers, and organizations related to the rumor.
1966	Shibutani	Rumors refer to unprepared news or newspapers produced by a group of people during the course of discussion.
2007	Coombs & Hlladayo	The main reason why rumors will become a corporate crisis is that consumers' purchasing intentions will change due to rumors.

Rumors Type

Knapp (1994) divided rumors into three types as shown in Table 2.

Table 2: Rumor Type

Type	Explanation
The Pipe-dream or Wish Rumor	When such rumors are circulating, the content looks promising.
The Bogie Rumor	Such rumors stem from fear and anxiety in the heart.
The Wedge-driving or Aggression Rumor	To divide groups and fight loyalty, the motivation is often aggressive or hateful.

Allport & Postman, (1947) sorted Knapp growth patterns into two types: (1) Expectation, (2) Damage, and Negative.

Peterson & Gist, (1951) said that when an event is attracted by the propagandist and the recipient, but the event itself is unclear as if it were true or false, rumors are likely to arise. According to scholars' views, rumors have three main characteristics:

1) Rumors are messages related to existing facts.

2) They are different from previous urban and rural stories and legends. The purpose of rumors is to make people believe that things really exist and the content of the message. It will also try to be as true as possible.

3) The rumors emphasize unconfirmed information, which may be authentic and not completely false (Kimmel, 2004; Sunstein, 2009).

In the book by Kapferer (Kapferer, 1990) classifies rumors into six types according to the process of rumor generation and origin, based on and extending Rowan (Rowan, 1979) classification of rumors, as shown in Table 3:

Table 3: Six types of rumors

		Originated from one thing	Retrieve a clip	Simple imagination
Rumor produce process	**Spontaneous**	1	3	5
	Passive	2	4	6

Source: Kapferer, J. Zheng Ruolin / Bian Qin translation, 1992, Rumors, Taipei; Laurel, p.308

1) The first type of rumors: This type of rumors mostly came from the occurrence of a shock event. Since January 1980, several recruits have disappeared near the Mourmelon camp. This is a real event. In the past eight years, the possibility of an incident has not been explained by an official unit to investigate.

2) The second type of rumor: This type of rumor is intentional by someone, and the possibility of someone deliberately using an event is not ruled out.

3) The third type of rumors: these rumors are extracted from certain details, small details or signs that have not been paid attention to by the public, in order to attract the attention of some people, try to uncover the "truth" hidden in the secret, no any basis may be mistaken for true due to the recipient's rendering.

4) The fourth type of rumors: This type of rumors is that someone deliberately dissembles these details among social groups, exaggerating the story and deliberately spreading it.

5) The fifth type of rumors: This kind of rumors is characterized by no basis of origin, and no signs can be found, that is, the so-called out of nothing. This rumor is derived from human imagination, some "city legends" or "models" "Story", adding special plots formed in this way.

6) The sixth type of rumors: This kind of rumors may have been deliberately fabricated, that is, the so-called windless waves, many adapted "model stories" are reproduced and then spread out, most of them are deliberately provoking, so-called "Rumors"**.**

Rumor Transmission

In the book by Kapferer, et al. (1992) Every time we talk about rumors, we will create a consensus by incorporating details, assumptions, and vinegar into the discussion. It can be said that speaking is to persuade others, that it is to liberate itself, that it is for fun, or that it is to seek knowledge, and the public speaks for it.

Koenig, (1985) mentioned the analysis of rumors from different points of view. He made an in-depth discussion on the Satan totem rumors of P & G Company and found that there must be three indispensable elements for the rumors to appear:

1) Target: It may be a person, place or anything related

2) Charge or allegation: specific issues related to the goal

3) Source: The formality of the source of the rumor or the endorsement of the relevant authority will increase its credibility. These three elements dominate the text and channel structure of the rumor spread.

Source Credibility

One of the purposes of the rumor is to make people believe so that it can continue to spread. If the rumor cannot be trusted by others, then the spread of the rumor will be unexpected. From this, the credibility of the rumor is the key to the spread of the rumor.

DiFonzo and Rosnow, (1994) mentioned that people would want to spread rumors because they believe the credibility of the message is high, and the credibility of the message will be affected by the source of the message. Perception of the communicator. Credibility can be regarded as believability, which is cognition of the credibility of people, events and information.

In a research study by Kiousis, (2001) divides credibility into two categories, namely source credibility and media credibility. Source credibility is mainly for research and investigation of individuals, organizations, and mass media texts, usually for research that considers individuals, groups, or organizations as communicators; media credibility is for channels for disseminating information content, usually news for the research object. Among them, the media credibility can be divided into "absolute credibility" and "relative credibility", the former refers to the reader's credibility to various media such as newspapers, television, radio, etc. It is reported that when the reports in different media (newspapers, television, radio, etc.) are inconsistent, the credibility of the readers to the media.

Involvement

The degree of involvement mentioned in this study refers to the degree of involvement in different messages. The degree of involvement has a great effect on consumer behavior, including product service and brand selection, consumer thinking and emotional response, information search and explanation, and attitude change.

McQuarrie and Munson, (1987) mentioned that the importance and interest felt by consumers are important factors affecting the degree of involvement. When the need, importance and interest in a message or product are higher, the degree of involvement will be the higher.

Risk Aversion

When discussing risk avoidance, for consumers, risk is the unpredictable uncertainty that they feel when making a purchase decision, that is, when making consumer behavior, the consumer believes that this move may not meet their consumption goals. There will be risk awareness, so consumer behavior can be said to be a risk-taking behavior. This kind of risk awareness is affected by external environment and individual psychological factors, including personality traits, personal experience, trust of risk information sources, risk relevance and cross-cultural factors. It is a subjective consciousness. This risk awareness may occur before consumption, and the consumer behavior may have unfavorable consequences; or after consumption, dissatisfaction with the results may result in a subjectively perceived loss level. The above two factors can be distinguished into two aspects: uncertainty risk and outcome risk. In a research study by Cunningham (1967) uses these two facets to measure the consumer's perceptual risk status.

- **Perceived Risk = Uncertainty Risk × Outcome Risk**

Emotional Identity

Westbrook, (1987) pointed out that emotion is an individual's assessment of the meaning, cause, consequence, and personal influence of a particular stimulus. Lazarus, (1991) advocates that emotion is the result of personal cognitive evaluation of the environment. Cognitive evaluation will produce emotion influences. However, some scholars such as Zajonc & Markus, (1982) believe that cognitive evaluation may not cause emotional reactions, because sometimes cognitive and emotional reactions are produced together. Chaudhuri & Holbrook, (2001) further argues that emotion refers to customers and service providers after contact, a positive emotional response to it occurs. Therefore, the

customer's emotional factors for the brand or service provider are also important factors that affect the customer's behavior intention.

Integrating Chaudhuri & Holbrook (2001) and Hall (1996) 's opinion on emotional identity, this study defines emotional identity as a positive emotional response to customers after contact with service providers, which is a process of long-term learning and re-learning It is also an important factor that affects customer behavior intentions, and this assimilation process is carried out unconsciously.

Consumer Purchase Decisions

The factors that influence purchase intention are divided into market motivation factors and individual difference factors.

According Hu Tian-zhong, et al. (2011), the purchase intention comes from the cognitive value. When consumers face the real price, they will be related to the quality of the product. As a basis for whether they are willing to pay, the higher the awareness or knowledge of the product, the higher the purchase intention.

Research Methodology

The independent variables in this study are "type of message", "intensity and characteristics of message", and "credibility of source", the intermediary variables are "verification", "distribution behavior", "conformity behavior", and the dependent variable Consumers' reaction to the purchase decision behavior of rumors. In addition, this study also added personal factors as disturbance variables, including "degree of involvement", "risk avoidance", "emotional identity", and "party tendency". The research object was set for the ethnic groups over 20 and under 65, and a questionnaire survey was conducted to understand the impact of online rumors on consumers' purchase decisions.

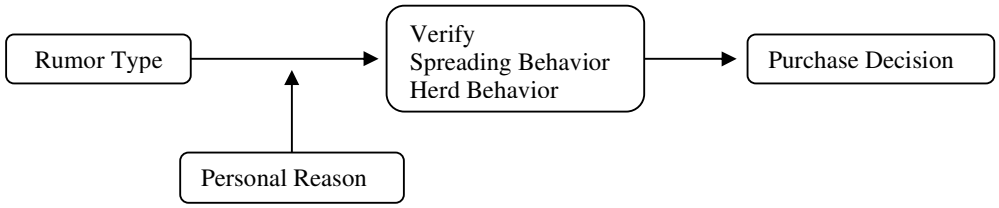

Fig. 1: Research Framework

Rumor Questionnaire Design

This study is expected to measure the positive and negative rumors and the source credibility of the variables, in order to explore consumer purchase decisions and personal factors (risk avoidance, involvement, emotional identity, political party tendencies, propaganda intensity and propaganda. Whether it is influenced by the relationship strength of the messenger), so this research tests based on the version of the online news rumors, and uses "Toilet Paper Chaos 2.0" as a keyword to highlight the livelihood issues of product attributes. The Survey Cake online questionnaire survey was used to provide rumors and ask questions to investigate the above purposes, and integrate the results of the literature discussion to carry out the overall design of the research questionnaire. The Likert scale 5-point scale is used to measure who should fill out the questionnaire agreement with each question: 1 means strongly agree, 2 means agree, 3 means ordinary, 4 means disagree, and 5 means strongly disagree.

References

- Allport, G. W., & Postman, L. (1947),' The psychology of rumor.'
- Allport, G. W., & Postman, L. (1946),' An analysis of rumor,' *Public opinion quarterly*, 10(4), 501-517.
- Cunningham, M. S. (1967) ' The major dimensions of perceived risk,' *Risk taking and information handling in consumer behavior.*
- Chaudhuri, A., & Holbrook, M. B. (2001),' The chain of effects from brand trust and brand affect to brand performance: the role of brand loyalty,' *Journal of marketing,* 65(2), 81-93.
- DiFonzo, N., Bordia, P., & Rosnow, R. L. (1994),' Reining in rumors,' *Organizational Dynamics,* 23(1), 47-62.
- Hall, S., & Du Gay, P. (Eds.). (1996) Questions of Cultural Identity: SAGE Publications. Sage.
- Hu Tianzhong, & Jian Qiuting. (2011),' Research on Product Knowledge, Product Channels Affecting Consumer Attitude and Purchase Intention-Taking Chinese Herbal Health Food and Scientific Chinese Medicine as an Example,' *Lianhe Bao,* 8 (1), 201-224.
- Kapferer, J. N. (1990) 'Rumors: Uses,' *Interpretations, and Images, trans. Bruce Fink* (*New Brunswick, NJ*, 1990), 50.
- Kapferer, J. N. (1992) 'How rumors are born,' (No. hal-00784127).
- Kimmel, A. J. (2004) Rumors and rumor control: A manager's guide to understanding and combatting rumors. Routledge.
- Kiousis, S. (2001) 'Public trust or mistrust? Perceptions of media credibility in the information age,' *Mass communication & society,* 4(4), 381-403.
- Knapp, R. H. (1944) 'A psychology of rumor,' *Public opinion quarterly*, 8(1), 22-37.
- Lazarus, R. S., & Lazarus, R. S. (1991),' Emotion and adaptation,' *Oxford University Press on Demand.*
- McQuarrie, E. F., & Munson, J. M. (1987),' The Zaichkowsky personal involvement inventory: Modification and extension,' *Advances in consumer research,* 14(1).
- Sunstein, C. R. (2014) On rumors: How falsehoods spread, why we believe them, and what can be done. Princeton University Press.

- Westbrook, R. A. (1987) 'Product/consumption-based affective responses and postpurchase processes,' *Journal of marketing research*, 24(3), 258-270.

- Zajonc, R. B., & Markus, H. (1982),' Affective and cognitive factors in preferences,' *Journal of consumer research,* 9(2), 123-131.

The Strategy of Competitiveness of Lower Middle-Income Countries in ASEAN with a Dynamic Panel Approach

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Abstract

Competitiveness is a primary factor in supporting economic growth through international trade performance. The ASEAN region counted as an essential geostrategic for the world. Based on the porter theory, the level of competitiveness is generating through a low-cost strategy. This study aims to analyze the factors that determine the competitiveness of middle-low income countries in ASEAN. There are 12 pillars as indicators of global competitiveness based on the Global Competitiveness Index (GCI). The data used in panel data, consisting of 4 countries in ASEAN with GCI data from 2008-2017 with dynamic panel data analysis. Four factors contribute the most to the competitiveness of middle-income countries: supporting elements consisting of adequate infrastructure both land, sea, and air, macro-economic environment with inflation and controlled government debt, as well as maintaining the credibility of institutions through bureaucracy with integrity, proper regulation and driving efficiency through antitrust competition in the goods market. But the drivers of innovation poorly the competitiveness of middle-low income countries in ASEAN. It is related to high costs for R&D expenses, and the quality of scientific institutions is not yet comparable with the output. Recommendations from the results of the study are needed infrastructure support, macroeconomic stability, improvement of institutions, both bureaucracy and regulations that guarantee antitrust competition in the goods market.

Keywords: Competitiveness, ASEAN, Panel Dynamic, Lower Middle-income countries

Introduction

Free trade based on a capitalist system has brought the consequences of business competition in the global market for all countries in the world. It opens up equal opportunities for all countries to access markets. Based on the perspective of national resilience, free trade provides opportunities as well as threats to a country's local economy. Economic opportunities are obtaining from the increasingly broad potential of the trade market, which in turn will have an impact on the potential for state revenue from the growing international trade sector. In this case, international trade can support the acceleration of a country's economic growth. For middle-lower income countries, this opportunity becomes a new hope in poverty alleviation efforts, which is the main problem of economic development. But along with economic openness in this globalization era, there are also external challenges that must be responded by each country is facing the free competitive market.

The high level of Singapore's gross domestic product reflected an excellent international economic performance and interpreted a higher competitive advantage compared to other countries in ASEAN. The per capita income of USD 58,248 shows the success of development in Singapore. Furthermore, the second and third rank has occupied by Brunei Darussalam, Malaysia, with income per capita of 31.437 USD and 12.110 USD, respectively (Tradingeconomic,2018). The high level of competitiveness of high-income countries such as the European Union-12 is characterized by high average expenditure on education of 5.1% of GDP compared to the countries of Croatia, Macedonia and Turkey with average spending on education at 3.5% of GDP (Matovac, VA, Vlatka, B and Sanja, F. 2010). That shows of strengthening human capital through education in realizing high

competitiveness for high-income countries. Research results for the Romanian case by Badea, L and Angela (2012) conclude there is a strong relationship between education with welfare and competitiveness. Countries that have invested in the education system have a high degree of success in development (Pan, Su-Yan. 2011). Other studies that strengthen the argument for the importance of human capital through education for the competitiveness of developed countries have been carried out by Aleksejeva L, (2016), Cherkesova, EY, Evgeniya, AB, Ekaterina, PS and Nataliya, ED, (2016), Palmer, RT, Ryan, JD, James. LM and Adriel, AH (2010), Kowal, J and Grazyna, P. (2017), Lengyel, I and Janos, R. (2013), Sekuloska, J.D. (2014), Sahlberg, P. (2006).

In addition to strengthening human capital, technology is also an essential factor that determines the level of competitiveness of a country. Several studies have proven the influence of technology on competitiveness, including Fagerberg J and Martin, S. (2007), and Chou, Y, and Ying-ying Hsu and Hsin-Yi Yen, (2008). Singapore and Malaysia have the highest level of technological readiness compared to Brunei Darussalam and Thailand. Based on GCI data, Malaysia ranks second after Singapore, with an average competitiveness growth rate of 1.57% per year. However, during the financial crisis in 2008-2009, Malaysia's competitiveness level had decreased by -3.37%, from 5.04 to 4.87. This because macroeconomic performance as a driving factor in Malaysia's competitiveness is lower than the three high-income countries in ASEAN.

Indonesia occupies the highest competitiveness value for lower-middle countries, with an average rating of 4.456 from 2008 to 2017. The performance of Indonesia's competitiveness is almost the same as Thailand, with a difference of 0.135 points. Of the four middle-low income countries in ASEAN, Cambodia is the lowest competitiveness country with an average level of competitiveness at a score of 3,828. The main weakness of Cambodia's competitiveness performance lies in the low value of higher education and training.

Amid the slowdown in the global economy, ASEAN middle-income countries such as Indonesia, Philippines, and Vietnam are taken into account by the world because they have stable economic growth with an average increase of above 5%. In comparison, other developing countries such as India and Russia have decreased by 0.1 each % and 0.3% in 2019 (BI, 2019). In this case, ASEAN has several advantages, including; (1) a market potential with a population of around 650 million people is ranked third largest in the world (2) fourth largest export in the world at 7% of global exports, and (3) The largest economy with the sixth-largest GDP value in the world (ASEAN, 2019). In the industrial era 4.0, investment in the digital economy became the most important factor for countries in the ASEAN region to increase regional competitiveness.

The ability to read the strengths and weaknesses of each state determines improvements in the country's competitiveness. Therefore, this research aims to analyze the determinants of the competitiveness of low-middle income countries. Understanding these competitiveness characteristics will be beneficial for determining international trade strategies in the face of free competition.

Literature Review

According to the law of comparative advantage by David Ricardo, it states that although one country produces less efficiently than two other commodity production, trade is still profitable for that country. On the contrary, the state will decide to import commodities which, if produced by themselves, are lost higher (Salvatore, D. 2013). For example, China can compete in furniture products with strong traditional competitors such as Italy and Germany, by understanding the comparative advantage possessed through labor-intensive industries (Han Xiao, Yali, W and Shasi, K. 2009).

Competitive advantage theory used in this study was developed by Michael Porter (Cho, S.D and Moon, H.C, 2000) as a critique of Ricardo's comparative advantage theory. The theory of competitive advantage is more relevant in measuring the competitiveness of every country competing in today's global market. It can explain the country's success in winning global markets through national competitiveness. Porter told four factors to determine national competitiveness (diamond models) consisting of: factor conditions, demand conditions, related and supporting industries, and firm, strategy, structure, and rivalry. It means that a country that can win a competition in the global market

is a country that can build national competitiveness by ensuring competitive games from upstream to downstream. This capability cannot only depend on the domestic industry but must also support by high demand. The more competitive the local market will drive innovation to produce quality and differentiated products. Furthermore, upstream sector support (suppliers) determines the level of production efficiency. So that government support is needed in maintaining competitive national markets.

Methodology

The research method uses a quantitative approach with dynamic panel analysis. The data consists of 4 lower middle-income countries in the ASEAN Region, namely: Indonesia, Vietnam, Philippines, and Cambodia, and annual data (2008-2017). The data source comes from the yearly Global Competitiveness Index report published by the world economic forum. The variables used consisted of 12 independent variables consisting of Institutions (Inst), Infrastructure (Infrast), Macroeconomic environment (Macro), Health and Primary Education (HPE), Higher Education and Training (HigherET), Goods market efficiency (GME), Labor market efficiency (LME), Financial market development (FMD), Technology Readiness (TR), Market size (MS), Business (Buss), Innovation (Inov).

Panel data analysis used in dynamic models, where the dependent variable depends not only on the exogenous variable but also on the lag of the dependent variable. The lag coefficient of the dependent variable produced by PLS will be biased upwards, while the lag coefficient of the dependent variable produced by FEM will be biased downwards. Therefore the method of moments or the Generalized Method of Moment (GMM) approach is used to overcome these problems using the System GMM (SYS-GMM) approach. The essence of the GMM System is an equation system that is estimated to be the form in the first difference and level. The dynamic panel data model illustrated as follows :

$$GCI_{it} = b_0 + b_1 GCI_{i,t-1} + b_2 Inst_{it} + b_3 Infrast_{it} + b_4 Macro_{it} + b_5 HPE_{it} + b_6 HigherET_{it} + b_7 GME_{it} + b_8 LME_{it} + b_9 FMD_{it} + b_{10} TR_{it} + b_{11} MS_{it} + b_{12} Buss_{it} + b_{13} Inov_{it}$$

All of these variables measured on a scale of 1-7. A score of close to 7 means excellent performance. After the estimation results obtained, the instrument validity test will carry out using the Sargan analysis and the Arrelano-Bond m1 and m2 statistical tests. Next will be seen whether the coefficient value is biased or not by comparing the lag value of the SYS-GMM coefficient with the pooled least squares (PLS) dependent lag coefficient and the fixed effects model (FEM). Having obtained a more valid model, then it will be further analyzed to answer the research objectives and hypotheses.

Findings

Performance Analysis of Factor-Driven

The assessment results show that Indonesia has the best performance in almost all categories of supporting factors compared to Cambodia, the Philippines, and Vietnam. The average value of the performance of Indonesian institutions is 4.008 out of a maximum scale value of 7. The performance of infrastructure also shows that Indonesia has the best average annual assessment compared to the three countries. That cannot be separated from government intervention, especially since the era of President Jokowi to lead in 2014 to the present. President Jokowi's work priorities set out in NAWACITA, which aims to provide equitable development throughout Indonesia. One form of construction is infrastructure projects, both on land, sea, and air. In facing the free market era and industry 4.0, air infrastructure has built in the form of PALAPA RING. The role of digital determines the superiority of products ranging from upstream to downstream in the free market. Therefore investment in affordability of digital access is urgently needed by Indonesia to encourage the competitiveness of domestic products.

The performance of Indonesia's macro-environment also ranks better than the Philippines. The government's ability to maintain macro conditions will have an impact on business confidence in the country. However, for the assessment of health and primary education, Vietnam has better performance than Indonesia, the Philippines, and Cambodia. That indicated by an assessment score of 5.687 for Vietnam and 5.535 for Indonesia.

Performance Analysis of Efficiency-Driven

Performance booster efficiency explained by the main factors that determine product competitiveness. The efficiency aspect is a direct assessment of the microeconomic conditions, in this case, including input factors that affect production to the state of the goods market and the money market. The more efficient it reflects, the higher competitiveness of a product.

Philippines and Indonesia have higher levels of education and training than Cambodia and Vietnam. For the efficiency of the goods market, Indonesia has the most efficient performance compared to other countries, but this is not in line with the efficiency performance in the labor market. That is partly because the minimum wage setting in Indonesia and the Philippines is higher than in Vietnam and Cambodia. The more upper minimum wage fixing indicates a less efficient level of wage determination.

Furthermore, Indonesia also considered having the best efficiency performance in the financial market and market share among the three countries. The average value of the return is 4,279 and 5,386, respectively (WFE, 2017). For technology readiness, the Philippines is the country with the best level of technological readiness compared to Indonesia, Vietnam, and Cambodia.

Performance Analysis of Innovation-Driven

The performance drivers of innovation explained by two factors, namely business sophistication and innovation. Business sophistication defines the quality of the business from upstream to downstream. The best business sophistication performance among lower middle-income countries in ASEAN is Indonesia. Overall, the average innovation performance of middle-low countries in ASEAN is at a low level. It was showing from the highest score of 3.76 out of a maximum rating of 7 occupied by Indonesia and the weakest in Cambodia with an average value of 2.865 (WFE, 2017)

Competitiveness Model of Lower Middle-Income Countries in ASEAN

The competitiveness model of lower middle-income countries in ASEAN explained through the SYS-GMM estimation procedure. Before the competitiveness model obtained, the instrument validity test first performed using the Sargan test. The validity test aims to ensure that the instrument does not correlate with errors in the SYS-GMM equation. Then an autocorrelation test was performed using the Arrelano-Bond *m1* and *m2* statistics. The autocorrelation test intended to see the consistency of the SYS-GMM estimation results.

Based on table (4), it can see that the dynamic panel method with the SYS-GMM approach has met the criteria of the best model statistically. The Arellano-Bond (AB) results on m2 show a p-value of 0.3684; value used by 5 percent, so the decision is to fail to reject H0. That is, estimates are said to be consistent, and there is no autocorrelation in the first-order difference of the second order. Sargan test estimation results show the p-value of 0.9605. By using an of 5 percent, it can conclude failing to reject H0. That is, there is no correlation between residuals and over-identifying restrictions or variable instruments that used more than the estimated number of parameters. So there is no problem with the validity of the device.

Table 4: Panel Estimation Results with SYS-GMM, PLS, and FEM

Variable	Estimated Coefficients	Standard-Error	P-Value
SYS-GMM			
Lag(1) Gci	0,0441	0,0325	0,175
Lag(3) Gci	-0,0134	0,0453	0,768
Institution	0,1035	0,0480	0,031**
Infrastructure	0,1544	0,0227	0,000***
Macro	0,1220	0,0125	0,000***
HealthEdu	0,0801	0,0302	0,008***
HigherHE	0,0756	0,0101	0,000***
GoodME	0,2152	0,0474	0,000***
LabourME	0,0919	0,0176	0,000***
FinancMS	0,0475	0,0188	0,012**
TechR	0,0796	0,0133	0,000***
Markets	0,0769	0,0266	0,004***
Bussiness	-0,0209	0,03308	0,527
Innovation	-0,0768	0,0263	0,004***
Cons_	0,0372	0,3099	0,904
Pooled Least Squared			
Lag(1) Gci	0,04008	0,0452	0,392
Lag(3) Gci	-0,03915	0,0479	0,429
Fixed Effect			
Lag(1) Gci	0,0275	0,0439	0,545
Lag(3) Gci	-0,0105	0,0427	0,811
Wald Chi2	107,94		
Prob>Chi2	0,000***		
AB Test	**Z**	**P-value**	
Arrelano-Bond *m1*	-1,9338	0,053*	
Arrelano-Bond *m2*	-0,8994	0,3684	
Sargan Test	**Chi(10)**	**Prob> Chi2**	
	8,2618	0,9606	

Sources : Calculated from Eviews.7 Output

Estimation results show the amount of influence of independent variables on the dependent variable. These competitiveness variables explained in three factors that drive a country's competitiveness. The level of significance used in this study uses a value of 5 percent.

Effect of Current Competitiveness Performance on Future Competitiveness

Variable global competitiveness index in the previous period, both the last one year period and three years,did not have a significant impact on the performance of the country's competitiveness in the current period. Or in other words, the level of performance of the country's competitiveness at this time does not determine the level of competitiveness of the country in the coming period. It is shown from the results of the estimated GCI lag variable (1) and GCI lag (3) with p-values of 0.175 and 0.768, respectively. It means it fails to reject H0, so it can conclude that the competitiveness performance of

previous years does not determine the performance of future competitiveness. The performance of the country's competitiveness cannot build in a short time. A long process is needed to prepare a country's competitiveness to increase in the long run. One example of China, since 2014, China's GDP has surpassed the United States. Whereas in 2004, the difference in China's GDP compared to the United States reached -6.7 trillion US $. Then in 2014, China's GDP exceeded the United States GDP by 0.2 Trillion US $. It means that it takes more than ten years for China to match the competitiveness of the United States so that the competitiveness performance of a country cannot change in a short period of one or three years (IMF, 2015).

However, the positive sign of the estimated GCI lag coefficient (1) is greater than the negative sign of the GCI lag estimated coefficient (3) shows the total magnitude of the effect of the current competitiveness performance has a positive impact on the competitiveness of a country in the future. It means that for countries with lower middle-income, it takes a long time to prepare competitiveness as early as possible so that in the future, it can match the competitiveness of developed countries.

Effect of Driving Factors on the Competitiveness of Lower Middle-Income Countries in ASEAN

Four independent variables are used to explain the driving factors of competitiveness, namely the assessment of institutions, infrastructure, macro environment, and health and primary education. This driving factor illustrates the macroeconomic perspective as a factor that drives the realization of a highly competitive country identical driving elements with government involvement in preparing and guaranteeing a conducive and stable business climate. The estimation results with the SYS-GMM panel model show that there is a positive and significant influence between infrastructure on the competitiveness of middle-lower income countries in the ASEAN Region. The magnitude of the influence of infrastructure on competitiveness can show from the estimated coefficient of 0.1544. However, for Indonesia, which has an average rating of the best infrastructure performance compared to the other three countries, amounting to 3,872, an increase in infrastructure performance by one point is not large enough to improve the country's competitiveness. A minimum of 15 times more effort is needed than normal conditions to reach a value of 6.188 so that it can compete with the infrastructure performance of developed countries like Singapore.

Currently, under the leadership of President Jokowi, Indonesia has built infrastructure ranging from road repair, building new roads that connect between regions, building ports, development in disadvantaged areas, development on regional borders to support for internet networks. From 2013 to 2019, there was an increase in spending on priority programs for infrastructure by 158.4%, health increased by 96.3%, and Education increased by 35.4% (Ksp, 2019). Infrastructure factor was the chief development priority for President Jokowi's administration during his five-year term of leadership in the first period

The second factor that contributes significantly in determining the competitiveness of lower middle-income countries in ASEAN is the macro condition. The estimation results show that there is a positive and significant influence between macro conditions on the competitiveness of middle-lower income countries in the ASEAN Region. The magnitude of the effect of macro conditions on competitiveness can show every one-point increase in performance evaluation of macro conditions in middle-low income countries in the ASEAN region will have an impact on improving the assessment of competitiveness performance by 0.122 points.

The average performance value of macro conditions in Indonesia and the Philippines is not too different, respectively, 5,418 and 5,321. This value can be said to be on a scale closer to the maximum amount of 7. That means that to maintain macroeconomic performance, and two countries need to improve the performance of inflation stability, economic growth, maintain budget deficits, and strengthen public savings by five times higher than the conditions typical to be able to rival the competitiveness of developed countries in ASEAN. Indonesia's macroeconomic performance shows a stable rate of economic growth amid global uncertainty. The average value of economic growth indicates this from 2006 to 2019, which is always above 5% and ranks third-best in the world after India and China. Indonesia's macro performance also shows a stable condition, as seen from the

inflation rate data, which is getting lower from year to year (YoY), from 8.36% in 2014 to 2.36% in July 2019 (Ksp, 2019). The low level of inflation shows the ability of the government to maintain public purchasing power and balanced prices of input goods.

The institution is the third driving factor that determines the level of competitiveness of lower middle-income countries in the ASEAN Region. Bureaucratic performance, government policy transparency, public trust to ensure a conducive business climate through legal certainty are factors that determine the performance of a country's institutions. Estimation results show that there is a positive and significant effect between the performance of institutions on the competitiveness of lower middle-income countries in the ASEAN Region. Every time there is an increase in the assessment of institutional performance in lower middle-income countries in the ASEAN Region by one point, it will have an impact on improving the evaluation of competitiveness performance by 0.1035 points. However, if Indonesia wants to increase its competitiveness, it can improve the performance of institutions through improving governance by up to 20 times better than regular efforts to be able to compete with developed countries in ASEAN. Indonesia occupies the fifth position in ASEAN as a country with a level of public service with a value of 59.1 better than the Philippines and Vietnam (Ksp, 2019).

Based on the estimation results, it concluded that lower middle-income countries in the ASEAN Region need government support in providing infrastructure, maintaining macroeconomic conditions, and ensuring a conducive business climate through excellent institutional performance to improve their competitiveness. Nigeria also experienced this result in Dimnwobi, S.K, Chukwunonso, S.E, and Emilia, M.M (2016) research, which recommended Nigeria to take concrete steps to overcome infrastructure, macro policy and security weaknesses in improving Nigeria's competitiveness.

Effect of Efficiency Drivers on the Competitiveness of Lower-Middle Income Countries in ASEAN

Efficiency drivers describe the factors that determine product efficiency performance, which is explained by input factors, technological readiness, the goods market, market size, and financial markets. The higher level of efficiency of these factors indicates the lower the cost of factor inputs or, in other words, the more competitive output prices. Estimation results show that the main factor that has the most influence on the competitiveness of low-middle income countries is efficiency in the goods market. The p-value of the goods market efficiency of 0,000 is smaller than the alpha error tolerance of 5 percent. The value of this magnitude of influence can interpret as a higher level of proficiency in the goods market; the performance of competitiveness will increase by 0.2152. Indonesia occupies the country with the most top average market efficiency assessment of 4.439. It means that there are consequences of increasingly less government intervention in the goods market. That is in line with the market theory of neo-liberal economics, which wants the market mechanism to run by itself. Every economic actor has the same right to determine the market price according to the agreement through a bargaining process.

For developed countries, this condition can apply easily because most economic actors have relatively equal commercial capabilities or have balanced competitiveness. It is different from lower middle-income countries in the ASEAN Region. Because in general, every country faced with the economic capabilities of economic actors that not evenly distributed. The high level of economic inequality is the main problem of not functioning a perfect market mechanism. The level of economic inequality in Indonesia with the GINI index shows a value of 45.7 less than the Philippines of 47.9 (world bank, 2018). That is one of the supporting factors that cause the goods market in Indonesia to run more efficiently than the goods market in the Philippines. Other factors that cause the goods market in Indonesia to be more efficient than Vietnam, Cambodia, and the Philippines are explained by the value of Indonesia's trade surplus in 2018 higher than the three countries. Although in terms of trade volume, Vietnam is 213.9 billion US dollars compared to Indonesia at 168.8 billion US dollars, Indonesia is better able to take advantage of free trade with a trade surplus of 11.8 billion US dollars compared to Vietnam only 3.3 US $ billion (Aseanstas, 2018)

Other factors affecting the competitiveness of lower middle-income countries in ASEAN are higher education and training, efficiency in the labor market, financial market development, technology readiness, and market size. But the magnitude of the effect shown by the estimated coefficient values of the five factors is less than 0.1 point. It means minimal efforts made up to 100 times greater than standard repairs. That indicates that there are still many problems related to the level of production efficiency that needs to fixed in a relatively long time. The results of previous studies that support the findings in this study are Sum, N.L (2013), Sahlberg, P (2006), which explains the importance of higher education and knowledge-based economics can improve a country's competitiveness according to Michael Porter's theory.

Effect of Innovation Drivers on the Competitiveness of Lower-Middle Income Countries in ASEAN

Business sophistication and innovation are factors that determine a country's innovation performance. Estimation results show the p-value of 0.527 is higher than the 5 percent. It can conclude that there is no significant effect between business sophistication on the competitiveness of middle-low income countries in the ASEAN Region. This result illustrates that business sophistication is currently not able to increase the competitiveness of middle-low income countries in the ASEAN Region.

The second factor that determines the drivers of innovation is innovation itself. The estimation results above show the p-value 0.004 is smaller than the alpha error tolerance value of 5 percent. It means rejecting the null hypothesis, i.e., statistically, there is a significant influence between innovation on the competitiveness of middle-low income countries in ASEAN. However, the regression coefficient shows a negative sign of -0.0768, which can interpret if there is an increase in innovation performance through the procurement of sophisticated technology, company expenditures for R&D to the availability of scientists and engineers will only hurt increasing the competitiveness of these countries. That contradicts the results of previous studies, which stated that competitiveness is closely related to a country's ability to innovate, such as the results of Clark, J and Key, G (2010) and Atkinson, R.D and Scott, M.A (2009). The negative impact of innovation on the competitiveness of low-middle income countries indicates that not all countries have a competitive advantage through innovation. Because the characteristics of lower middle-income countries are different from those of developed countries that have superior technological advantages, the quality of scientific research institutions, and the availability of scientists, with these advantages, make it easier for developed countries to produce innovative products. It is different from middle-lower income countries with characteristics of a low-educated population, and a large number of productive age workers. With these characteristics, the right strategy used by low-middle income countries to be able to compete with developed countries is to strengthen labor-intensive. The policy of strengthening innovation is not appropriate for lower middle-income countries because the costs incurred for the procurement of advanced technology, and investment in R&D has not to balance with the results obtained.

Conclusion

Four factors contribute the most to the competitiveness of lower middle-income countries. Those are supporting factors including adequate infrastructure, both land, sea, and water, macro-economic environment with inflation and controlled government debt, as well as maintaining the credibility of institutions through bureaucracy with integrity, proper regulation, and driving efficiency through antitrust competition in the goods market. Cambodia, Philippines, and Vietnam need to prioritize infrastructure development to support their national competitiveness. But the drivers of innovation hurt the competitiveness of lower middle-income countries in ASEAN. It is related to high costs for R&D expenses, and the quality of scientific institutions is not yet comparable with the output. Recommendations from the results of the study are needed infrastructure support, macroeconomic stability, improvement of institutions, bureaucracy and regulations that guarantee antitrust competition in the goods market.

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References

- Acs, Z.J, and Jose, E.A., 2008. Entrepreneurship and Competitiveness Dynamics in Latin America. Springer.
- Aleksejeva L, 2016. Country's Competitiveness and Sustainability: Higher Education Impact. Journal of Security and Sustainability Issues. http://dx.doi.org/10.9770/jssi.2016.5.3(4). 355-363
- Asean, 2019. Investing in ASEAN. Association of Southeast Asian Nations.www.asean.org
- Aseanstats, 2018. Asean Statistical Highlights 2018. Aseanstats.org
- Atkinson, R.D, and Scott, M.A, 2009. The Atlantic Century: Benchmarking EU & U.S. Innovation and Competitiveness. https://ssrn.com/abstract=1435523
- Badea, L, and Angela, R., 2012. Controversies Concerning the Connection Higher Education-Human Capital-Competitiveness. Theoretical and Applied Economics, Volume XIX, No 12(577), 125-142
- Bank Indonesia, 2019. Developments in financial economics and international cooperation: trade conflicts are increasingly pressing the global economy, Edition III 2019. Bank Indonesia, International Department. Jakarta. http://www.bi.go.id/id/publikasi/ekonomi-keuangan-kerjasama-internasional
- Cherkesova, E.Y, Evgeniya, A.B, Ekaterina, P.S, and Nataliya, E.D., 2016. Competitiveness of the Human Capital as Strategic Resource of Innovational Economy Functioning. Journal of Advanced Research in Law and Economics. Volume VII,Issue 7(21),1662-1667 https://doi.org/10.14505/jarle.v7.7(21).11
- Cho,D.S, and Moon,H.C, 2000. From Adam Smith to Michael Porter: Evolution of Competitiveness Theory. Asia-Pacific Business Series-Vol.2. World Scientific Publishing Co.Pte.Ltd
- Chou, Y, Ying-Ying Hsu, and Hsin-Yi Yen, 2008. Human Resources for Science and Technology: Analyzing Competitiveness Using the Analytic Hierarchy Process. . www.elsevier.com/locate/techsoc. Technology in Society 30(2008), 141-153
- Clark, J, and Ken, G, 2010. Innovation and Competitiveness: A Review. Technology Analysis and Strategic management, Vol. 10, No.3, 1998. 363-395 http://www.tandfonline.com/loi/ctas20
- Dimnwobi, S.K, Chukwunonso, S.E, and Emilia, M.M, 2016. Creativity, Innovation and Competitiveness in Nigeria: An Economic Exploration. International Journal of Academic Research in Economics and Management Sciences, Vol. 5 N0.3, 29-52
- URL: http://dx.doi.org/10.6007/IJAREMS/v5-i3/2242Domanski, J., 2012. Competitiveness of Nongovernmental Organizations in Developing Countries: Evidence From Poland. URL : http://www.sagepub.com/journalsPermissions.nav

- Fagerberg J and Martin, S. 2007. The Competitiveness of Nations: Why Some Countries Prosper While Others Fall Behind. www.elsevier.com/localate/worlddev. Vol. 35, No.10,4 1595-1620.

- Gentzoglanis, A., 2007. Financial Integration, Regulation, and Competitiveness in the Middle East and North Africa Countries. Emerald Group Publishing Limited

- Guerrero, M, David. U and Alain, F, Entrepreneurial Activity, and Regional Competitiveness : Evidence from European Entrepreneurial Universities. Springer.DOI. 10.1007/s109761-014-9377-4.

- Han Xiao, Yali, W, and Shashi,K. 2009. The Global Competitiveness of the Chinese Wooden Furniture Industry. Forest Policy and Economics, Volume 11, Issue 8. Elsevier.

- International Monetary Fund, 2015. GDP Current Prices (Billions of U.S dollars). Imf.orgJunz, H.B, and Rudolf, R.R, 2020. Price Competitiveness in Export Trade Among Industrial Countries. American Economic Association. URL:https:// www.Jstor.org/stable/1817104

- Kantor Staff Kepresidenan (KSP), 2019. Five years forward together: the achievements of the Joko Widodo-Jusuf Kalla government. Jakarta, ksp.go.id

- Kowal, J, and Grazyna, P. 2017. ICT for Global Competitiveness and Economic Growth in Emerging Economies: Economic, Cultural, and Social Innovations for Human Capital in Transition Economies. Information systems management, Vol. 34 No.4, 304-307. https://www.tandfonline.com/loi/uism20.

- Lall, S., 2001. Competitiveness Indices and Developing Countries: An Economic Evaluation Of the Global Competitiveness Report. World Development, Vol. 29, No. 9, 1501-1525.

- Lengyel, I, and Janos, R. 2013. Drivers of Regional Competitiveness in the Central European Countries. Springer

- Matovac, V.A, Vlatka, B, and Sanja, F. 2010. Understanding the Importance of Human Capital and Labor Market Competitiveness in the EU Candidate Countries and Selected EU Members. Ekon. Misao Praksa DBK. God XIX (2010).

- Palmer, R.T, Ryan, J.D, James.L.M and Adriel, A.H. 2010. A Nation at Risk: Increasing College Participation and Persistence Among African American Males to Stimulate U.S. Global Competitiveness. Journal of African American, Vol 1, Issue 2, 105-124

- Pan, Su-Yan. 2011. Education Abroad, Human Capital Development, and National Competitiveness: Chin'S Brain Gain Strategies.

- Porter, M.E, and Klaus, S., 2008. The Global Competitiveness Report 2008-2009. World Economic Forum.Geneva, Switzerland

- Razafimahefa, I, and Shigeyuki, H. 2005. An Empirical Analysis of FDI Competitiveness in
- Sub-Saharan Africa and Developing Countries. Economic Bulletin. URL :http://www.economicsbulletin.com/2005/volume6/EB-05F40005A.pdf.

- Sabadie, J.A, and Jens, J., 2010. How Do National Economic Competitiveness Indices View Human Capital?. European Journal of Education, Vol. 45, No.2, 236-258.

- Sahlberg, P., 2006. Education Reform for Raising Economic Competitiveness. Journal of Educational Change (2006) 7, 259-287. DOI 10.1007/s10833-005-4884-6. Springer
- Salvatore, D., 2013. International Economics 11th Edition. Wiley.
- Sekuloska, J.D., 2014. Higher Education and Training as Crucial Pillars in Creating the Competitiveness of Nation. Procedia Social and Behavioral Sciences 156 (2014), 241-246. www. sciencedirect.com
- Sum, Ngai-Ling, and Bob, J. 2013. Competitiveness, the Knowledge-Based Economy and Higher Education. Springer. J Know Econ (2013) 4, 24-44. DOI 10.1007/s13132-012-0121-8
- Trading economics, 2018. GDP per Capita 2018. https://tradingeconomics.com. Access 29 March 2020
- Zahra, S.A, and Carol, D.H., 2000. Privatization, Entrepreneurship, and Global Competitiveness in The 21 st Century. Emerald Insight. Competitiveness Review: An International Business Journal, Vol. 10 Issue 1, 83-103

Assessing Cloud Infrastructure Suitability for A Manufacturing Environment in South Africa

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Abstract

Cloud infrastructure solutions in South Africa are still in its infancy and it must be assessed if it is capable for use by the manufacturing sector where costs are a concern and rapid delivery of service is a requirement. The research is conducted in a local manufacturing company in which the population is all of the employees who can influence cloud migration. The research follows the positivistic paradigm and questionnaires are used to collect the data. Factor analysis is used to analyse the data and network performance tests are also run. Two significant factors namely security and business productivity are identified, with network performance showing that the performance of on premise servers are significantly better than that of cloud servers. It is concluded that manufacturing companies in South Africa should wait for cloud solutions to mature as well as wait for more advanced telecommunications technologies before attempting to use cloud solutions for daily operations. Future research possibilities include making use of the interpretivism methodology to gain insight from an interpretative perspective, increasing the Likert scale from 5 to 10 to gain better results from the data collected, and research can be conducted at multiple manufacturing companies to gain better experiences and results across South Africa and globally.

Keywords: Cloud computing, network performance, business productivity.

Introduction

Cloud infrastructure solutions in South Africa are still in its infancy and it must be assessed if it is capable for use by the manufacturing sector where costs are a concern and rapid delivery of service is a requirement. According to Schwab (2017) the technological world is entering into the Fourth Industrial Revolution which will have a great impact on how consumers and companies will use systems and services for the foreseeable future. The Fourth Industrial Revolution can be defined as "the advent of cyber-physical systems" (Davis, 2016). Companies, such as those in the manufacturing sector need to consider cloud computing solutions to modernize manufacturing and to gain a competitive advantage in the industry as well as streamline some if not all business processes. Stocking (2017) also states that especially the manufacturing industry lacks interest in cloud computing due to numerous key factors that play a significant role in the decisions made to implement solutions to benefit the sector.

This research will be identifying and discussing these key factors to emphasize the importance of improving these factors, in order to influence the manufacturer's decision making for considering cloud computing solutions for daily business operations. It will also discuss the identified key factors that play a significant role in the decision by manufacturers for considering cloud computing as a solution for certain services and if at this stage, it would be possible for manufacturers to utilize the cloud.

Cloud Computing

As the world is entering the Fourth Industrial revolution, new technologies and solutions comes with it. One of those technological solutions is cloud computing. As Mell and Grance (2011) defined, cloud computing is simply the delivering of computing services over the Internet in a globally distributed manner. These computing services refers to either physical hardware such as servers, data centres, or storage. It can also be software solutions such as applications, databases, and analytics that can be hosted in a cloud data centre (Mell & Grance, 2011). As Fox *et al.* (2009) explains, the term "Cloud" refers to a collection of computers, called servers, which are situated in a specific global location. Each of the servers are placed in a data centre, and there can exists several data centres across the world. There is a term for this, called the "distributed cloud". According to Rouse (2015), the term "distributed" in the information technology field refers to something that is shared by several systems that can co-exist in multiple locations. Cloud computing is an innovative way for businesses to reach more consumers or do business operations more efficiently.

According to Fox et al. (2009), there exists three main types of cloud computing deployment models. These are called the Public Cloud, Private Cloud, and Hybrid Cloud. According to Knorr (2018), these are considered to be the main deployment models to use when a business should decide on moving to the cloud. Microsoft (2019) states that the public cloud is a cloud solution offered by cloud providers over the Internet for anyone to use or purchase. Mell and Grance (2011) further states that a public cloud is created to be used by the public and is usually located on the cloud providers premises. The public cloud is a solution for any consumer or business to start with, although there may be some limitation regarding security and trust since the public cloud is owned by the cloud provider.

Mell and Grance (2011) states that the private cloud is created to be provisioned by a single business entity. The private cloud is usually owned and managed by the same business entity. Further, Microsoft (2019) states that a private cloud is cloud services that are offered over the Internet usually in the form of a company internal network (intranet) and is offered to a limited set of users instead of to the general public. The limited set of users are usually the employees that can work with the services only, such as financial information. According to Knorr (2018), the private cloud runs on a business entity's own infrastructure and it is the responsibility of the business entity to maintain the physical hardware and network connections to keep the cloud operational. A private cloud is a better suited deployment model for businesses that have sensitive data that needs to be kept private and managed by the business itself.

Microsoft (2019) defines a hybrid cloud as a combination of a public cloud and a private cloud. When the workload of computing tasks gets too intensive to be processed in the businesses' own data centres, it can be offloaded to a public cloud solution. According to Knorr (2018), businesses can run applications in the public cloud while databases with critical information can be contained in the private cloud. This separates the business-critical data from the data that can be shared with external cloud providers. In Table 1 a comparison of the different cloud deployment models is illustrated in terms of the tenancy environment, data centre location, how resources are shared, the storage provided, pricing, security, and performance.

Table 1: Comparison of cloud deployment models (Espreson, 2016)

Comparing Cloud Deployment models	Public cloud	Private cloud	Hybrid Cloud
Cloud environment	Multi-Tenancy-Shared environment.	Single tenancy-only for single use of an organization.	Both single tenancy and multi –tenancy. When data is stored in the public cloud, it delivers multi- tenant environment meaningthe data from multiple organizations is stored in a shared environment whereas when data is stored in private cloud, it is kept private for the use of asingle organization.
Data center location	Anywhere – where the cloud service provider's services are located.	Inside the organization's network.	Inside the organization's network for private cloud services as well as wherever service provider's services are there for public cloud services.
Resource sharing	Server hardware, network and storage are shared by multiple users in the cloud.	No sharing of resources. Hardware, storage and network are dedicated to the use of a single client or company.	Very secure; integration options add an additional layer of security.
Cloud storage	Public cloud delivers storage as a service on a pay per use basis. Best for backups asa part of a disaster recovery plan as well as archiving email and static non-core application data. OneDrive is an example of public cloud storage.	Private cloud delivers internal cloud storage that runs on a dedicated infrastructure in a data center.	Hybrid cloud manages streamlined *storage* that uses both local and off-site resources and serves as a gateway between on premise and public cloud storage.
Scalability	Instant and unlimited.	Sacrifices scalability but provides greater control and security.	On demand unlimited resources.
Pricing structure	Prices charged on the usage basis.	Comparatively expensive.	High but delivers competitive advantage.
Cloud Security	Good, but depends on the security measures of the service provider.	Most secure.	Secure.
Performance	Low to medium.	Very High.	Very High.

Not only should there be distinguished between cloud deployment models but also between cloud computing service models. Firstly, Microsoft (2019) define Infrastructure as a Service as a cloud service model in which consumers rent a cloud providers infrastructure such as servers and pay only for the resources used. Knorr (2018) further states that most public cloud providers offer a large range of services on the pay as you use principle that are largely scalable to a user's needs. Infrastructure as a Service is the most basic cloud service model. Secondly, Microsoft (2019) state that Platform as a Service is a cloud service model that is mainly aimed at developers. Knorr (2018) supports the statement that in this service model developers can quickly build, test, and deploy solutions using only specific assigned cloud services, while the operators manage the infrastructure. Developers can rapidly create business solutions without having to worry about the underlying infrastructure in this service model. Lastly, according to (Knorr, 2018), the Software as a Service cloud service model involves providing applications over the Internet that can be opened on a web browser. A popular service is Gmail that utilizes this service model. The infrastructure on which the applications are running are maintained by the cloud providers (Microsoft, 2019). This cloud service model is efficient for businesses that has the capacity to provide services to consumers by managing a data centre internally.

Research Methodology

According to Kuhn (1962), a research paradigm is a set of common agreements that is used by scientists globally to understand and scientifically prove real world problems. The choice of paradigm usually also governs the relevant methodology, which MacIntosh (2009) defines as the methods or tools used in conducting a research study. There are currently four major research paradigms that can be used to conduct research. These paradigms are Positivism, Interpretivism, Critical Social Theory, and Design science research. Since this research will use the positivism paradigm and methods for conducting research, it will be the only method to be discussed in more detail.

The positivist approach first emerged in the 19th century from French philosopher, Auguste Comte (1798–1857), who rejected metaphysics for research and considered that scientific knowledge is the only manner of proving the truth about reality (Kaboub, 2008). Metaphysics, as defined by Masters (2017), is the combination of the word meta – meaning over and beyond, and physics. It means over and beyond physics and is usually related to a branch of philosophy studies that handles the nature of being. Positivism requires a researcher to prove the knowledge in a measurable and observable manner before it can be considered science. The positivism paradigm can only be used when there is a need to turn qualitative data into quantitative data that can be measured and observed by means of scientific methods. The positivistic approach is used in the study to measure and gain knowledge in a quantifiable manner to be used by South African companies in a decision-making process. Companies today use numerical figures rather than relying on feeling or ideas to make decision of the future of the company.

The population for this research consists of all the employees involved directly or indirectly with the decision-making process for cloud solutions in the company. For the study, the population size is relatively controllable for analysis and therefore sampling is not required as all 23 employees took part. Data was collected in the form of questionnaires that conform to the positivistic paradigm standards. Since the positivistic paradigm works with research methods that require analysis and results of quantitative data, the inputs will first be obtained as qualitative data from questionnaires before being transformed to quantitative data for analysis. Each of the 10 questions were answered in a closed-question format for quantitative analysis. Closed-ended questions are better suited to this research as the questions will be transformed into quantitative data for analysis. Each question carried a weight of between zero and five and the respondent will be asked to choose a value based on their agreement with the question. Questions 1, 2, 4 and 9 relate to security, 3, 5, 6, 7 and 10 to productivity, and question 8 to the network. Each of the respondents will be working for the South African company faced with the issue of moving to the Cloud, and each respondent will be actively involved in the decision-making process for Cloud computing migrations.

Data Analysis will take place through factor analysis, which is the process of taking a large data set of data and converting it into a more manageable smaller data set that can be used to analyze and interpret the data in an efficient way (StatisticsHowTo, 2019). Factor analysis involves multiple variables that have similar response patterns that all relate to one variable that is not directly measurable, called the latent (hidden) variable. StatisticsHowTo (2019) states that factors are classified and listed according to their variance (factor loading) and that factors providing little information can be discarded from the analysis. For this research the explanatory factor analysis method will be used. Employing this method, a researcher can discover the relationships between the set of variables and the underlying latent variable.

Network Performance

Network performance refers to the speed or quality of service that the network provides. In the case of cloud computing, the network is the global Internet, and the network performance is the measurement of how long it takes to access certain cloud services and the amount of data transferred between client and cloud. Network performance is measured using several different metrics such as bandwidth (capacity), network throughput, and network latency.

According to Spacey (2018), bandwidth is the theoretical limit of the maximum amount of data that can be transmitted over a computer network. Bandwidth can also be referred to as the "volume of information per unit of time" that can be transferred over a specified medium (Fisher, 2019). There are several things that can affect the network bandwidth, as mentioned the amount of data that can be transferred at a time, as well as the number of simultaneous connections using the same network line (Fisher, 2019).

Network throughput can seem similar in definition to network bandwidth, although it is not the same. According to Rivenes (2016), network throughput is the actual amount of data that can be transferred in a certain time. While bandwidth refers to the number of packets that can be theoretically transferred over the Internet, throughput refers to the number of data packets that actual gets transferred factoring in lost packets.

Spacey (2018) defines network latency as the time it takes for a communication circuit between two endpoints to occur. Network latency is generally a collective term referring to the types of delays that can occur during a network transfer. According to Mitchell (2019), the types of delays are called transmission delays, usually caused by the characteristics of the transmission medium, and processing delays such as network hops and the processing power of a piece of equipment. Network latency has a direct influence on network throughput and bandwidth. If there exist delays in the network, this can lower the amount of data that transfers in a time frame between the two endpoints (Mitchell, 2019). Spacey (2018) states that network latency is mostly caused by the geographical position of the server relevant to the accessing client. The closer the client is to the server the less network latency will possibly occur in communication. To measure network latency in this research, ping tests and traceroute tests between the server and the client will be performed to determine the best geographical location to use by a business entity for using cloud services (Mitchell, 2019).

Data Analysis and Findings

The software that was used to perform the factor analysis was IBM SPSS Statistics. The criteria that were used to complete the factor analysis were:

- Descriptive Correlation Matrix:
  - Coefficients.
  - Significant levels.
- Extraction:
  - Maximum likelihood extraction method was used based on the eigenvalue.
  - Maximum Iterations of 16 was used for convergence.
  - Direct Oblimin was used for rotation.
  - Loading plots were added.

Table 2 contains the correlation matrix obtained from the data.

Table 2: Correlation Matrix

Correlation Matrix

		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Correlation	Q1	1.000	.552	-.177	.228	-.026	.026	-.025	-.333	.030	-.123
	Q2	.552	1.000	-.038	-.059	.239	.290	.252	-.126	.002	-.133
	Q3	-.177	-.038	1.000	-.019	-.010	-.037	.085	.213	.278	.333
	Q4	.228	-.059	-.019	1.000	.550	.209	.007	-.182	-.102	-.086
	Q5	-.026	.239	-.010	.550	1.000	.255	.098	-.100	.160	.171
	Q6	.026	.290	-.037	.209	.255	1.000	.408	-.109	-.030	-.127
	Q7	-.025	.252	.085	.007	.098	.408	1.000	.442	.353	.396
	Q8	-.333	-.126	.213	-.182	-.100	-.109	.442	1.000	.482	.641
	Q9	.030	.002	.278	-.102	.160	-.030	.353	.482	1.000	.888
	Q10	-.123	-.133	.333	-.086	.171	-.127	.396	.641	.888	1.000
Sig. (1-tailed)	Q1		.003	.210	.148	.452	.452	.455	.060	.446	.288
	Q2	.003		.432	.395	.136	.090	.123	.283	.497	.273
	Q3	.210	.432		.467	.482	.434	.350	.164	.099	.060
	Q4	.148	.395	.467		.003	.169	.487	.203	.321	.348
	Q5	.452	.136	.482	.003		.121	.329	.324	.234	.218
	Q6	.452	.090	.434	.169	.121		.027	.309	.446	.281
	Q7	.455	.123	.350	.487	.329	.027		.017	.049	.031
	Q8	.060	.283	.164	.203	.324	.309	.017		.010	.000
	Q9	.446	.497	.099	.321	.234	.446	.049	.010		.000
	Q10	.288	.273	.060	.348	.218	.281	.031	.000	.000	

The correlation matrix shows all the p-values for each question variable used in the analysis. In the research the values that should be looked at should be in the 95% interval range which correlates to p-values that are equal to or less than 0.05. Q1 (Security) has a p-value of 0.003 in comparison with Q2 (Security) with the same p-value. Both these variables are in equal significance for the Security category. Q5 (Productivity) also has a p-value of 0.003 in comparison with Q4 (Security), which means that these questions are correlated in a manner.

Table 3: Communalities

Communalities[a]

	Initial	Extraction
Q1	.740	.999
Q2	.748	.505
Q3	.251	.135
Q4	.691	.386
Q5	.729	.999
Q6	.396	.377
Q7	.515	.864
Q8	.647	.577
Q9	.828	.809
Q10	.894	1.000

Extraction Method: Maximum Likelihood.

In Table 3 the Extraction column shows the proportion of variance for each question variable. The higher the extraction value of each question variable, the more information can be explained

regarding the important factors analysed. As shown, Q10 has a .894 proportion which means it contributes greatly to the factor of Productivity, and secondly Q1 and Q5 both also contributes to Security and Productivity. Q3 contributed the least with the lowest proportion of all.

Table Error! No text of specified style in document.**: Total Variance**

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.851	28.508	28.508	2.555	25.554	25.554	2.606
2	2.072	20.723	49.231	1.300	12.998	38.552	1.630
3	1.387	13.871	63.102	1.628	16.285	54.837	1.606
4	1.170	11.697	74.799	1.161	11.610	66.448	1.353
5	.874	8.736	83.535				
6	.641	6.407	89.942				
7	.539	5.390	95.332				
8	.313	3.132	98.464				
9	.096	.956	99.419				
10	.058	.581	100.000				

Extraction Method: Maximum Likelihood.

According to Table 4, the factor analysis has summarized a total of four factors from the data set. Under the "Extraction Sums of Squared Loadings" data, the total column values explain the Eigen values gathered from each derived factor. The percentage of variance explains how much variance is contributed by each of the derived factors. The cumulative percentage for the derived factors is 66% which explains the variability of the 10 variables from the data set with a 34% loss of information during summarization. Figure 1 contains the graphical representation of Table 4.

Scree Plot

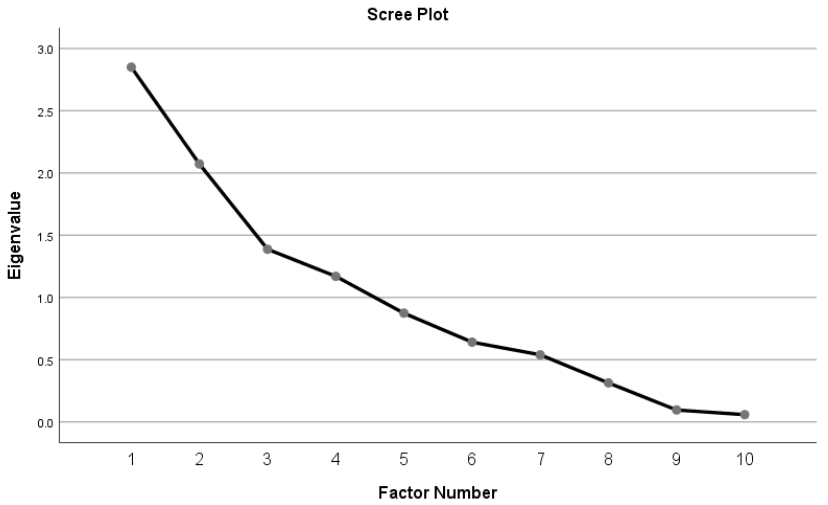

Figure 1: Scree Plot

The Scree Plot shows that 4 factors have an Eigen value of above 1. Factors with an Eigen value of 1 and above explain the most variance from the data set provided. Should more variables from the factors be added to the data set, the Eigen values demonstrates how the analysis would evolve.

Table 5: Factor Matrix

Factor Matrix[a]

	Factor			
	1	2	3	4
Q10	1.000	.012	-.011	.000
Q9	.887	.147	.025	.010
Q8	.640	-.203	-.266	.234
Q3	.333	-.117	-.097	-.032
Q1	-.133	.972	.190	.000
Q2	-.135	.478	.367	.348
Q5	.184	-.190	.964	.000
Q4	-.081	.104	.607	-.013
Q7	.396	.023	.031	.840
Q6	-.123	-.044	.279	.528

Extraction Method: Maximum Likelihood.

The factor matrix shown in Table 5 explains all the variances across the derived factors from the analysis. According to the table, Factor 1 has the most variance explained with a significance above 0.5. This factor includes Q10 (1.000), Q9 (.887), and Q8 (.640) as the variables that provides the most significant values of the analysis.

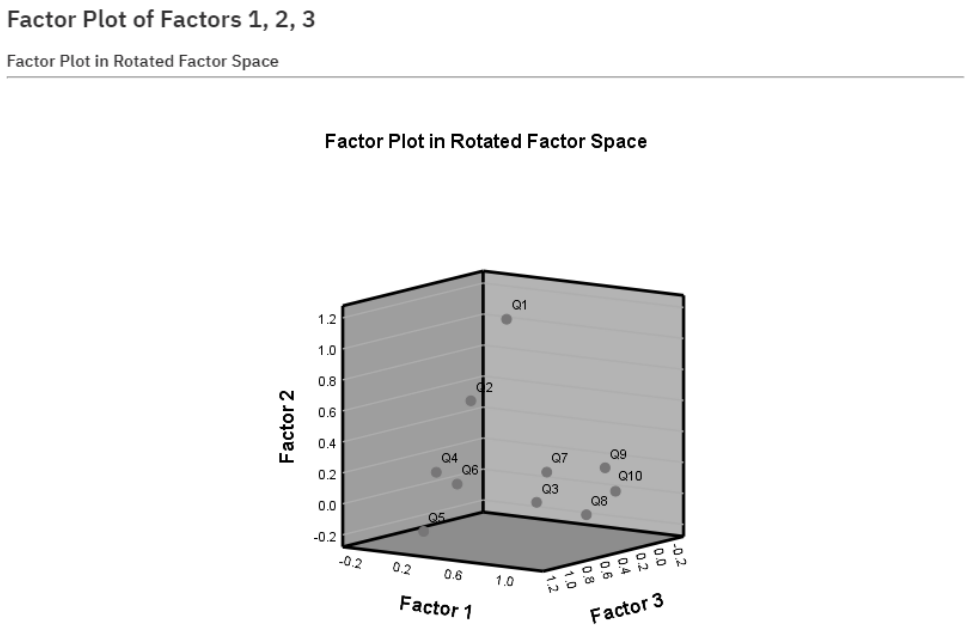

Figure 2: Factor Plot

Figure 2 is a data visualization provided by the analysis software to aid understanding of how each of the variables fit into the main derived factors for the research. It can be used as a guidance tool for analysing the data set.

Network performance test were conducted for the study since asking about network performance in a questionnaire would not particularly provide accurate results towards if South African Internet bandwidth can handle day to day operation to the cloud. The respondents expressed that network performance is a major concern in South Africa and that motivated the creation of the network test separately from the factor analysis. Thus, a simple network ping test was conducted using on premise servers along with servers based in the cloud that are used by the organisation where the tests were conducted.

The network test consists of running a ping test 25 times at specific intervals, first at 9h00 in the morning, 12h00 at noon, and lastly 15h00 in the afternoon. The reason the network tests were conducted as such is to ensure proper network conditions were tested to reflect possible daily operation and network traffic impact that may occur during the day. Each ping test performed returned the minimum, maximum, and average based on a local on premise test, or a test to the cloud provider server. Each element is measured in milliseconds (ms).

During the time interval of 09h00 the on premise server was very responsive by having a total average of 13 milliseconds where the cloud server has a round trip time of 313 milliseconds across the test runs. The local server has fluctuations of 1 to 104 milliseconds of maximum recorded round trip, which is substantially lower than the cloud server that had variations of 8 – 279 milliseconds. It

should also be noted that the results were recorded an hour after employees commences their daily operations.

During the interval of 12h00, the local server network traffic has slowed down with an average of 6 milliseconds across the test runs performed. This is in contradiction with the cloud server which had experienced an increased in network traffic resulting in an average of 2107 milliseconds across all test runs. The results also show that the local server has maximum latency fluctuations of between 1 and 61 milliseconds, while the cloud server has between 81 and 316 milliseconds fluctuations during the continuous test runs.

The 15h00 time interval is the time before most of the employees leave work to go home and finish off their last tasks for the day. The local server has a 1 milliseconds average and the cloud server has 2017 milliseconds across the test runs. The cloud server still experienced longer round-trip delays with a 2017 millisecond average across the test runs.

Table 6: Local vs. Cloud averages

	Daily Interval		
Service	09h00	12h00	15h00
Local	13	6	1
Cloud	313	2107	2017

Per the averages summarized in Table 6, the cloud server experienced larger fluctuations of network delay during the morning (09h00), midday (12h00) and afternoon (15h00) time intervals. The local server which hosts the services on premise had its largest delay in the morning, although it decreased throughout the day. The cloud server had its lowest delay in the morning, but only increased as the day went progressed. The network traffic delay to the cloud server could be caused by a poor network connection or a very busy network that needs to handle large requests between the premise and the cloud.

Conclusion

The analysis was performed to determine the most significant factors that contribute to the decision-making process of a manufacturing environment for using Cloud services in South Africa. According to the analysis done based on the questionnaire results, the most significant factor identified is Factor 1.

Factor 1, 2, and 4 corresponds to the key factor (categories), Security. Factor 3 corresponds to Business Productivity. Each of these factors had a significant outcome from the results obtained in the questionnaires. It seems that the key factor, Security, is the largest factor taken into consideration for moving daily operations to the cloud in South Africa. This is an important factor for many of the employees as business information must always be handled confidentially. One of the comments provided by an employee states as follows; “Data privacy is very important to me & the security of my data & company data is very important to me”.

Factor 3 that is identified as Business Productivity was the least significant regarding the employees as most are trained or will be trained in using the cloud solutions effectively. The main reason the factor was identified is due to the smaller sample size causing a slight skew in the results of the study where the variances do not correlate properly.

Based on the separate network performance analysis, it has been discovered that on premise solutions provide faster access times than cloud solutions. It is evident in the results that the latency experienced between on premise solutions and cloud solutions on certain times of the day is too significantly apart to choose cloud solutions as a use for daily operations. The geographical location of the manufacturing company also contributed to the latency experienced.

One question in the questionnaire was based on network performance and did not create a large impact in the factor analysis but created a large interest in the comments of the employees. One comment provided was: "Certain manufacturing environments do not have proper connections to the Internet and that cloud solutions are simply not possible". This is true to the results where an on premise solution would be better for performing critical daily operation, and cloud solutions can be used for backups of data that are safely encrypted locally before storage. One employee provided a comment in general that stated: "South Africa is just not ready for cloud solutions". This correlates to the key factor of Network performance where South African Internet bandwidth is not suitable yet for employing cloud solutions in a manufacturing environment. Manufacturing companies in South Africa should therefore wait for cloud solutions to mature as well as wait for more advanced telecommunications technologies before attempting to use cloud solutions for daily operations.

Future research possibilities include making use of the interpretivism methodology to gain insight from an interpretative perspective, increasing the Likert scale from 5 to 10 to gain better results from the data collected, and research can be conducted at multiple manufacturing companies to gain better experiences and results across South Africa and globally.

References

- Davis, N. 2016. What is the fourth industrial revolution? https://www.weforum.org/agenda/2016/01/what-is-the-fourth-industrial-revolution/ Date of access: 26 March 2019.
- Espreson. 2016. Public vs private vs hybrid cloud: a comparison chart. https://espreson.com/public-vs-private-vs-hybrid-cloud-comparison-chart/ Date of access: 31 May 2019.
- Fisher, T. 2019. What is bandwidth? https://www.lifewire.com/what-is-bandwidth-2625809 Date of access: 31 May 2019.
- Fox, A., Griffith, R., Joseph, A., Katz, R., Konwinski, A., Lee, G., Patterson, D., Rabkin, A. & Stoica, I. 2009. Above the clouds: A berkeley view of cloud computing. Dept. Electrical Eng. and Comput. Sciences, University of California, Berkeley, Rep. UCB/EECS, 28(13):2009.
- Kaboub, F. 2008. Positivist paradigm. Encyclopaedia of Counselling, 2:343.
- Knorr, E. 2018. What is cloud computing? Everything you need to know now. https://www.infoworld.com/article/2683784/what-is-cloud-computing.html. Date of access: 1 October 2019.
- Kuhn, T.S. 1962. The Structure of Scientific Revolutions. (In INTERNATIONAL ENCYCLOPEDIA of UNIFIED SCIENCE, 2.
- MacIntosh, R. 2009. Being Clear About Methodology, Ontology and Epistemology. The Phd Blog (Vol. 2019.).
- Masters, P.L. 2017. What is metaphysics? https://universityofsedona.com/meaning-of-metaphysics/ Date of access: 01 May 2019.
- Mell, P. & Grance, T. 2011. The NIST definition of cloud computing. NIST Special Publication 800-145. US Department of Commerce. https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf. Date of access: 1 October 2019.

- Microsoft. 2019. What is a cloud computing? https://azure.microsoft.com/en-gb/overview/what-is-cloud-computing/ Date of access: 31 May 2019.
- Mitchell, B. 2019. Introduction to latency on computer networks. https://www.lifewire.com/latency-on-computer-networks-818119. Date of access: 31 May 2019.
- Rivenes, L. 2016. What is network throughput? https://datapath.io/resources/blog/what-is-network-throughput/. Date of access: 31 May 2019.
- Schwab, K. 2017. The fourth industrial revolution. https://www.weforum.org/about/the-fourth-industrial-revolution-by-klaus-schwab/ Date of access: 27 September 2019.
- Spacey, J. 2018. 7 types of network performance. https://simplicable.com/new/network-performance. Date of access: 31 May 2019.
- StatisticsHowTo. 2019. Factor Analysis: Easy Definition. https://www.statisticshowto.datasciencecentral.com/factor-analysis/ Date of access: 04 April 2019.
- Stocking, A. 2017. Why Manufacturers are Switching to the Cloud. https://www.liquidplanner.com/blog/manufacturers-switching-cloud/ Date of access: 26 March 2019.

Peculiarities of Implementation of Peace Education in Ukraine

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Abstract

Purpose: The article provides synthesis and critical analysis of the best foreign practices concerning peace education and outlines the system of civic education based on peace-making and peacekeeping trends in the light of contemporary Ukrainian realities. The authors identify the potential of education in conflict-affected environments in foreign studies, which is of great use in conditions of protracted conflict in the East of Ukraine. On implementing peace education, Ukraine should consider the necessity to tackle the following problems: inequality, recognition and respect for multiculturalism, local communities' involvement in educational policy and reforms; reconciliation, combating injustice and conflict consequences. **Methodology**: In the study system approach is used which consideri peace education in the system of general education. The systematic method has become the basis for realization methodological instruments in the process of critical analyzing the most successful world practices in peace education and determining own vision of citizenship education system. Furthermore, a set of methods of scientific knowledge applied in humanitarian and social sciences are used, in particular, methods of structural and functional analysis, comparative analysis, synthesis, induction, deduction, analogue and generalization. **Conclusions**: Peace education events in volatile environment should take place in different sectors, cobbering the processes of social changes. On implementing peace education in Ukraine, definitions like 'lecturer's mission' and 'teacher's mission' should be the first to pay the closest attention to. The tasks of providing the teacher with strategies, practices and methods of self-efficiency improvement, impact on students' SE and other results, as well as creating strong school communities are among the priorities. Regarding the educational level of Ukrainian citizens as pretty high, this country's peace education should cope with the challenges of the youth's civic education more than just tasks to teach reading and writing. **Implications**: Promoting peace education should provide gradual changes of attitudinal guidance in the society aimed at shaping universal human values. Their final purpose is to ensure sustainable development of society based on the principles of democracy and peace.

Keywords: Peace Education, Peace-Making, Peacekeeping, Peacebuilding.

Introduction

According to the UN estimates, the conflict in the East of Ukraine is "one of the highly lethal in Europe after the Second World War". 7,2 per cent of Ukraine's territory, including Crimea and eastern parts of the Donetsk and Luhansk regions, are currently under occupation, with about 13,000 people killed, including 240 children, and more than 28,000 wounded in the conflict, which began in 2014. 700 schools were ruined as a result of banned artillery and tanks firing; 177 educational establishments are in a field of fire reaching. 36 thousand children were granted the status

of victims of war conflict. More than 1.8 million residents of Crimea and Donbas had to leave their homes and became the internally displaced persons, including 200 thousand children. 25 thousand children live and study in so called 'grey zone' at present [13].

Lasting military confrontation and the growth in human losses, population being in the occupied territories and surrounding areas under the constant impact of Russian propaganda reinforce the trends of misunderstanding and opposition in society. Defusing such stand-off requires a great deal of outreach and advocacy which should involve all stakeholders who influence human's world view shaping, in particular, educationalists.

Civil reconciliation will take at least 10-15 years and has to become an essential part of complicated and complex process of Ukrainian society consolidation, patriotism and Ukrainian identity establishment. GEFI – Global Education First Initiative define global citizenship as a third priority of its work: "Global education policy should be a profound link on the way of creating fairer more tolerant and more inclusive societies" [17]. Grounded on that fact, peace education in Ukraine is of actual importance, since it is aimed at addressing such root causes of conflicts as political, economic and social inequality and injustice. Peace education promotes security enhancement in the country, as well as political, economic, social and cultural transformations in communities which experience conflicts.

Literature Review

A lot of scientific studies reveal the problem of peace education implementing, among them we should emphasize works by Professor Harris I.M. who investigated evolution of peace education theories and their impact on contemporary theories based on non-violence (reducing threats posed by interpersonal and ecological violence). He highlights five ways of diversified peace education: international education, human rights education, development education, environmental education and conflict resolution education [8]. The significant contribution into peace education development was made by the Canadian Professor H. Danesh, the founder of integrative theory of peace and the author of 11-volume educational program "Education for peace". His integrative theory of peace is grounded on the fact that peace is understood as a psychosocial, political, moral and spiritual reality. So human's worldviews are defined as the subconscious lens (acquired through cultural, family, historical, religious and societal influences) through which people perceive the nature of reality, human nature, the purpose of existence, the principles governing appropriate relationships [2].

Fountain S. considered the issue of peace education founded on Convention on Child's Rights and Jomtien World Declaration on Education for All [4], which followed the interlinks between peace education and other educational trends (education on Human rights, Education for Development, Gender Training, Global Education, Education on Life Skills, Changes Awareness and Psychosocial rehabilitation).

Works by Datzberger S., Dr of Amsterdam University are of scientific and practical interest. She carried out a number of field-based case studies in several countries which implemented the process of transformation from conflict to peace (Sierra-Leone, Uganda and Mexico) [3; 15]. Studies by Datzberger S. are aimed at processing whether peace education matches security conditions and conflicts or not; searching for the ways of addressing structural and non-direct forms of violence with the help of alternative and flexible educational trends; civilian society developing in these countries.

In their studies Greenberg M., Weissberg R., O'Brien M., Zins J., Fredericks L., Resnik H, & Elias M. deal with the overview of schools reformation models directed at achieving social, medical and academic results [5]. Scholars proved that educational policy promotes child's full development. Its realization is in vain without professional development and education improvement which should guarantee the efficient realization of educational programs.

Harber C., Emeritus Professor of International Education, School of Education, University of Birmingham, studied the phenomenon of peace education impact on individuals and society basing on the example of Southern Africa schools. He came to conclusion that peace education influences the community in different ways. It can benefit society, reviving it at its best, but in specific cases making it worse and harmful to people [6]. Harber S. made a substantial contribution to the study of existing alternative educational forms directed at democracy and peace development [7].

Hymel S., Darwich L. studied ethnic discriminatory at schools and impact of Social and Emotional Learning (SEL) within reconciliation context [9]. Scholars proved that SEL can be achieved with the help of different educational programs, interaction between a teacher and a student, mixed engagement in the process of tackling the problems of peaceful resolution of conflicts etc.

The studies and results of foreign scholars are of relevant use and value for Ukraine concerning the profound experience study in developing peace education, its spreading into security and peaceful processes in regions covered by the conflicts etc. The first steps in this direction were introduced by the UN Program on Restoring Peace and Development which has secured priority demands in the East of Ukraine since the start of military conflict in the spring of 2014. The Program is aimed at enhancing civilian security and social mobilizing, supporting economic recovery for those who suffered from community conflicts and realizing reforms aimed at central power decentralization and helath care reviving on the territories of Donetsk and Luhansk regions under the Ukrainian control. Ukrainian Peacebuilding School (UPS), represented by Association for Middle East Studies (AMES) and Maidan Monitoring Information Center, as well as Fund "Europe XXI" made the substantial contribution to promoting such outreach work (education). At the same time a set of challenges concerning implementation of peace education in Ukraine are remained uncovered.

The purpose of article

lies in critical analysis of the best foreign practices concerning peace education and defining own concept of civilian education system in our country based on peace-making and democratic contemporary trends.

Social and Emotional Learning while implementing peace education.

At present time the studies aimed at emphasizing advantages of Concept on Social and Emotional Learning (SEL) while implementing peace education are of actual importance. SEL is directed at providing students with academic knowledge, efficient socialization skills, emotional control, emotional interaction with other people, as well as developing skills concerning care about people, complicated problem-solving etc. We consider the teaching students social and emotional skills in secondary educational establishments and their further development in higher educational establishments of great importance nowadays. They promote positive children's and adolescents' development, increasing choices of pro-social and non-violent ways of fixing relationships with surrounding people (developing interpersonal skills). Hymel S., Darwich L., basing on the SEL Concept, explain the ways of its realizing with the help of different educational strategies, including programs, relations between a teacher and a student, co-education, approaches to discipline and peace conflict-solving. They claim that peace-building through promoting social and emotional development in education bears a great hope for future generations [9]. Complex knowledge and skills linked to the understanding of the processes concerning shaping senses of justice and affiliation in a human, team-work skills, interpersonal skills, as well as ability to study efficiently is of high value for the youth.

According to World Economic Forum (WEF) results [18], education innovations require developing in young people the skills which promote their efficient participation both in educational process and society in general. WEF experts named 16 most important skills in XXI century for students which are divided into three groups : fundamental knowledge (literacy), competences (skills), personal qualities. It should be mentioned that educational reform in Ukraine also considers SEL Concept and related methodology while shaping global vision of education in future.

The researchers group's conclusions are of great interest as well. [1]. They estimated the economic value of SE skills within benefits and expenses analysis. They claim that despite the existing of specific challenges the benefits from acquiring SE skills by young people outweigh the expenses on their developing.

Challenges of Implementing and Spreading Peace Education

There are specific challenges occurring while implementing peace education which should be outlined. It is clear that global mission of educational establishments is to teach young people to be healthy, socially responsible and careful citizens. This mission is supported by increasing number of educational programs on prevention and development of different age groups of the youth. Simultaneously, the impact of these programs is limited due to insufficient accordance with other components of educational processes and ignoring specific tools of realization as well as their impact factor. In American scholars' view [5], the wide implementation of programs aimed at peace education programs promotion require development of complex school reforms program directed at improving social, medical and academic results; educational policy which demands responsibility for promoting children's comprehensive development; professional advancement that prepares and supports teachers to realize the programs efficiently; constant monitoring and evaluation for the authorities of educational establishments. Within Ukrainian realities it is clear that above-mentioned scholars are cautious about this situation. If we consider peace education as itself, it is not the top priority in Ukrainian educational establishments, so it is not a component of national educational programs. In particular, it is hard to link peace education to other components of educational programs in secondary educational establishments. It is also the reason why realization of peace education is of no substantial impact factor during institutional auditing in educational establishments which, in its turn, does not motivate establishments authorities to implement peace education.

Moreover, educational establishments may experience the lack of time to implement peace education, as an efficient educational programs, particularly in secondary educational establishments, are overburdened which is explained by the fact that considerable part of educational tasks should be fulfilled at limited time period. Mapping the way to realize peace education in institutes of formal and non-formal education is also a specific challenge. We should mention that the majority of scholars consider the idea of peace education incompatible with existing system of formal education. For instance, the study of Harber C., Sakade N. [7] reveals the role of school education both in reconstruction and active violent behaviour. They make historic argument as for the case that school is established in a way to make the violence possible. We believe that in Ukrainian secondary educational establishments the contrasts and tension like those are also probable because of authoritarian approach in education which has not been eradicated yet.

Peace education conflicts with school spirit in terms of structure, customs and methods of studying. Occasionally, peace upbringing is regarded as a threat to existing school hierarchy. Some professionals (i.e. overwhelming majority of elderly teachers in Ukrainian secondary educational establishments) are really afraid of the situation when hesitations in authoritarian approach correctness can lead to anarchy, as reconciliation education motivates students to ask questions and come up with own ideas which is considered the threat to existing hierarchy.

It is clear that peace education will be successful in educational establishments which appreciate children's thoughts of themselves, one another, their peers, as well as at schools which pay specific attention to 'positive behavioural management' which helps students change their behaviour giving them positive stimuli instead of punishment, At the same time it should be emphasized that 'positive behavioural management' is absent in this country's educational management practice.

As for school education, the model existing in the world, beyond some exceptions, is of more authoritarian nature than democratic one. A vast majority of schools represent authoritarian institutions as of good nature and bearing useful educational aspects. According to Harber C. and Sakade N., "due to organization and contents of educational programs, school education has become one of the institutes of social control alongside with prisons, hospitals, factories which used constant supervision to discipline and punish, prevent social fragmentation and provide order and obedience" [7].

This problem is especially acute in developing countries. According to the UN estimates [6], the role of school education in supporting of explicit violence is widespread and takes various manifestations. The results of Global Education First Initiative which examined the health condition of school-age children in 16 developing countries show that a part of pupils who suffered rude verbal or physical

bulling at school within 30 days fluctuated from 30% to 65%. Besides, it revealed the following negative manifestations [11]:

- gender violence (girls who are a subject of sexual abuse and violence by male-classmates and male-teachers);
- racial and ethnical discrimination, hatred and tortures;
- use of corporal punishment;
- school education militarization.

Pope D.C. [12] emphasizes one more negative manifestation. It is physical, psychological stress and diseases caused by over-testing and over-examining of pupils (students) for the sake of the state. We are also cautious about this country's educational policy which provides mass introduction of State Certification of pupils of primary school, External Independent Evaluation of pupils in Grades 9 and 11, as well as Common Entrance Examination to enter the Magistrate and planned External Independent Evaluation on its graduation.

At the end of the 20th century the increase in social concern as for the harsh forms of violence such as genocide, ecocide, contemporary war, ethnic hatred, racism, sexual abuse and family violence was observed. The peace education studies have become actually important as a decent reply to these challenges. The study by Harris I.M. [8] is a good confirmation to the fact. He highlighted the peace education theory evolution from the sources of international community concerns like war danger to up-to-date theories based on decreasing the threats of interpersonal and ecological violence.

Peace education is implemented with the aim to provide opportunities for the skills, knowledge and values development which is necessary in conflict-solving practice, communication and cooperation on peacekeeping, war and conflict prevention and justice establishment. It can be realized in conflict, post-conflict and sustainable societies to acquire peace solution to the problems. According to UNICEF definition, "peace-building education is a process of investing knowledge, skills, views and values which are necessary for behaviour changes. It allows children, the youth and adults to prevent conflicts and violence both factual and structural; solve conflicts in a peace way; create conditions promoting peace at intrapersonal, interpersonal, intergroup levels, as well as at national and international levels" [8].

Professor Danesh H. [2], the founder of integrative theory of the world, claims that all human state of being statuses including peace are determined by our worldviews, our views of reality, human nature, aim of life and human relations. Danesh H. formulates four preconditions of efficient peace education: worldviews based on unity, healing culture, education culture and educational program aimed at peacekeeping.

According to Johnson D. W. and Johnson R. T. [10], to develop the viable peace through education we need:

- to shape the concept of national peace education which allows students from conflicting groups to communicate with one another and develop positive relations;
- to shape the sense of common fate which emphasizes common purposes, fair distribution of means to achieve goals and common identity;
- to teach student the procedure of constructive arguing, the skill of complicated decision-making and participate in political debates;
- to equip the students with the skills of integrating negotiating and interpersonal mediation, as well as skills of constructive mutual conflict-solving;
- to shape civilian values designed to be of benefit for the society.

While shaping the national concept of peace education we have to realize the distinguishing features between the education which is given in comparatively peace and stable conditions and education got in a period of violent conflicts and education, being both as a component of reviving after conflicts or political transition and as a part of a long-term process if peace and reconciliation.

As for the chances to implement peace education, we should mention the potential of informal education in Ukraine. The program of informal education ABEK in Karamoja (Uganda) is of great scientific and practical interest [3] which helped to overcome structural and non-direct forms of

violence at schools with the help of alternative and flexible forms of education. It is clear that Uganda by the education development index is of huge gap with Ukraine, though they have faced common challenges, in particular, economic inequality and uneven distribution of wealth, competitiveness for resources, land arguments, inefficient management, absence of truth in informational environment, corruption. The studies show the opportunities for informal education in the countries which suffered from conflicts which is of great value under the terms of lasting war conflict in the East of Ukraine. We should consider the experience of Uganda while implementing peace education in Ukraine to solve the following challenges:

- inequality (vertical and horizontal inequality in educational resources and results, redistribution in reforms or educational policy, particularly, the impact of decentralization in different communities and population groups);
- recognition and respect for multiculturalism (language policy, policy of cultural diversity and religious identity recognition, civilian education as a tool of state building);
- participation involvement (involving of local communities into educational policy and reforms shaping, efficient school management oriented at stakeholders' interests, support of main freedoms in education system);
- reconciliation, combating injustice and conflict consequences (preventing historical injustice, linked to the conflicts, vertical trust to schools and horizontal trust among the groups grounded on identity).

Regarding that experience, we should realize that to make the peace education measures in unstable environment sustainably influential on peace-building process in general they ought to work simultaneously in different sectors covering processes of social changes lying beyond the sphere of education. Their success depends on a set of political, historical, cultural and economic factors. Educational peace-building programming should consider history and reasons of a conflict, as well as cultural, historical, socio-economic and political context of the country or region. All stakeholders (state authorities, authorities of educational establishments, scholars, practical teachers, non-governmental and civilian organizations etc.) have to be a part of dialogue concerning peace education model adaptation and its limits.

In our view, while implementing peace education in Ukraine, first and foremost we have to draw attention to 'mission of a teacher' and 'mission of a lecturer'. The mission of a teacher in 21st century is to bring up a decent human enable to live and work efficiently in globalized world, as well as realize own creative abilities with respect to ideas, culture and traditions of own nation in full way". We should also mention that a mission of a teacher should have peacemaking and educational direction, since efficient peace education management is impossible without teachers' equipment with strategies, practices and methods to increase self-efficiency, impact on students' SE and other results, as well as creating of strong school communities.

Practical aspects of peace education implementation in Ukraine

Within the UN traditional four-vectored approach to the work on peace reconciliation (preventive diplomacy, peace-making, peacekeeping and peace-building) the role of communities, civic and international organizations is more and more recognizable. The structure of peacekeeping which matches the UN approach to the work on peace achievement comprises 9 models: 1) peacekeeping through diplomacy realized by the government activity with further distribution into other models; 2) peacekeeping through professional conflict problem-solving; 3) peacekeeping through commerce (business); 4) peacekeeping through personal engagement (privates); 5) peacekeeping through education (science and education); 6) peacekeeping through advocacy (activity); 7) peacekeeping through faith in actions (religion); 8) peacekeeping through resource supply (financing); 9) peacekeeping through informing (communication and media). All these models work in Ukraine. Though the support of civilian society and international organizations is of extreme tangibility at this stage. In this context we should highlight the Program on dialogue support which matches the UN Security Council Resolution 1325 "Women, peace, security" and aimed at the search for mutual understanding between Ukrainian and Russian leaders and world activists for peace. Furthermore, at state level we observe the constant support of decentralization and local management strengthening. This Government introduced National Plan of Actions "Women, peace, security" till 2020 [16]. One

of this plan main priorities is organization and introducing peace education of wide range of actions. It provides development and implementation of educational programs including distant courses or special courses and national and methodical materials on gender problems in education in emergencies and war conflicts into the system of staff training and improving qualification. Such education is directed at general population from civil servants, military men, volunteers, social workers, psychologists, lawyers, defendants, medical staff, educational establishment authorities, internally displaced persons to students of comprehensive schools and fosters of kindergartens. Enlightenment mission of peacekeeping educational programs lies in education on prevention and resistance to violence, gender aspects of forced relocation, and problems of disarmament, security, demobilization, reintegration and justice availability. Unlike the number of countries which implement peace education, Ukraine pays much attention to adults at present. The issues on applying positive actions in the activity of law enforcement bodies and Army, as well as preventing sexual abuse linked to the conflicts, establishing the set of measures to protect and rehabilitate women suffered from conflict and crisis situations, settling of conflicts, dialoguing, promoting good governance and capacity-building of communities which experienced the conflict are included into staff educational programs and improving qualification programs for servicemen and policemen.

The experience of Ukrainian social project based on peace-building "Community of the future" is of great practical interest for the counties suffering from war conflict. Ukrainian entrepreneur Satov O. is the creator and ideologist of the project. The purpose of the project is the realization of population's collective self-organization model, as well as shaping the community of people with active citizenship through common independent housing construction within one social settlement. The project is aimed at addressing human needs for creating and resettlement own housing space and self-realization. The participants of the project are low-income families, young couples, residents of dormitories, tenants of a dwelling, internally displaced persons, families of soldiers, war veterans and members of hostilities, underpaid families (there are more than 5 mln families of such kind in Ukraine). It is the project which has to become important ground for accumulating the best practices of peace education both for children and adults, adapted to Ukrainian realities [14].

As we mentioned above, authoritarian system of formal education is unable to develop critical thinking skills, objective perception of a problem and problem-solving skills in the youth. Among the consequences of authoritarian approaches in education there are low economic efficiency of the society and its technological backlog from developed world countries. Considering these challenges, participants of the project "Community of the future" formed a team of specialists-teachers, creators of innovative educational systems who believe that school teachers' slogan should be "a little bit ahead but always nearby". The project provides implementing of El'konin-Davydov's system in educational establishments of newly-formed communities. This system promotes the use of developing methodology grounded on the basis of modernized educational environment with loyal approach of teachers to students' studying process.

Danylo El'konin was a Soviet scientist, the author of theory of Child Studies, corresponding member of The Academy of Psychology. But the greatest El'konin's contribution to the world pedagogics is developing and implementing a new system of so called 'developing training'. The term 'developing training' was introduced by the scientist Vasyl' Davydov, a teacher, psychologist and vice-President of Academy of Pedagogical Sciences.

El'konin-Davydov's sytem is well known for more than 50 years. However, during the period of Soviet power, as well as within times of Ukrainian independence it was not recognized and even rejected by the official authorities. Neither Soviet Ukraine nor the USSR required critically thinking citizens. Young independent Ukraine has not been aware of this need for some time. The complexity of implementation of El'konin-Davydov's system lies in the fact that it is grounded on fundamental psychological and philosophical theories. Besides scientific research done by its founders, it is based on Hegel's dialectics, works by Vygorskyi L., Leontyev O. Gal'perin P. The system demands a whole new concept of educational preparation of a teacher who is able to shape national identity and citizenship in students, promotes personality's development and socialization, manners and attitudinal guidance, critical thinking and creativity, research and analytical skills as well as professional qualities. Ideologists provides for formation SE skills and peacebuilding upbringing in communities of future which should be integral part of both children's and adults' education.

At present the Project founders and the school of Boryspil district in Kyiv region, located nearby the settlement of the project concluded the agreement on cooperation. The plans are made to organize improvement qualification courses for the teachers with the involvement of the Department of Management of Borys Grinchenko Kyiv University, particularly, the authors of this article. Since 2019 the Department has been working closely on developing educational modules for the general secondary education staff focused on SE skills and peace education which are being tested in secondary educational establishments. These programs are based on the results of the Department's experimental work "Formation 21st century skills as a the basis for self-determination and self-realization of a personality" in Gymnasia №191 in Dniprovskiy district in Kyiv. In 2020 the Department of Management is going to start a new experiment on implementation of peace education skills in Lyceum-Boarding school №23 "Cadet corps" of Kyiv where the future servicemen study. The education in newly-formed communities will be free for the settlement inhabitants so it is planned to attract public funds as well as grants.

Social and psychological rehabilitation of the inhabitants of newly-formed settlement is one more important challenge for the project participants. It is explained by the fact that the project is mainly focused on internally displaced persons, veterans of Russian-Ukrainian war who are need for social and psychological assistance to restore psychic and physical power and integrate successfully into micro-society "Community of the Future".

Conclusion

Military events of 2013-2019 in Ukraine brought a lot of losses, including human cost. Along with this, they revealed new opportunities for the development of the country, civic society, generated inquiry for a new vector of social and cultural promotion which will guarantee peace and democracy. Peace education in conditions of military conflict in Ukraine has become of actual importance. At present it is considered an integral part of state-building processes grounded on humanization, social equality and justice.

Currently in Ukrainian society there is an objective need for social reboot, value integration inside the country as well as in the processes of restoration of the state's unity and achieving peace. In our view, social project "Community of the Future" in Ukraine is the first step towards practical implementation of peace education concept. The project promotes educational, cultural, social and professional realization of socially vulnerable groups of people, war veterans, members of hostilities as well as their families that had to leave their homes due to military events. The participants of the project will gain the chance to enter psychological rehabilitation in combination with reintegration into civilian life and restoring their social, economic and professional skills. The main social effect of the project is creation of new jobs and maintenance of the settlement with own social infrastructure, own energy resources and own production. Social project "Community of the Future" presents the opportunity for the war-affected and members of hostilities to return to peace life as well as the way of achieving the goals which were seen as a dream for the majority of them before military conflict.

References

1. Belfield, C., Bowden, A., Klapp, A., Levin, H., Shand, R. and Zander, S. (2015), 'The economic value of social and emotional learning,' *Journal of Benefit-Cost Analysis,* 6 (3), 508-544. DOI: 10.1017/bca.2015.55.
2. Danesh, H. (2006), 'Towards an integrative theory of peace education,' *Journal of Peace Education,* 3(1). 55-78. DOI: 10.1080/17400200500532151.
3. Datzberger, S. (2017), 'Peacebuilding through non-formal education programmes: a case study from Karamoja, Uganda,' *International Peacekeeping,* 24(2). 326-349. DOI: 10.1080/13533312.2016.1214073.
4. Fountain, S. (1999), 'Peace Education in UNICEF,' *New York: UNICEF*. [Online], [Retrieved January 22, 2020], http: https://www.unicef.org/lifeskills/files/PeaceEducationUNICEF.pdf. (Accessed 30.12.2019).
5. Greenberg, M. T., Weissberg, R. P., O'Brien, M. U., Zins, J. E., Fredericks, L., Resnik H. and Elias M. J. (2003), 'Enhancing school-based prevention and youth development through coordinated

social, emotional, and academic learning,' *American Psychologist,* 58(6-7). 466–474. DOI: 10.1037/0003-066X.58.6-7.466.
6. Harber, C. (2004), 'Schooling As Violence: How Schools Harm Pupils and Societies,' London: Routledge DOI: 10.4324/9780203488423.
7. Harber, C. and Sakade, N. (2009), 'Schooling for violence and peace: how does peace education differ from 'normal' schooling?' *Journal of Peace Education,* 6(2). 171-187. DOI: 10.1080/17400200903086599.
8. Harris, I. M. (2004), 'Peace education theory,' *Journal of Peace Education*, 1(1). 5-20. DOI: 10.1080/1740020032000178276.
9. Hymel, S. and Darwich, L. (2018) 'Building peace through education,' *Journal of Peace Education,* 15(3). 345-357. DOI: 10.1080/17400201.2018.1535475
10. Johnson, D. W. and Johnson, R. T. (2005), 'Essential Components of Peace Education,' *Theory Into Practice*, 44(4). 280-292. DOI: 10.1207/s15430421tip4404_2
11. Pinheiro, P. (2006), World Report on Violence Against Children, Geneva: United Nations [Online], [Retrieved January 22, 2020], https://www.unicef.org/violencestudy/I.%20World%20Report%20on%20Violence%20against%20Children.pdf) (Accessed 30.12.2019).
12. Pope, D.C. (2001), Doing School: How We Are Creating a Generation of Stressed Out, Materialistic and Miseducated Students. New Haven: Yale University Press.
13. PU (2019), The speech of the President of Ukraine at the UN General Assembly debates 'Situation on timely occupied territories of Ukraine", February, 20, 2019. [Online], [Retrieved January 22, 2020], https://www.president.gov.ua/news/vistup-prezidenta-ukrayini-na-debatah-generalnoyi-asambleyi-53282. (Accessed 30.12.2019) [in Ukrainian]
14. Satov, O., Pavliuk, V. & Akilina, O. (2019), '*Sustainable development of regions: Creation of a future settlement by means of unification of territorial communities and implementation of innovative initiatives by agents of change,'* Proceedings of the 34th International Business Information Management Association (IBIMA), ISBN: 978-0-9998551-4-0, 13-14 November 2019, Madrid, Spain. [Online], [Retrieved January 22, 2020], https://ibima.org/accepted-paper/sustainable-development-of-regions-creation-of-future-housing-by-means-of-territorial-community-association-and-implementation-of-innovative-initiatives-with-agentsof-change/ (Accessed 30.12.2019).
15. Tromp R. E. and Datzberger S. (2019), 'Global Education Policies versus local realities. Insights from Uganda and Mexico, Compare,' *A Journal of Comparative and International Education*. DOI: 10.1080/03057925.2019.1616163
16. UKM (2018), The National Plan of the actions on implementing the UN Security Council Resolution "Women, peace, security" is actualized. [Online], [Retrieved January 22, 2020], https://www.kmu.gov.ua/news/aktualizovano-nacionalnij-plan-dij-z-vikonannya-rezolyuciyi-radi-bezpeki-oon-zhinki-mir-bezpeka (Accessed 30.12.2019) [in Ukrainian].
17. UNESCO (2020), Global Education First Initiative. [Online], [Retrieved January 22, 2020] http://www.unesco.org/new/en/gefi/home/ (Accessed 30.12.2019).
18. WEF (2016), New Vision for Education: Fostering Social and Emotional Learning Through Technology [Online], [Retrieved January 22, 2020], http://www3.weforum.org/docs/WEF_New_Vision_for_Education.pdf (Accessed 30.12.2019).
19. Williams J. H. and Cummings W. C. (2015), 'Education from the Bottom Up: UNICEF's Education Programme in Somalia,' International Peacekeeping. 22(4). 419-434. DOI: 10.1080/13533312.2015.1059284

Classification of Post-Soviet Countries by The Level of Socio-Economic Development

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Abstract

The process of transition of 15 post-Soviet republics from the centrally-controlled economy to a market economy was accompanied by fundamental changes in their political, economic and social life. As a result of cluster analysis of 15 post-Soviet countries, 3 groups were defined, and during the last three periods the proportion and filling of groups is the same, which indicates stabilization of the cluster. Those post-Soviet countries that had strong natural and human capital in the beginning of the transition, have achieved significant success and integrated into the global economy. The Baltics also stand out: these countries have joined the European Union and significantly improved their macroeconomic indicators.

Keywords: Post-Soviet Countries, Classification, Cluster Analysis.

Introduction

It has been almost 29 years since the dissolution of the Soviet Union. Fifteen republics of the ex-USSR have initiated their own development. According to Firsova et al (2014), this led to emergence of a new transition process that has never existed before in the world practice - the transition from the centrally-controlled economy to the market economy. Moreover, with the dissolution of the USSR new states have undergone three stages of transformation from regional economy to the national economy of their own state. Akayev (2016) revealed that the first stage is the ideological transformation, the second - economic transformation, and the third stage is institutional.

At that, all post-Soviet countries had history of a unified Soviet approach to the economic management, such as centrally planned organization and financing, subordination to several sector ministries, etc. Despite these common features, differences in socio-economic development between ex-USSR republics were quite significant.

Difficulties that accompanied the transition from the centrally-controlled system of economic management to the market system, were approached differently by the governments of post-Soviet countries. Some stayed the course of the shocking therapy, while others implemented the gradualist policy. In their researches, Sunday, Babatunde (2018), Sawhney and Kiran (2019) mention that transition to the market has significantly affected the relationship between ex-republics of the USSR, which resulted in formation of communities and commonwealths (CIS, EEU, SCO, BRICS). A number of countries have changed their preferences from Russia to the EU countries and USA. Therefore, classification of the group of post-Soviet countries during dissolution of the Soviet Union (1991), post-crisis years (1999 and 2009), and the reporting period (2015, 2017) is considered relevant. This approach allows to assess changes in differentiation of post-Soviet countries under the influence of transformational shifts.

In this research, post-Soviet countries should be understood as a group of 15 countries, that were a part of the USSR.

On the one hand, the considered group of countries is characterized by common roots (ties of history, language, ethnic culture, confession, etc.), and on the other hand - by inconsistency in development after dissolution of the Soviet Union in 1991. This is the reason for increased interest on the part of Russian scientists pursuing this issue, such as Avdeeva (2014), Vardomskiy (2012), Petrov (2012), Tekueva et al (2016).

Considering the submitted materials from a perspective of the group of post-Soviet countries, the following papers, containing the authorial vision for the amount and members of the group of post-Soviet countries, should be mentioned.

In her research, Avdeeva (2014) studies the state of economies of post-Soviet countries as of 2013, groups the CIS countries 'in accordance with the state and budget revenue sources'. In this, three groups are identified:

The first group includes countries exporting energy carriers: Russia, Kazakhstan, Azerbaijan, the budget of these countries is filling through the hydrocarbon export;

The second group consists of countries exporting labor: Armenia, Moldova, Kirgizstan, Tajikistan, budgets are mostly funded through flow of funds from migrant workers;

The third group includes countries with export diversification, such as: Belarus, Uzbekistan, Ukraine, where along with commodities export there is a large proportion of highly processed products.

The multi-author monograph 'Social and economic development of the Post-Soviet countries: twentieth anniversary results' guided by L. Vardomskyi is the most detailed scientific work dedicated to post-Soviet countries. In particular, a socio-economic survey of each of 15 USSR republics is conducted, heritage of the Soviet Union and its impact on trajectories of counties during the transformation period are analyzed. Development of the classification of member countries of the Soviet Union during its dissolution is to the credit of the teams of authors. The authors specify three groups of countries: 1 - the Baltics (Latvia, Lithuania, Estonia); 2 - Neighbors of EU and Russia (Moldova, Belarus, Ukraine); 3 - Caucasus (Azerbaijan, Georgia, Armenia); 4 - Central Asian 'mosaics' (Kazakhstan, Kirgizstan, Tajikistan, Turkmenistan, Uzbekistan).

Considering socio-economic development of post-Soviet countries, Petrov (2012) specifies four groups of countries and one 'overshoot'. According to the territorial belonging, the countries are grouped as follows:

The first group is represented by Eastern European countries (Ukraine, Belarus and Moldova). Their location between Europe and Russia imposes certain limitations to their economic and social sovereignty.

The second group includes Central Asian countries (Kazakhstan, Kirgizia, Tajikistan, Uzbekistan, Turkmenistan). The political elite of these countries faces certain problems, each of which can threaten the existence of any of them. The region is influenced by Islamic culture and economic pressure from China.

The third group consists of Transcaucasian countries (Armenia, Azerbaijan and Georgia). Area of political instability. USA and Russia have maximum impact on these countries' policies.

The fourth group includes the Baltics (Latvia, Lithuania and Estonia). The economy of these countries is greatly influenced by their integration into the European Union.

Russia is an 'overshoot' - this country is seen as a separate group due to its leading role in the region.

The shortcoming of selected groups lies in the approach to categorization and grouping of post-Soviet countries, because scientists do not use any formalized methods, which does not devoid the results of subjectivism. It seems necessary to implement statistical tools such as table and graphic methods, grouping method, cluster analysis, and general scientific methods (analysis, synthesis).

Methods of Research

Objects grouping is one of the ways of studying the structure of cluster at a single point in time. It should be noted that post-Soviet countries are in a turbulent state and their positions always change with respect to each other. The possible solution to this situation is grouping in reference periods, such as 1991 (dissolution of the Soviet Union), 1999 (impact of the 1998 crisis), 2009 (impact of the 2008 crisis), 2015 (impact of the 2014 crisis), and 2017 (relevant data is currently available), which would help to establish the amount of change in the relationship between countries.

In most of researches groups of post-Soviet countries are specified In accordance with one of the indicators, and it is usually a qualitative one. However, their socio-economic development can be characterized by not only one indicator, but a set of them.

Therefore, to construct a classification it is more appropriate to use statistical methods of polythetic classification, which main feature is that all available attributes are used when forming a group.

The set of subjects of post-Soviet countries forms an attribute space. If the federal subject is characterized by m attributes, then it is considered as a point in the m-dimensional attribute space. The solution is to identify the points close to each other in this attribute space. This multidimensional grouping is solved by means of cluster analysis, when the entire set of objects is divided into homogeneous groups (clusters). Those post-Soviet countries that belong to the same cluster should be similar to each other, and the degree of similarity between them within each cluster should be higher than between the subjects of the Russian Federation included in other clusters.

At present, statistics has a significant range of clustering algorithms. Most often, researchers use hierarchical algorithms, among which the Ward method is the most common. According to Mooi and Sarstedt (2001), this method involves using dispersion analysis procedures to estimate distances between clusters. With this, as noted in the research by Nosov, Tcypin, Abdulragimov, Mahanova and Zhenzhebir (2019), at each step of clustering, elements leading to the smallest increase in intracluster dispersion, will be combined into one cluster. Therefore, the smallest clusters are gradually merging into larger ones.

Research Results and Discussion

The easiest way of grouping post-Soviet countries in accordance with their economy development levels, is the GDP grouping, as this indicator is calculated on the common methodological basis, which means that it is comparable in space. Figure 1 and figure 2 present positions of post-Soviet

countries in two-dimensional space in accordance with data obtained from the UN Statistics Division and the World Bank.

According to information presented in the figure 1, transformation processes have negatively affected the economic efficiency of the country: none of 15 ex-republics of the Soviet Union were able to keep the economy from sinking, therefore, the whole cluster has a rate of decline.

Looking at the GDP per capita value, it can be seen that Russia, the Baltics and three large republics (Kazakhstan, Ukraine and Belarus) had high figures. The value for other countries was varying around 750 USD.

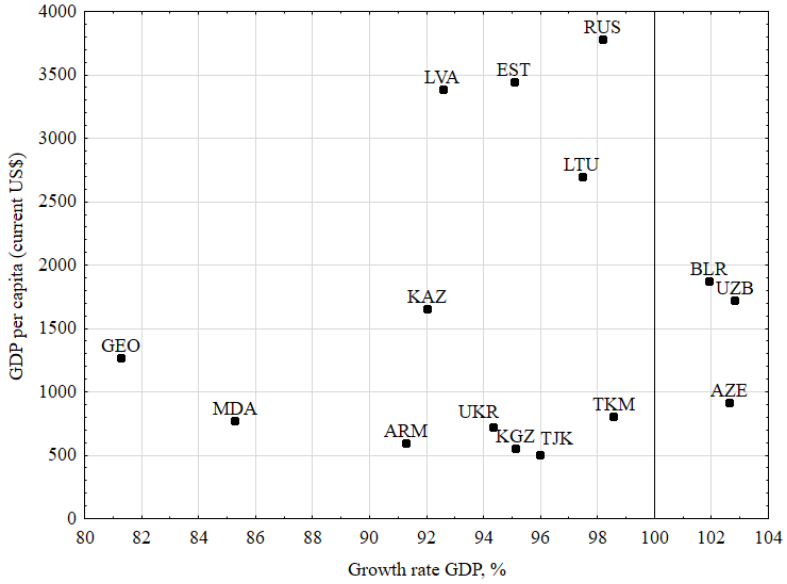

Fig. 1: Distribution of post-Soviet countries by GDP per capita and GDP growth rate in 1991. Drafted by authors using the service 'A world of information un data'

To assess the impact of transformation processes on the economies of considered countries, it is proposed to look at the figure 2, that contains data for 2017.

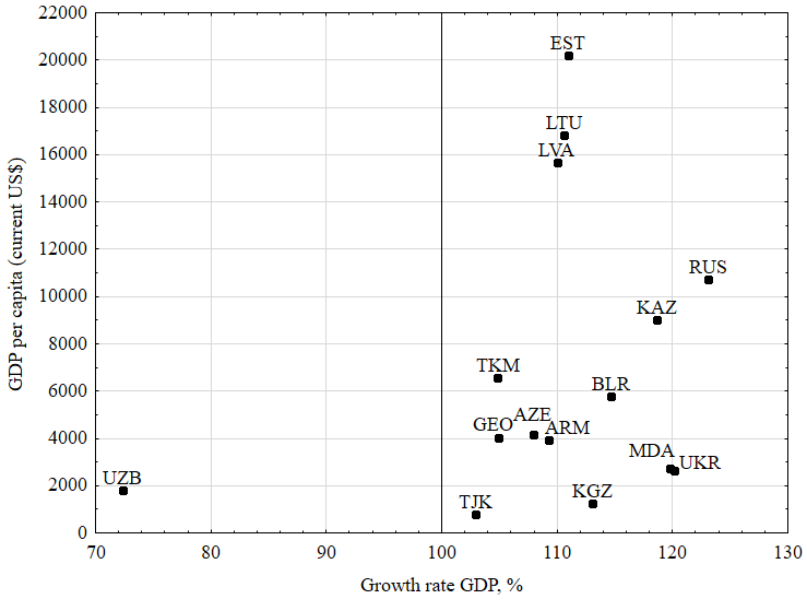

Fig. 2: Distribution of post-Soviet countries by GDP per capita and GDP growth rate in 2017. Drafted by authors based on the research by Benešová, Smutka and Laputková (2019).

According to information presented in figure 2, high GDP per capita values in the Baltics (EST, LTU, LVA) are worth pointing out. In regard to such success, it should be noted that outcomes of the 25-year development of independent Latvia, Lithuania and Estonia are mixed. Technically, they carried out successful political and socio-economic transformations, which have made it possible to achieve the needed macroeconomic indicators and join the EU and NATO in a short time. On the other hand, by joining these unions, they themselves have transferred a significant part of sovereignty they have been working so actively towards, to the supranational level. Being subsidized Soviet Union republics, they are now subsidized by Brussels.

However, it is not entirely correct to judge positions of post-Soviet countries based on only two indicators, which means that there is a need to use a set of characteristics of objects. For these purposes, a multidimensional pooling is most suited, and cluster analysis appears to be one of its forms.

It is proposed to use socio-economic indicators provided by the World Bank and the UN Statistical Division as indicators in the cluster analysis: X1 - GDP per capita, USD per person; X2 - share of industry (sections C-E) in GDP, %; X3 - share of agriculture (sections A-B) in GDP, %; X4 - labor coefficient, %; X5 - the unemployment rate, %; X6 - share of export in GDP, %; X7 - gross fixed capital formation, USD per worker.

Information processing in the STATISTICA package results in the dendrogram presented in the figure 3.

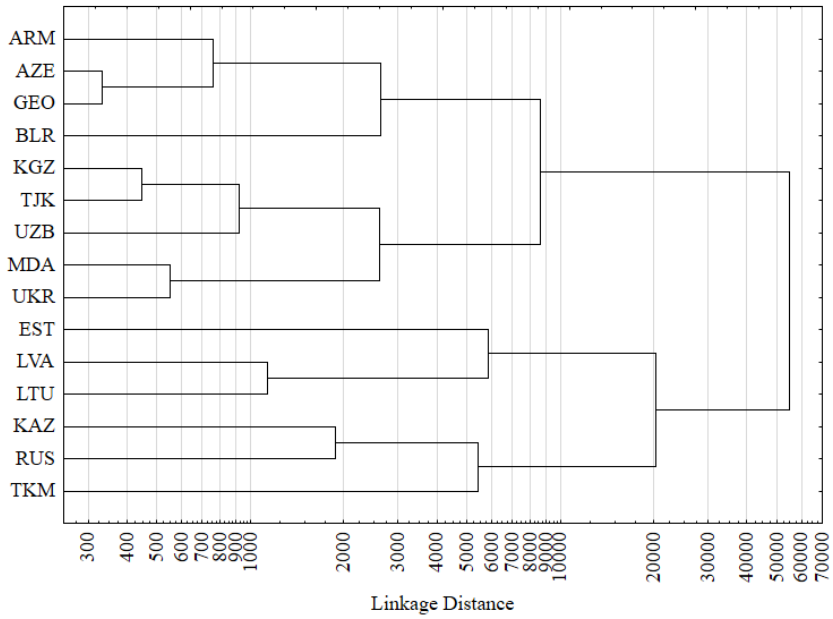

Fig. 3: Tree diagram of groups of post-Soviet countries in 2017

In their research, Benešová, I., Smutka, L. and Laputková, A. (2019) highlight that there are three groups in 2017. The first one includes Russia, Kazakhstan and Turkmenistan, which were characterized by average GDP per capita values, high share of industry and low share of agriculture. The second group has low values of the X1 indicator and average shares of industry and agriculture. The third group only consists of Estonia, Latvia and Lithuania, these countries have the highest GDP per capita values, low share of agriculture and the highest share of export in GDP.

Similar calculation conducted for the rest of reference points have provided the following results presented in the table 1.

Table 1: content of groups of post-Soviet countries in accordance with the results of the cluster analysis

Group	1991	1999	2009	2015	2017
1	RUS, LTU, LVA, EST	RUS, BLR, KAZ, TKM	RUS, BLR, KAZ, TKM	RUS, BLR, KAZ, AZE, TKM	RUS, TKM, KAZ
2	UKR, BLR, KAZ, GEO	UKR, UZB, GEO, AZE, MDA, KGZ, TJK, ARM	UKR, UZB, GEO, AZE, MDA, KGZ, TJK, ARM	UKR, UZB, GEO, MDA, KGZ, TJK, ARM	UKR, UZB, GEO, MDA, KGZ, TJK, ARM, AZE, BLR
3	UZB, AZE, MDA, KGZ, TJK, ARM, TKM	LTU, LVA, EST	LTU, LVA, EST	LTU, LVA, EST	LTU, LVA, EST

Drafted by authors in the STATISTICA package

It can be seen that the content of 1991 groups is completely different from the groups in subsequent periods. In all times Russia is included in the first group, but the content is different: whereas in the first year of transition to the market economy this group included the Baltics, further these countries were in a separate group. In the late 1990-s large countries which are now among the EEU members,

started to consolidate around Russia. It can be concluded that integration of the Baltics into the European Union had a great impact on them, which resulted in them moving apart from Russia.

Comparative characteristics of existing groups and the one obtained as a result of research, is presented in the table 2.

Table 2: comparison of the results with other studies

Group	Results of 2017 grouping	Avdeeva, Varapaeva (2014)	Vardomskyi et al (2012)	Petrov (2012)
1	RUS, TKM, KAZ	RUS, KAZ, AZE	LTU, LVA, EST	UKR, BLR, MDA
2	UKR, UZB, GEO, MDA, KGZ, TJK, ARM, AZE, BLR	ARM, MDA, KGZ, TJK	RUS, MDA, BLR, UKR	KAZ, KGZ, TJK, UZB, TKM
3	LTU, LVA, EST	BLR, UKR, UZB	AZE, GEO, ARM	ARM, AZE, GEO
4	-	-	KAZ, KGZ, TJK, TKM, UZB	LTU, LVA, EST
5	-	-	-	RUS

Drafted by authors using data regarding the CIS countries.

According to the data presented in the table 2, different grouping characteristics (and approaches), lying in the foundation of the grouping result in different contents of these groups. The only group that is similar in 3 out of 4 variants, is the one that includes the Baltics. Evidently, these republics differ so much from the rest 11 post-Soviet countries that they identify uniquely.

Conclusions

Obtained results show stabilization of the structure of post-Soviet countries. The conducted cluster procedure has resulted in three groups selected from the analyzed pooling of post-Soviet countries. The first cluster includes large post-Soviet countries led by Russia. All these countries have a common denominator such as natural capital and labor force.

The second group consists of countries that have changed their polarity, which means that they share political views with western countries and keep 'moving apart' from Russia in their development process (Ukraine, Armenia, Georgia).

The third group includes the Baltics, which are characterized by the most rapid pace of movement towards the market system, which can be due to a number of factors: the existence of fundamentals of market economy before the establishment of the centrally-controlled system, close economics and historical ties with the Western Europe, relatively balanced structure if the national economy or small disparities, consensus of all social groups on the necessity of transition to the market system.

References

- Firsova, A., Balash, O. and Nosov, V. (2014), 'Sustainability of Economic System in the Chaos,' *Springer Proceedings in Complexity*, 299-304.
- Akayev, A., Ichkitidze, Yu., Sarygulov, A. and Sokolov, V. (2016), 'The post-socialist transformation of central and eastern european countries at the turn of the century: Regional development and economic inequality,' *Economy of Region*, 2 (3), 613-626.

- Sunday, O. and Babatunde, A. (2018), 'Stock market development and economic growth of Brazil, Russia, India, China and South African (BRICS) Nations: An empirical research,' *Accounting*, 4, 83-92.
- Sawhney, U. and Kiran, T. (2019), 'Bilateral Trade Among Brazil, Russia, India, China and South Africa Economies: An Empirical Analysis,' *Millennial Asia*, 10 (2), 204-228.
- Avdeeva, E. and Varapaeva, V. (2014), 'Russia and countries of the former Soviet Union: a condition of economies and the foreign trade communications in 2013,' *Bulletin of the Volga Region Institute of Administration*, 6 (45), 24–33.
- Vardomskiy, L., et al. (2012) Social and economic development of the Post-Soviet countries: twentieth anniversary results, Institute of Economics RAS Publ., Moscow.
- Petrov, A. (2012) Countries of the former Soviet Union, Irkutsk State University Publ., Irkutsk.
- Tekueva, M., Burkov, A., Nosov, V., Novoselova, S. and Nayanov, A. (2016), 'Agriculture and Agribusiness: Clustering Issues,' *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, 7 (6), 1634–1638.
- Mooi, E. and Sarstedt, M. (2011) A concise guide to market research: The process, data, and methods using IBM SPSS Statistics, Springer, New York.
- Nosov, V., Tcypin, A.,Abdulragimov, I., Mahanova, T., Zhenzhebir, V. (2019), 'Classification of Subjects of the Russian Federation by the Level of Socio-Economic Development' Proceedings of the 34th International Business Information Management Association (IBIMA), ISBN: 978-0-9998551-3-3, 13-14 November 2019, Madrid, Spain, 1922-1929.
- World Bank Open Data. [Online], [Retrieved January 12, 2020], https://data.worldbank.org.
- A world of information un data. [Online], [Retrieved January 12, 2020], https://data.worldbank.org.
- Benešová, I., Smutka, L. and Laputková, A. (2019), 'Specifics of the mutual trade of the post-Soviet countries,' *Entrepreneurial Business and Economics Review*, 7 (1), 29-43.

Application of The Cognitive Linguistics Methodology in The Process of Identifying the Linguistic Potential of The Child

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Abstract

The aim of the article is to present an innovative approach using the methodology of cognitive linguistics to describe the image of children's linguistic capabilities as a social group and the child as a subject with the right to be an individuality. The text refers to fundamental concepts of cognitivism: conceptualization, profiling, usage-based model, prototype, family resemblances, experimental Gestalt, Idealized Cognitive Models (ICM), fuzzy sets, metaphors, etc. The description of the cognitive linguistics-based methodology of research on children's language is so detailed that it will allow educators to use this form of viewing the child's linguistic competence in everyday pedagogical practice, in activities focused on researching, diagnosing, designing and planning of activities supporting and assisting the child in a harmonious, holistic development. According to the methodology of qualitative research, it is the child speaking language who is the subject of the research, and not – as it is traditionally expressed in quantitative methodologies – the language of the child which is the object of the research. The approach built on the dialogue, in which the potential for positive synergy lies, is guided by an anthropocentric philosophy, and the research strategy presented here leads to a positive picture of a child's linguistic competence, taking into account both those aspects that place the child's vocabulary and grammatical forms in the group of those language users who communicate without disruption and without cognitive effort, as well as revealing the individual character of the linguistic realizations, resulting from various reasons: the child's creativity, disorders, e.g. in Asperger syndrome, or a socioconstructive pattern based on a limited code. The author also signaled wider possibilities of implementing this strategy, e.g. in learning a foreign language, to study the understanding of abstract or literary texts, especially poetry.

Keywords: the child's linguistic competence, conceptualization, family resemblances, usage-based model, Idealized Cognitive Models

Introduction

The use of all kinds of tests to diagnose linguistic competence is becoming almost standard in countries of Western civilization. These procedures are being applied to younger and younger children, e.g. in Poland the following tests are gaining popularity: TUNSS – Ability test at school start, TRJ – Language Development Test, OBUT – The Polish National Third Grade Skills Survey. However, the constructivist approach leads to the search for such methods of research and diagnosis that would have an inscribed individualization and subjectivity of the child as a Person, and would depart from the primitive differential evaluation that Niemierko (1975) characterized already half a century ago, and to which Niemierko (1999) continues to refer, stressing its strength inherent in teaching habits. Drawing on models from the world of medicine, educators are constantly raising the need for such observation of the child and such a diagnosis of child's linguistic competence that would illustrate progression or regression, and even herald the stagnation in the child's both lexical and grammatical acquisition. Such research is assumed to be of a longitudinal nature and requires systematic monitoring of the speech, or rather the language of a particular child in general, so that all references, including any implied comparisons, can be made within the material collected only from that research subject. It seems that this type of research approach is both laborious and incomplete, since it does not allow to make deductions regarding the language development process as a result of

socioconstructive or even connective interactions, as Bednarkowa (2009, 2012) pointed out, focusing only on the conceptual structure of the subject.

The aim of this article is to present a picture of linguistic capabilities of the children as a social group and the child as the subject with its right to be an individuality, an innovative approach using a boldly developing methodology of cognitive linguistics. Definitions of fundamental notions of cognitivism, used to describe abstracts – an untouchable, unspecific and difficult to imagine layer of language, especially the conceptualization of feelings can be found in Bartmiński (1988), Nowakowska-Kempna (1995) or Bednarkowa (2005, 2009). The conclusions that have been drawn from the results of the signaling research on the language of children in primary education carried out by Bednarkowa (2010a, 2011a) or their confirmation by Bednarkowa (2010b, 2011b) after the research of older youth give grounds to describe the methodology of research on children's language – based on the methodology of cognitive linguistics and reaching for such concepts as profiling, prototype, family resemblance – which in my opinion could and should be successfully used in pedagogical activities: research, diagnosis, design and planning of activities supporting and assisting the child in their harmonious, holistic development.

In pedagogics, situated the field of social sciences yet still associated with the humanities, there is an increasing departure from unprofessional research using quantitative methodology, and qualitative research is undertaken in which the child and not the child's language – according to the methodology of qualitative research – **is the subject of research and not the object**. It is the child who, due to their phenomenological subjectivity, requires researchers to reflect on the ethics of behavior. Even when the subject of such research is the child's behavior / feelings / attitudes / competences, the researchers give attention to the child, turn to the child, collect data / information / opinions about the child, talk to the child, observe the child, etc.

Micro-scale research (deepened, multi-instrumental, using triangulation in various ways – consisting in a thorough examination of a fragment of reality, focusing on in-depth case studies, also using changing research perspectives) is becoming desirable, and probably even popular. And it is precisely such a pedagogical practice that can be aided by this part of the cognitive linguistics methodology which in my opinion is worth implementing to pedagogical research because in pedagogy the entirety of research activities both is based on language, directly subjecting it to the view, and in the equal amount uses language, e.g. as a communicative medium, and thus reaches for language directly and indirectly.

The Text Itself – The Marriage of Pedagogy with Cognitivism and the Study of the Child's Language

Cognitivism is characterized by interdisciplinarity, therefore the cognitive study of the language people speak and which puts them at the top of the ladder of biological organisms requires an openness to other disciplines of science in order to draw from them knowledge that helps to describe the grammar of language.

Cognitive linguists use among others, the results of the research in general psychology and social psychology, neurology, philosophy and religion, as well as sociology, ethnology, anthropology and pedagogy, which, in order to improve the quality of its work, also merges with various fields of science. It is enough to mention the emergence of neurodidactics in pedagogy, or educational linguistics, which, although it was separated as a science by Rittel (1994) within the framework of applied linguistics, is also successfully used by teachers and educators. Educational linguistics, facing the requirements of building a coherent theory and own language – by its very nature language (meta-language) of linguistics, shaped today on the road from structuralism to cognitivism, allows to combine educational discourse with the simultaneous accommodation of specific meanings, definitions and terms of various fields in an appropriate way used in linguistics.

Lakoff, Johnson (1988) in the spirit of cognitivism rejected the thesis that all language users have the same language units in their grammar and the same meaning for a given word. It was also confirmed

on multiple occasions by Langacker (1995), what opened the way to learn / study the linguistic competence of a child or a person of any other age, to learn / study the overall extra-linguistic and linguistic knowledge of language users, combining the rules of semantics, pragmatics and grammar.

As a basic methodological principle, cognitivism accepts holistic gestaltism, in which semantic representation (RS) extends the characteristics of meaning to essential characteristics, i.e. considered representative, perceivable, typical, and characterized by cognitive obviousness, without necessity of cognitive **efforts**. Rosch (1978) was the first to see this, while Bartmiński (1988) was the first to present it in Poland.

The idea of Zadeh (1976) to move away from the sharp, clearly defined boundaries between categories/collections, caused by the influence of significant discoveries in the field of molecular physics, has given rise to changes in the categorization process by indicating the importance of the **theories of prototype, family resemblances, fuzzy sets** and **cognitive schemas**. The processes of the human mind consisting in combining isolated objects into classes, sets, i.e. categories, using fuzzy set theory and a natural biological principle, as pointed out by Lakoff (1986) and using various parameters that are difficult to determine unequivocally, are subject to significant differentiation in relation to activities carried out on multitude sets, which, for example, are not capable of creating synergies. The cognitivists' finding of a different type of logic than the set theory, such that would allow for the interpretation of linguistic phenomena, led to the abandonment of the collection of members/representatives within the category on the basis of having the necessary and sufficient characteristics required so far. The solution was brought by game theory of Wittgenstein (1972), which showed that there are representations of one category, seemingly without any common features, but whose individual copies have something in common, which was called family resemblances after Wittgenstein, and what was adopted by Rosch (1973) and Kleiber (1990) and in Poland by Kurcz (1992). In my opinion, this discovery cannot be overestimated when looking at it from the perspective of pedagogics and in relation to the analysis of the results of pedagogical research on the child – its intellectual (mental) as well as physical potential, e.g. in the assessment of the latter, doctors have been using percentile scales for a long time, which seems to be a step towards cognitive methodology. In order to prove this theory right, it is also worthwhile to recall situations where strangers find similarities between adopted children and adoptive parents.

In the mind of a human being, so also of a child, in their consciousness, and often beyond it, the contact with reality, with the world, results in the possibility of a faithful copy of the impression (totally adequate to perception) or only a signal of things. This is because the human perception uses above all the human ability to think with symbols. Perception is not a passive, photographic representation of reality, but an active process of cognition and shaping relations of appropriateness, as Langacker (1995) pointed out in his lectures. Since the dawn of time, the man has been "recording" his experiences by using a system of signs, especially language signs. Using expressions, the man names concrete things (objects) as well as abstract things (relations, features, feelings, literary creations, etc.). If we pay attention to the nature of the meanings of abstract words, it is impossible to analyze them in isolation from the meanings of concrete words, which is particularly evident in relation to children's language, therefore cognitivists speak of the embodiment of thought.

Children, reflecting on the attributes of humanity, on the meaning of life, give voice to their emotions, feelings and imagination, which enables and helps to develop creative attitudes, model their dreams. The study of feelings / relationships / understanding becomes interesting not only for philologists or linguists, but also for educators and other representatives of social sciences. As a result of such reflections on the language of a particular group of people, images of captured knowledge about..., lingualized definition of the term... These images can be presented in a comprehensive linguistic portrait as pointed out by Apresjan (1993). The application of cognitive semantics to linguistic analysis allows to expose the essential features of the subject (notion) given by children, because for cognitive grammar it is possible to study and thoroughly analyze the structure of the notion/feeling, which is given by the image of its understanding by children in language. Cognitivism helps to bring the concept closer to understanding. The understanding is possible thanks to the functioning in the research paradigm of cognitivism of such assumptions as the thesis regarding:

- **inductive** way of the research procedure,
- a drawing of a **prototype**,
- a description of **individual experiences**.

The human being understands what they can call, what they have experienced directly, or what they have been communicated to them within a cultural community. In cognitive science, the term **conceptualization**, introduced by R. W. Langacker, is used to name the term understanding, which means a cognitive way of determining meaning. Langacker puts the mark of equality between conceptualization and meaning. Nowakowska-Kempna (1995) believes that "conceptualization can be called such a way of inductive conduct, based on a logical cause, on which due to a presumed cause it is concluded from a visible effect and is based on the direct analysis of given contexts, the construction of metaphors and/or metonymies and other ways of imaging that make it possible to detect the meaning of a word".

From the pedagogue's point of view, it seems interesting that the characteristics of the ideal may appear – characteristics that are also important for individual experience. Cognitive semantics meets the axiological aspects in the process of developing consciousness, attitudes, general human behavior towards another person by exposing these contents in the sense of the concept, and the analysis of individual multiplications of the use of language allows to observe a tendency to categorize according to certain rules: a prototype in the center of the category and the members joined to it by family resemblances.

When psychologists found that concepts relating to natural categories, such as animals, plants, everyday objects made by man, created in the human mind based on family probability, the problem of a specific mental representation – a prototype – emerged. It was in the **gestalt of experience**, a multidimensional whole with a specific structure that contains the features of a prototype case, that G. Lakoff and M. Johnson (1988) saw the key to understanding the coherence of human experience.

The Gestalt has two structures of organization: vertical (phonological – syntactic – semantic), the study of which is mainly dealt with by linguists, as well as horizontal – prototype (scalar), which allows to separate nuclei (central units) and individual (peripheral) experiences. The study of the latter structure – horizontal and spatial – is worthwhile for the interest of educators who, thanks to their humanistic approach, seem to be predestined to apply in their pedagogical research a cognitive methodology, using, among other things, the notion of **graduality** – membership based on gradual affiliation – allowing to respect the individuality and, sometimes, specific behaviors of children. However, in order to talk about graduality, clusters, scalability, one must start from identifying and describing the central unit – the nucleus, or the **prototype**.

The prototype – the most representative, typical, important and conventional representative of a category whose members are combined by the characteristics of family similarity with the prototype itself and with each other. This is what we perceive during the process of classification, when usually not individual objects, but a representative of the object class, who is a model representative for us, is recalled in the mind without the slightest cognitive effort, e.g. for a keyword: "an animal" – a response is: "a dog."

Rosch (1978) says about the **prototype**: "by **prototypes** of categories we have generally meant the clearest cases of category membership defined operationally by people's judgements of goodness of membership in the category". It also indicates the whole diapason of characteristics essential for a given category and, at the same time, **by standing in the center of the category, it allows for analyzing the place occupied by individual representatives in the category**. Adopting such a position in the analysis and interpretation of research results is by all means worth popularizing, as it allows us to see both what is important in children's statements/behavior from the point of view of the child itself and from the perspective of the entire cultural community.

For cognitivists, the **prototype** is a concept that has grown from **experience**. So, if you assume that the category membership is graded, it means that the members of the category can be said to be more or less similar to the prototype, meaning their best representative. The category is therefore described by the characteristics of the best representative of the category. It should also be stressed that the term "prototype" – apart from referring to the semantic component of "pattern" – has little in common in Polish with a technical prototype (e.g. a prototype car means the first signaling copy). Therefore, it should be introduced as *ex definitione*. Also noteworthy are the conclusions from the conducted summary of the discussion on the prototype, which indicated different understandings of the term: due to its way of existence (ontological); object of cognition; object of linguistic analysis; cognitive dimension (ideal object, real object, mental object, conditional and conditioned by the way the designates are conceptualized); type of thinking (e.g. typical examples, ideals, model cases, generators, detailed models, expressive copies); the principle of emergence (typical or representative).

Cognitivists, including the creator of the usage-based model, R. W. Langacker (2003) and the father of the theory of multiple intelligences, H. Gardner (1988) believe **that there is no unique linguistic ability that is separate from other mental abilities**. Langacker (2003) recalls: I proposed the concept of a usage-based model. In "Foundations of Cognitive Grammar" (2000) I described such a model as follows: "Substantial importance is given to the actual use of the linguistic system and a speaker's knowledge of this use; the grammar is held responsible for a speaker's knowledge of the full range of linguistic conventions, regardless of whether these conventions can be subsumed under more general statements."

It is precisely for this reason, that in order to make it safe for the researcher – for the value of their conclusions – and to ethically operate with a language during pedagogical research and to penetrate into the language of another person, especially a child, it is worth learning the elementary principles of cognitive research methodology. It seems that the description of human cognitive abilities by cognitivists has a chance to become a "first aid kit" for a researcher-educator who, according to the etymology of the name of the profession – paidagogos – "leading a child" – takes responsibility for both the subject of the research and the quality of their research, conducted in the spirit of the methodology of qualitative research (sic!).

It is important for cognitivists to believe that the people – and so the children – have:

- the innate ability for sensual experience. Thanks to the fact that a thought is "embodied", a person can be perceived as an **experiencer** – i.e. a subjectively experienced person, also thanks to the polysensory ability to perceive the world – and a **conceptualizer** – a rational person, thanks to the cerebral potential of the ability to make mental effort to give meaning to the image in the mind – the effect of conceptualization and activity of multiple intelligences;
- awareness of physical space;
- the ability to experience – not always consciously – different emotions that always influence conceptualization;
- the ability to perceive the passage of time objectively measured and subjectively assessed as people grow older;
- the ability to compare, which Bloom observed in his studies in infants (2015) and the ability to find similarities and differences.

Based on cognitive analysis, there is a possibility of dealing with the experiencers of discussion of the examined concept/perceived object. The answers to these questions provide knowledge about the **individual experiences of the experiencers** and **their conceptualization**, which, included in the semantic scheme, allows for the emergence of Idealized Cognitive Models (**ICM**), giving a "full portrait" of a concept/feeling.

The representative function of language, i.e. the ability of language to present an objective reality, was described and specified by Benveniste (1974) long before the cognitivists, when he wrote: "the task of a sign is to represent, to replace another thing by evoking it by a substitute. (...) So the

language will be the system that interprets society". It is therefore necessary to refer to the sign theory in order to make this thought easier to understand. In his theory, Cassirer (1929) distinguished two types of signs:

- arbitrary signs, indicating that they refer to a marked (represented or at least representable) reality;
- allegorical signs, referring to a difficult marked reality.

The sign established without a marked object becomes primarily a symbol, which – as stated by Durand (1986) leads to the conclusion that the **symbol belongs to the category of the sign**. Thus, it can be assumed that the path of the symbol leads from the senses and imagination to mental conceptualization – marking something difficult to express (unspeakable). However, to make possible to recall the mysterious meaning, in its significant half the symbol is overloaded with concreteness and, as Ricoeur (1986) believes, it has three specific dimensions:

- "cosmic" refers to the visible world that surrounds us;
- "oneiric" rooted in gestures, in memories (experiences);
- "poetic" the symbol refers to the most concrete language.

Structures of concepts, semantic representations (RS) have been called differently over the centuries: the content of thoughts, propositional content, dictum, lecton, and in cognitive terms, i.e., **nonreducible** and **holistic**, they appear in the form of a full picture/portrait of a concept. For a given category, an intersecting beam of characteristics of the most **representative, typical representative** may be defined, forming cluster models. This cluster proves the application of non-reductionist theory of cognition and meaning. Any other member of the category thus distinguished is more or less – to a greater or lesser extent – like the prototype, i.e. it occupies a more central or peripheral place within the category.

The cognitive methodology also uses the concept of constructing a scene in the terms of figure – ground. Thanks to those notions the pedagogues have many opportunities to seek out solutions, for example in organizing didactic situations which will facilitate:

- the birth of positive emotions (non-destructive to the process of conceptualization and thinking) in a child – pupil/student, which will make the learners active;
- intellectual activity (activation of child's dominating abilities/separated intelligences of multiple intelligences as "tools" aiding the development of those abilities/intelligences which are desired for the sake of learning efficiency/effective mastery of the educational content determined educational curriculum, e.g. children with dominant kinesthetic intelligence need to move in order to "make it" possible to activate the potential of linguistic intelligence – blocking movement in such a child also closes the language skills needed to learn to read and write);
- profiling (seeing) in order to widen / narrow the field of vision, focusing attention on what results from the content of education components (balancing between the "individual" and "community");
- metaphorizing – conceptualizing a more difficult concept in terms of another concept (easier to conceptualize or already so anchored in the mind of the child that it does not require excessive cognitive effort). According to Lakoff, Johnson (1988) for a man the ability to understand experiences through a metaphor means as much as having another sense, such as sight, touch or hearing, because a metaphor provides the only way to perceive and experience a large part of the real world, co-creates a basic resource of human notions, and not only serves as a stylistic ornament of a text;
- using metonymy to help the child mentally reach the notion (the metonymy will be willingly used by those pedagogues/teachers who will accept Langacker's usage-based model), and conceptual amalgams that creatively combine elements of different concepts, enabling the understanding of complex aspects of the world in terms of what is more familiar and possible to be learned in an organoleptic, polysensoric way.

Cultural assumptions, values and attitudes are not the top layer that can be applied to experience at will – **human experience is deeply cultural** – culture, experiencing the world is an immanent part of the Gestalt, as Lakoff, Johnson (1988) pointed out. Although the emotional experience is obviously and unambiguously less clearly defined in terms of the actions performed by the body, it is as fundamental as spatial and perceptual experiences. Therefore, a more explicit way of conceptualization, e.g. feeling, is allowed by a referral to the category of metaphors, e.g. HAPPY IS UP / GO UP, np. Jumping with joy, chin up, lightened up eyes, SAD/UNHAPPY IS DOWN / GO DOWN, np. with lowered head, slouching, burdened.

Conclusion

In my pedagogical practice I often met pupils and/or their parents who were upset by the children's educational problems. The reluctance to learn, destructive reactions to emerging stress, especially in difficult situations, and the school's assessment is definitely such a situation, or finally, the numerous children's educational failures, which traumatize for years from adolescence to adulthood, made me look for ways to solve them and, even better, to prevent them. I deliberately use the imperfect aspect, because it is an endless process of searching for the best didactic, pedagogical and educational solutions. As a cognitive linguist, it is in the methodology of cognitive linguistics that I see an opportunity to introduce changes to pedagogical practice. I presented my thoughts for the first time in the form of a report at the conference of cognitive linguists – Bednarkowa (2002), however it is not the group of researchers and scholars with whom I should share my reflections. I found support in the publications of a Canadian psychoeducator, whose books, translated by me, could be made available to Polish readers – Royer (2009). However, the real chance that children's problems generated by bad habits used in education can be challenged – which, I hope, under the influence of theory will change the practice – I noticed in the publications of a Polish researcher of children's life problems – Cywińska (2011, 2014, 2017).

I see a remedy for the ineptitude and inefficiency of education in cognitive linguistics. Lack of school effectiveness is generated by a lack of school efficiency both in the methodical area – the school loses to an attractive virtual reality that surrounds and attacks children – as well as, above all, in the diagnostic-evaluation area. To understand human activity: non-verbal and verbal, it is necessary to know how the human mind functions, as Eliot (2003) raised this issue. Therefore, it is cognitivism that places the grammar within the abilities of the human mind which means that children, having various potentials, abilities, domains of their multiple intelligences (i.e. talents) also have various, neither deserved nor culpable, cognitive and linguistic abilities – creates for pedagogues conditions to introduce individualized approach to the study and diagnosis of children's linguistic potential – their linguistic competence, their perception and conceptual abilities and the power of not only lexical acquisition.

A category, having an internal prototype structure that allows it to evoke in the mind without the slightest effort a cognitive prototype – the best specimen/representative – as the central element of the category, becomes a space with a designated cognitive reference point. Since the boundaries of categories or concepts are blurred, it is sufficient for educators to make an effort, to make an appropriate cognitive effort, which will allow them to find arguments, resulting from family resemblances, in favor of recognizing the belonging to a category of a given copy, especially the effects of work/behavior (not only linguistic) of children, especially those which in the traditional (behavioral) approach seem to be "difficult", with problems, i.e. requiring exceptional care on the part of teachers. This kind of categorization will allow children to feel the taste of success and avoid the pain of failure.

The Gestalt's holistic approach to the child – to its conceptualization, creations and behaviors – allows and encourages to reach out to contexts, to combine not to divide, to organize didactic situations that favor learning to cooperate and consciously reduce the need for competition, and finally to generate positive synergy, thanks to which the sum of the ingredients is not only a mathematical sum, but is enriched with added value.

The use of cognitive methodology in pedagogical research guarantees its anthropocentric character. The approach to the human being, as a research subject situated in the center of research activities, allows for profiling both the common, socio-cultural and individual, resulting from the uniqueness of a Person. The research strategy presented here leads to a positive picture of a child's linguistic competence, taking into account both those aspects that place the child's vocabulary and grammatical forms, in the group of those language users who communicate without disruption and without cognitive effort, as well as revealing the individual character of the linguistic realizations, resulting from various reasons: the child's creativity, disorders, e.g. in Asperger syndrome, or a socioconstructive pattern based on a limited code.

The cognitive approach allows to change points of view, i.e. to respect the subjective judgement of the experiencer; the cognitive perspective and the goal, i.e. the clarity/graininess of the analysis (the view from the position of a generalist, as if "from the bird's eye view" and/or from the point of view of a specialist interested in details, as if "under a magnifying glass"), and also makes the study flexible, and in the evaluation of values – treating all results equally.

The methodology of cognitive research assumes that subjects have the right to use different language codes – from limited to developed – and the researcher should approach children (pupils/students) as sensory subjects – experiencing the world with their senses; thinking – conceptualizing in a way that is characteristic for them. Such a research approach enables finding for answers to questions, among others: How does a child understands / what does it mean to a child...? What is the semantic structure of the concept being learned/remembered? What structure of the meaning of ICMs the individual effects of children's experiences is laid down?

The basic condition for the success of this type of research strategy, the application of the main concepts of methodology of cognitive linguistics and the usage-based model presented here is the teacher's openness to the fact that children have the right to constructively experience themselves, the world and themselves in this world; that it is worth creating conditions for socioconstructive cooperation and safe exchange of personal thought constructs within a group, and that there is a potential for positive synergy in the dialogue, as Bednarkowa (2016) stated in a report at the IACEP conference.

The implementation of the fundamental concepts of the methodology of cognitive linguistics presented here may be more widely used in educational practice, e.g. in the methodology of learning a foreign language, to study understanding of highly abstract texts, or for literary works, especially poetic ones, especially when the text has been written in a language with some archaic features. A communication on piloting the use of such a research strategy was presented by Bednarkowa (2014) at the IACEP conference in Budapest.

References

- Apresjan, J. (1993) 'Językoznawstwo teoretyczne, modele formalne języka i leksykografia systemowa,' O definicjach i definiowaniu, UMCS, Lublin.

- Bartmiński, J. (1988) 'Definicja kognitywna jako narzędzie opisu konotacji,' Konotacja, Lublin, 169-183.

- Bednarkowa, W. (2002) `The Influence of Cognitivism on the Development of Educational Diagnosis. The Prototype Theory, Family Resemblance Categorisation, Concept Profiling as the Basis for the Improvement of Didactic Evaluation,` Cognitive Linguistic Today, Peter Lang, Europäischer Verlag der Wissenschaften, 643-653.

- Bednarkowa, W. (2005) `A Cognitive Definition of One In Love and an Object of Love In the Context of the Conceptualisation of Love by Teenagers In Annales,` *Historia et Sociologia*, 15, 2005, 1, Koper, , 111-121.

- Bednarkowa, W. (2009) `Le dialogue comme le besoin dans le processus de conceptualisation des mots – les redéfinitions de certains termes,` IANUA AD LINGUAS HOMINESQUE RESERATA II, Brána jazykov k l`ud`om otvorená II, Vedecké monografie, UKF v Nitre, INALCO (Paris), 340-348.

- Bednarkowa, W. (2010a) `External and internal conditions of linguistic intelligence development,` CUDZIE JAZYKY V ŠKOLE 7. Foreign languages and cultures at school 7. Nitra,

- Bednarkowa, W. (2010b) `Poświata Poświatowskiej, czyli kreatywne warsztaty poetyckie dla młodzieży,` In: Halina Poświatowska. Czytanie wielokrotne, Częstochowa, 143-162.

- Bednarkowa, W. (2011a) `Refleksje nad polonistyczną kompetencją uczennic i uczniów XXI wieku,` Folia 94. Annales Universitatis Paedagogicae Cracoviensis. Studia ad Didacticam Litterarum Polonarum et Linguae polonae pertinentia III. Kraków, 164-175.

- Bednarkowa, W. (2011b) `Wielointeligentna lekcja poezji. Czesław Miłosz – ku pamięci noblisty,` *Język polski w praktyce*, 5 (17), 33-36.

- Bednarkowa, W. (2012) `Cognitivism and didactics (the "multiple-intelligence" lessons in teaching the native language),`*Societal Innovations for Global Growth*, 1(1) ISSN 2335-2450 (online), 1112-1121.

- Bednarkowa, W. (2014) `Reception of poetry at schools: how cognitive sciences change the didactics of literature and native language,` IACEP European Regional Conference 2014, Budapest In Cognitive and executive functioning concepts, measurements and educational implication. Book of abstacts, Faculty of Education, University of Presov, 2014, ISBN 978-80-555-1075-0

- Bednarkowa, W. (2016) When "I" and "you" means "we"? About the need to agree on the meaning, IACEP European-Middle East Regional Conference 2016 Kraków In Meeting the challenge of assessing and educating students with special needs. Book of abstracts, Faculty of Education, University of Presov, 2016, s. 39, ISBN 9788055516165

- Benveniste, E. (1974) `Semiologie de la langue,` In Obszczaja lingwistika, Moskwa.

- Bloom, P. (2015) `To tylko dzieci. Narodziny dobra i zła,` Smak Słowa, Sopot.

- Cassirer, E. (1923-1929) `Philosophie der symbolischen Formen,` vol. 3, Berlin.

- Cywińska, M. (2011) `Dialog jako wymiar podmiotowości w edukacji dziecka` In Podmiot. Sztuka – Terapia – Edukacja. Między teorią a praktyką, Wydawnictwo Naukowe UM, Poznań.

- Cywińska, M. (2014) `Oblicza trudnego dzieciństwa. Konteksty rodzinno-edukacyjne,` Wydawnictwo Naukowe UAM, Poznań.

- Cywińska, M. (2017) `Stres dzieci w młodszym wieku szkolnym,` Wydawnictwo Naukowe UAM, Poznań.

- Durand, G. (1986) `Wyobraźnia symboliczna,` PWN, Warszawa.

- Eliot, L. (2003) `Co tam się dzieje? Jak rozwija się mózg i umysł w pięciu pierwszych latach życia,` Wydawnictwo Media Rodzina, Poznań.

- Gardner, H. (2007) `Five Minds for the Future,` Harvard Busiess School Press, Boston, Massachusetts.
- Gardner, H. (1983) `Frames of mind: the theory of multiple intelligence,` Basic Books. New York.
- Kleiber, G. (1990) `La semantique du prototype. Categories et sens lexical,` Paris.
- Kurcz, I. (1992) `Stereotypy, prototypy i procesy kategoryzacji,` Kolokwia Psychologiczne 1, Warszawa.
- Lakoff, G. (1986) `Cognitive Semantics,` *Quaderni di Studi Semiotici: Meaning and Mental Representations*, Versus 44/45, 119-155.
- Lakoff, G., Johnson, M. (1988) Metafory w naszym życiu, PIW, Biblioteka Myśli Współczesnej, Warszawa.
- Langacker, R. W. (1995) Semantyka kognitywna (maszynopis).
- Langacker, R. W. (2000) `Grammar and Conceptualization,` Mouton de Gruyter, New York, Berlin.
- Langacker, R. W. (2003) `family dynamiczny oparty na uzusie językowym,` In Akwizycja w świetle językoznawstwa kognitywnego, Universitas, Kraków.
- Niemierko, B. (1975) Testy osiągnięć szkolnych. Podstawowe pojęcia i techniki obliczeniowe, Wydawnictwa Szkole i Pedagogiczne, Warszawa.
- Niemierko, B. (1999) Pomiar wyników kształcenia, Wydawnictwa Szkolne i Pedagogiczne, Warszawa.
- Nowakowska-Kempna, I. (1995) Konceptualizacja uczuć w języku polskim. Prolegomena, Wydawnictwa Szkolne i Pedagogiczne, Warszawa.
- Ricoeur, P. (1986) `Symbolika zła,` PAX, Warszawa.
- Rittel, T. (1994) Podstawy lingwistyki edukacyjnej, Wyższa Szkoła Pedagogiczna, Kraków.
- Rosch, E. (1973) `Natural categories,` *Cognitive Psychology*, 4.
- Rosch, E. (1978) `Principles of Categorization,` In Cognition and Categorization, New Jersey, s. 31-38.
- Royer, É. (2009) 'Jak kameleon na szkockiej spódniczce, czyli jak uczyć „trudnych" młodych, nie wykańczając siebie,' [Comme un caméléon sur une jupe écossaise ou Comment enseigner à des jeunes difficiles sans s`épuiser. ISBN 2922266-14-1] Wyd. Fraszka Edukacyjna, Warszawa
- Wittgenstein L. (1972) Dociekania filozoficzne. Warsaw PWN.
- Zadeh, L. (1976) `A Fuzzy Algorithmic Approach to the Definition of Complex or Imprecise Concepts,` *International Journal of Man-Machine Studies*, 8, 249–291.

Climate Effects in EU Agriculture

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Abstract

Climate change and pressures on natural resources will continue to affect agriculture and pose food security concerns. The EU's 2030 climate and energy targets set ambitious targets. Like all other sectors, agriculture should make a fair contribution to achieving them, as outlined in the Commission's proposals on effort sharing and land use, land change and forestry (LULUCF). At the same time, agriculture is one of the sectors most vulnerable to climate change. Water deficit, changing rainfall regime, general temperature rises and variations, increased intensity and frequency of extreme climate-related phenomena, the presence and persistence of (new) harmful organisms and diseases, as well as fire risks are already challenges for practices and current agricultural and forestry production. Farmers and foresters are not only users of natural resources, but also indispensable managers of ecosystems, habitats and landscapes. Any new type of CAP should reflect greater ambition and focus more on results in terms of resource efficiency, environmental care and climate action.

Keywords: Natural Resources, Global Warming, Climate Change, Agri-Food, Growing Population

Global/Mondial Context

Worldwide there is a process of structural transformation, as a result of the emergence of new global challenges with long-term effect, which requires the elaboration of a strategic vision in the field and the realization of concrete actions by the competent authorities. The growing global population, increasing the pressure on natural resources and global warming determine a new working framework at national and international level. In Europe, the aging process of the population is also an additional challenge. All these aspects will have profound implications for agriculture and rural areas.

World food demand is increasing, rising prices for inputs, increased urbanization, pressure on water resources and increased vulnerability of crops and animals to climate change will limit food production. It is forecast that, globally, the demand for food will increase by 70% by 2050, as a result of the growing population and increasing incomes. Developing countries will contribute the most to this trend, their demand for food is expected to double in the coming years. It is estimated that the world population will grow from 7 billion, as it is today, to 9 billion by the middle of this century, and 95% of this growth will occur in the least developed countries (in 50 of the least developed countries, worldwide). Increasing global incomes will be mostly associated with increased urbanization (70% of the world's population is expected to live in the urban area by 2050, compared to 49% today) and with rapid economic growth in some the most populous countries (for example, Brazil, China, India and Russia). (MADR, 2014)

For the agri-food sector, these aspects are both an opportunity and a challenge. The prospects for the growth of the agri-food market are a significant advantage for farmers around the world. However, it is expected that deficient market infrastructures and socio-economic vulnerabilities in the most populated areas of the world will increase food insecurity. In addition, global agricultural systems will increasingly face the negative effects of climate change (changing precipitation patterns, extreme weather phenomena, water scarcity) as well as price volatility.

On the other hand, increasing agricultural productivity can be achieved through investments, research and innovation, good agricultural practices and proper public policies. In this global context, the

Northern Hemisphere (including Europe) will be well positioned to continue to supply global markets with numerous essential agri-food products. The outlook is positive, for example, for cereal production in temperate areas and favorable areas for vegetable production could extend even north as the temperature rises. In turn, countries in the southern hemisphere, as well as those in the (sub) dry tropical areas, are likely to be strongly affected by climate change, by decreasing yields and increasing the frequency of extreme climate events (drought and floods).

Although agriculture has always focused on food security and has been a positive driver of economic growth, society's growing concern for the environment in recent decades has affected global agricultural policies. Since the United Nations Earth Summit in 1992, sustainable development has received worldwide recognition, and consumers are increasingly concerned about the environmental sustainability of agriculture. The desire to know where the food comes from, how it was produced and whether agricultural practices respect the environment are just some of the demands of today's consumers. (MADR, 2014)

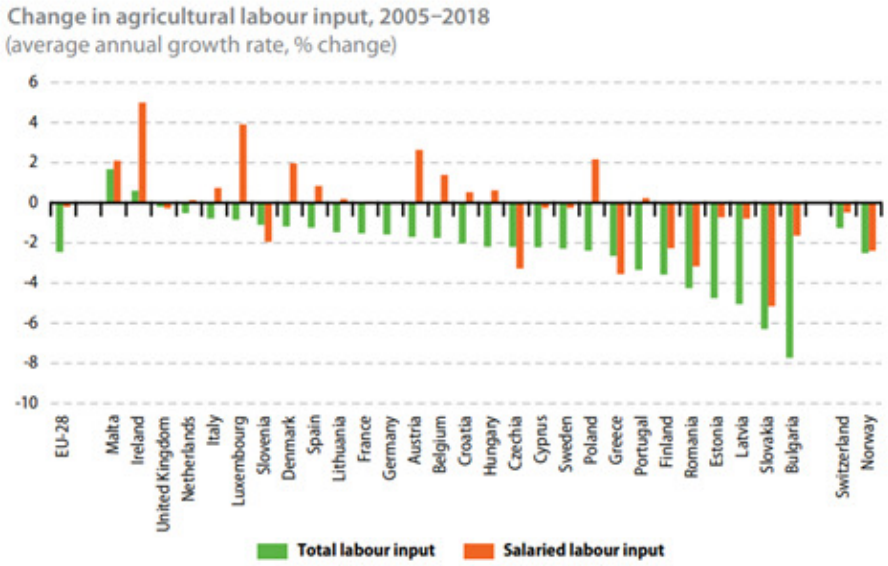
Increasing Demand for Food Products – Causes

In the EU the number of farms decreased by about one quarter in a short period, between 2005 and 2016. This suggests losses of up to 4.2 million farms across the Member States, the vast majority of which (about 85 %) were small farms of a size under 5 ha. During this period, Poland has the largest reductions in farm numbers (1.1 million farms, or 43 %), Romania (0.8 million farms, or 20 %) and Italy (0.6 million farms, or 34 %). (Eurostat, 2017)

Worldwide there is a growing demand for food while supply is relatively the same. Romania has easy access to world markets through the Black Sea ports and the Danube, and accession to the EU offers access to substantial financing, as well as access to important markets. Domestic demand is solid and is fulfilled both by national production and from imports of processed agricultural products. In the same context of increasing demand for food products, there is the major problem of food waste, the year 2014 being stated as the year of the reduction of food waste at European level. According to the latest studies by FAO and OECD, this must be taken into account by all the states of the world. (MADR, 2014)

Unlike the global trend, it is expected that the European population will grow old and stagnate. The aging of the population is considered to be one of the fundamental socio-economic challenges of Europe over the next fifty years. With an average age of 46.8 years, and with over 27.8% of its population aged at least 65, this challenge reaches unprecedented levels. Also, it is expected that the working population to decrease as the generation born in the period of significant increase in the birth rate goes to retirement. At the same time, the number of people over the age of 60 will increase twice as fast as before 2007, by about 2 million per year. By 2050, the total EU population is expected to grow only 5% from the 2008 level and reach just over 515 million people.

As the number of farms in the EU has declined, so has the number of farmers and those employed in agriculture; the share of people employed in agriculture fell from 5.7 % of total EU employment in 2005 to 4.4 % in 2016. The volume of work carried out by the EU's labour force in agricultural activities declined by 3.3 million AWUs between 2005 and 2016, a decline of one quarter (-25.7 %). Just shy of three quarters (71.1 %) of these full-time equivalent job losses occurred in the Member States that joined the EU after May 2004. The biggest losses were in Romania (1.0 million AWUs), Poland (0.6 million AWUs) and Bulgaria (0.4 million AWUs, which represented a 60 % decline).



By 2050, Romania total population is expected to fall to just over 18 million, which is a 10% decrease from 2011. This is one of the strongest declines in the EU, being only surpassed by Bulgaria (-22, 5%), Latvia (-20.5%) and Lithuania (-18.7%). Although it is in the general trend affecting the NSM (-10.5%), this contrasts with the forecasts for the old Member States (+ 8.3%).

The aging of the population will also affect Romania more than Europe on average, and by 2050, the average age will reach 51.4 years, with a population aged 65 representing 30.8% of the total.

Farmers				EU-28 average
Employment in agriculture	2017	22.8 %	share of total employment	*4.1 %*
Total labour force input in agriculture	2018	1 474	thousand annual work units	-
Young farmers (under 40 years old)	2016	7.4 %	share of all farm managers	*10.6 %*
Female farmers	2016	33.5 %	share of all farm managers	*28.4 %*
Farmers with full agricultural training	2016	0.4 %	share of all farm managers	9.1 %

Compared to the urban environment, rural areas in Europe are facing the greatest demographic threats. In line with global trends, Europe will see an increase in urbanization. Compared to 2011 levels, the total urban population of Europe is expected to increase by approximately 10%, while the rural population will decrease by 2.7%. External migration, rather than negative spur, would be a driving factor. A smaller and smaller rural population will restrict the supply of work in agriculture and threaten the vitality of the rural areas as a whole. These trends have serious implications for the demand for agri-food products, as European markets are expected to provide limited scope for expansion. For arable crops, the medium-term outlook for goods in Europe (in 2022) suggests only slight increases in EU consumption. The demand for food and feed will be subject to a slow growth, with the notable exception of biofuels, which will continue to be a dynamic market segment.

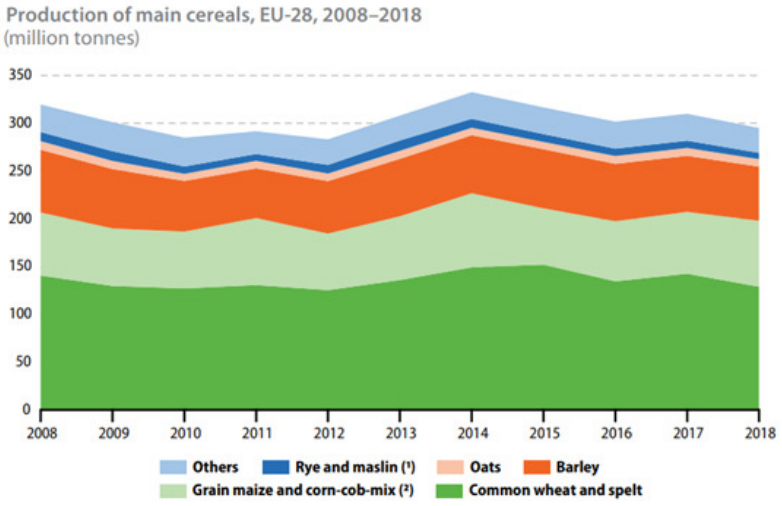
Expected Climate Effects in Eu Agriculture

It is expected that in the medium and long term, climate change will increasingly affect Romania and its agricultural sector. Romania will have to expect a constant increase in average annual temperature, similar to the projections for Europe, which can fluctuate between 0.5 ° C and 1.5 ° C by 2029 and between 2.0 ° C and 5.0 ° C until 2099, depending on the global scenario. It is expected that the precipitation models will change significantly and produce a differentiated territorial impact in Romania. The northern part of the country will possibly reap productivity gains in the medium term,

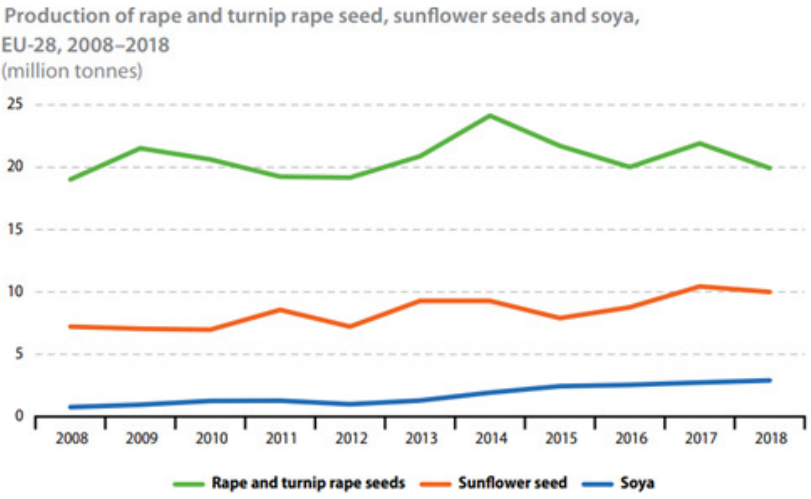
but will be subject to higher flooding in winter and problems due to lack of water in summer. The south and south-east of Romania will be more severely affected, and the heat and drought waves will lead to a general decrease in productivity and production in the plant sector.

More specifically, some climate models do not provide that, in the absence of climate change mitigation actions, individual harvests and yields could be affected as follows:

- **Maize**: in a "warm" scenario, the EU is facing a decrease and this will mainly affect France, Romania, Italy, Hungary and Spain. In a "cold" scenario, however, Romania could even register an increase of maize production.
- **Wheat**: Romania could be significantly affected in the cold scenario (-25% by 2030), but this could actually benefit from an increase in production under a hot scenario (7%). Comparatively, a warm scenario would affect northern and Western Europe (France, Belgium, northern Germany, Poland and Lithuania) and favor the southern countries, while a cold scenario would most significantly affect Poland and parts of Germany.



- **Sunflower**: In both hot and cold scenarios, Romania should expect a decrease in sunflower production by up to about 14% by 2030. Other EU producers (Bulgaria and Hungary) are expected to be similarly affected.



Production of Organic Goods Across The EU

Today, farmers in the 28 EU Member States guarantee food security for over 500 million consumers. Food abundance, accessibility, safety and quality are just a few attributes offered by the approximately 14 million farmers in the EU.

Organic farming tends to have a limited environmental impact as it encourages, inter alia: the responsible use of energy and natural resources; preservation of regional ecological balances; maintenance of water quality; the maintenance of biodiversity; enhancement of soil fertility; a high standard of animal welfare which requires farmers to meet the specific behavioural of animals needs. This type of farming looks to use many of the factors to produce agricultural goods in a more sustainable way than conventional farming. European Union (EU) regulations on organic farming are designed to provide a clear structure for the production of organic goods across the whole of the EU. This is to satisfy consumer demand for trustworthy organic products while providing a fair marketplace for producers, distributors and marketers.

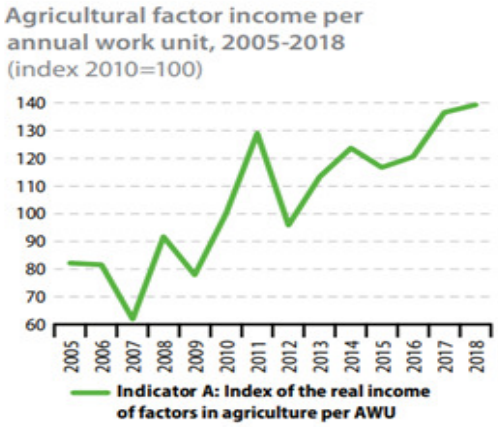
The total organic area in the EU increased by one quarter (25.0 %) between 2012 and 2017. This upward development was noted in a majority of Member States, with some notable exceptions. The increase in the EU as a whole was driven by the above-average growth in the total organic area in France (+69.2 % between 2012 and 2017) and in Italy (+63.5 %) but also Germany (+18.6 %) and Spain (+18.5 %). This development was further supported by the increasing of organic area between 2012 and 2017 in Bulgaria (where about 100 000 ha were added) and Croatia. The overall growth at the level of the EU as a whole was tempered by declines in the total organic areas in Romania (-10.3 %), Greece (-11.3 %), the United Kingdom (-15.6 %) and Poland (-24.5 %). (Eurostat, 2018)

The Agricultural Sector in Romania

Agriculture plays an important role in Romania, in relation to the size of the rural population and the degree of employment. About 45.7% of the population in Romania lives in the rural area, compared with about 23.6% in the EU member states. About 30% of the population is engaged in agriculture, compared to about 2% in the old Member States (EU15) and 3-14% in the new Member States(EU-8).

There are major differences between rural and urban areas, the former being marked by a significantly higher level of poverty and a correspondingly lower standard of living. Agriculture development and the provision of public goods in rural areas is therefore essential for the European integration of Romania and for achieving the objectives of social cohesion. Compared to other EU countries, the agricultural sector in Romania has a relatively high share in gross value added (GVA), but lags behind in labor productivity.

The upward trend in agricultural factor income per annual work unit, particularly since the relative low in 2007, was confirmed by a further small rise (+1.9 %) in 2018.



When communism fell in 1989, 28.5% of Romania's population was involved in agriculture. Until 1989, the total labor force in Romania increased, while the agricultural labor force decreased; after 1990, these trends reversed: the total labor force began to decline, and the agricultural labor force increased quite rapidly until 2000, when it reached 115% of its level since 1989. The percentage increased to 43.5% in 2001, as the population brought by the communist system in urban areas moved back to the relative stability of the rural environment and subsistence agriculture. 2003 data, however, indicate a decline in the share of agriculture in the total workforce for the first time since 1996 (the share of agriculture in the total workforce has fallen below the level of 36%). 3.6 million people active in the agriculture of Romania, representing 34.7% of the total work force of Romania. By 2008, the population involved in agriculture decreased to about 30%. About three million Romanians worked in agriculture, about 30% of the total number of employed persons (August 2009).

Agricultural sector in Romania has the folowing percentage, in country's GDP:

Percent	Year
14,5%	**1989**
23%	**1990**
12,1%	**2000**
11,7 %	**2003**
12,6%	**2004**
6%	**2007**
5,4%	**2013**
4,8%	**2015**
5,5%	**2018**

The active population in agriculture in Romania - in a continuous decrease:

Percent	Year
28,5%	**1989**
28,2%	**1990**
41%	**2000**
29,47%	**2007**
29,25%	**2013**
25,6%	**2015**
22,3%	**2018**

Agricultural labour input, 2010 and 2013-2016

	Total agricultural labour input (thousand annual work unit)					Change 2010-2016 (%)
	2010	2013	2014	2015	2016	
EU-28	10 345.3	9 913.5	9 737.4	9 504.3	*9 490.1*	*-8.3*
Romania	1 639.0	1 564.0	1 433.0	1 293.0	1 592.0	-2.9

Conclusions

CAP is the basis of the policies set out in the energy and climate framework for 2030, which calls on the agricultural sector to contribute to achieving the target of the entire 40% reduction economy by 2030 and the EU Adaptation Strategy. European agriculture must also contribute more to achieving the EU's environmental goals. These commitments cannot be fulfilled without farmers, foresters and other rural actors managing more than half of EU land, being key users and guardians of associated natural resources and providing large-scale carbon absorbers as well as renewable resources for industry and energy. For this reason, a modernized CAP should increase its European added value by reflecting a greater degree of ambition in the field of environment and climate and addressing citizens' concerns about sustainable agricultural production.

References

- Commission of the European Communities (Directorate General for Regional Policy) – Regi ons 2020Demographic challenges for European regions, Brussels, November 2008

- European Commission (Directorate General for Agriculture and Rural Development) – Pros pects for Agricultural Markets and Income in the EU 2012 - 2022, December 2012
- (http://ec.europa.eu/agriculture/markets-and-prices/medium-termoutlook/2012/fullrep_en.pdf)

- European Commission, Joint Research Center – Assessing agriculture vulnerabilities for the design of effective measures foradaptation to climate change (AVEMAC Project), 2012, (http://ec.europa.eu/agriculture/analysis/external/avemac/full_text_en.pdf)

- MADR, Analiza socio-economică a dezvoltării rurale în România,AM MADR, ed.III iulie 2013.

- https://ec.europa.eu/eurostat/web/agriculture/publications

Relations of Multinational Business at the Local Level as an Economic Modernization Factor (The Russian Black Sea Region Experience).

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Abstract

The economic modernization processes modern analysis includes the study of the multinational corporation (MNC) role as the modernization resource and mechanism at the local level. The MNC and local business integration mechanisms and results in various economy sectors in the Russian Black Sea region (Rostov Region and Krasnodar Region) are analyzed in the article. The forms and tools for including MNC in the processes of restructuring the economy of the Russian Federation regions from the point of view of forming ties at the local level and of management mechanisms providing this result, are analyzed for the first time in the Russian research practice. The practice analysis of more than 20 multinational corporations that came to the regions after 2000 revealed a number of patterns in organizing their presence in both regions: significant investment volumes, export orientation, formation of relations between foreign multinational corporations, business models' change compared to those in Europe. A significant number of MNC relations were established in both regions, for the reason of the agrarian orientation (which implies the counterparties multiplicity), and also owing to the MNC conditions fulfillment to localize production. A fairly active role of both regions authorities in promoting foreign investment has been identified, a number of policy measures strengthening the ties between MNC and local economies have been identified.

Keywords: MNC, economic modernization, Black Sea region, Russia.

Introduction

The problem of economic modernization and the formation of conditions for its implementation remains on the agenda of the Russian scientific community and management system. In world practice the modernization problems analysis from the 2nd half of the XX century was mainly connected with the MNC role as a significant actor in the developing and transition economies structural transformation. Relevant discussions have included not only discussions on industrialization issues, but also the problem of innovative updates through technology and experience transfer of large companies to local businesses in recent years. At the same time, the connection between the MNC sector and the national economy is discussed as a key condition for such a transfer. Targeted efforts to form such links can increase the chances of involving local producers in the relations chains and cause an increase in value-added and in the share of national value-added in exports.

The Russian specificity lies in the inherited significant industrial complex, but in modern conditions it is oriented primarily towards the extraction and export of raw materials. At the same time, the problem of modernizing the Russian economy is constantly on the agenda of both the scientific community and the management system. This task is of the greatest importance at the local level. Two key regions forming the Russian Black Sea region are considered in the article as an object of analysis: the Rostov Region and the Krasnodar Region. They which occupy fairly strong positions in the Russian economy, have a developed economic structure and also attracted a significant number of foreign MNC in the post-Soviet period, making up a significant part of the economy regions today. The experience of forming MNC relations with local producers, the problems and factors of this process are analyzed in the article and an analysis of public administration practices at the

regional level as a tool for building the ties between MNC and local producers in the interests of modernizing the economy is proposed.

Methodological Framework

The experience of analyzing and formulating modernization policies is mainly based on evidence from developing countries, but in recent decades it has also affected countries with economies in transition. Extensive theoretical generalizations of this experience, as well as empirical evidence, are contained in a series of Flagship Reports of UNCTAD (Trade and Development Report World and Investment Report, from the early 2000s). The reports provide the modernization processes analysis, as well as the role and risks of MNC participation in this process, the state policy features of regulating the MNC participation in the economy. The significance of the national approach to the economy modernization and the importance of local conditions are substantiated.

At the same time, a systematic analysis of the forms and scales of foreign MNC communication and the influence of these processes on modernization of the Russian Economy has not been carried out yet. The corresponding analysis requires an interdisciplinary approach, in particular, the analysis of MNC factors entry into the country's economy. The most popular research methods are the statistical research methods. To study the nature of the MNC influence on the local economy, structural-sectoral analysis was used. The institutional approach, in turn, made it possible to analyze the building state regional policy practice in the regions with regard to MNC, to form their links with the local economy and to identify promising transformations of such policy in the interests of MNC modernization functions accelerating.

MNC links formation and local economy in the interests of modernization: features and problems

The redistribution of influence and resources in the global economy determines the active processes of finding the positions by countries and regions. As a model of the economies' adaptive transformation in such countries, modernization restructuring with the approach to the developed countries model is considered. Industrialization and increasing the exports share are considered as tools, including the ways of attracting MNC as technology carriers and managerial knowledge. At the same time, the condition for the success of such a strategy is the presence or absence of links between foreign MNC and the national economy.

The particular importance of relations between foreign affiliates and local suppliers is seen as a tool to maximize the benefits of export-oriented FDI as it is underlined by WIR (2002). In export-oriented economies, an increase in the MNC ties role contributes both to an increase in the technological products share in exports and in the share of value-added created in the country in exports according to Trade and.. (2016).

The process of forming MNC relations in the host economy is significantly associated with the MNC's sphere of activity. So, the mining sector MNC forms fewer bonds. Such companies use more capital-intensive technologies and processes according to the opinion of WIR(2006). However, this sector can form the relationships in the host economy in order to obtain locally produced inputs at lower cost. Business development in agricultural production can also lead to increased demand for local equipment and materials as proved by The Least.. (2015).

On the contrary, the manufacturing industry has the maximum effect on linking due to the need to form the links in the areas of production, investment, knowledge and income generation (in particular: Tregenna F (2008), Structural change.. (2009).

Regardless of the industry, however, MNC can have only a limited positive impact on development, in particular, due to the MNC affiliates' desire to acquire the production factors bulk from parent companies or associated suppliers, and not from the local companies. Leveling this risk is provided by stimulating the competitive suppliers of resources or MNC products' consumers network creation according to the Trade and.. (2006).

A different kind of risk in increasing the FDI importance and encouraging exports may be the host countries (natural resources, cheap labor) traditional, non-profitable, comparative advantages strengthening which does not allow achieving productivity growth and structural transformation. An

example of this kind is the establishment of subcontracting relations with multinational corporations or the strengthening of relations with multinational enterprises by the enterprises to the detriment of relations within the economy. Also, a wide selection of subcontractors leads to the enterprises' competition, to the buildup of benefits for multinational corporations, which reduces the benefits of foreign trade exchanges and FDI. These processes also do not imply the ties creation in the host economy. Thus, with the exception of Taiwan and Singapore, the emphasis of East Asian countries on the output production for export did not allow them to develop and strengthen feedback. With the exception of Taiwan, the export of industrial products continues to be dominated by foreign enterprises that do not maintain sufficient links with the local market and local firms according to Oxford Analytica (2002), Trade and …(2002).

Trade in tolling products can contribute to the appropriation of MNC value-added, so that the actual production in the countries of foreign branches localization accounts for a small part of the exported finished products' value. For example, the transformation of Mexico and the countries of Central America into industrial assembly centers in the form of an enclave economy that is weakly connected with the country's economy (see: Gallagher and Zarsky (2007) should be mentioned here. The same can be said of the electronic and automotive industries in Eastern and Central Europe (see, for example: Pavlinek P (2015). According to Fons-Rosen et al. (2013) a serious "internal technological update" took place in the MNC branches, which, however, rarely affected the rest of the country's economy in the form of increased labor productivity or imitation activities of national companies, partly due to the MNC weaknesses with local firms and labor markets.

However, the FDI effectiveness depends on the human capital existing in the host country (Borensztein, De Gregorio and Lee, 1998); a significant positive effect of FDI on growth has been found in a number of countries with more skilled labor as proved by Xu (2000). The multinational corporations' arrival can ensure the knowledge and technology transfer, however - only with educated and qualified personnel availability and a significant level of demand noted in World Investment… (2006). So, in the 2000s the list of developing countries where, for example, American MNC localized R&D was very limited: 5 countries — Brazil, China, Mexico, the Republic of Korea, and Singapore — accounted for an estimated 70% of the corresponding FDI inflows noted by WIR (2005).

As a kind of external factor the terms of international trade, due to which, for example, most of the China's previous industrial policy elements were curtailed, can be called. In particular, measures to protect fragile industries, preferential interest and tax rates, as well as some forms of direct financial assistance to industries were abolished. With the China's accession to the WTO, many JV participants in China separated from their local partners, becoming fully owned by foreign capital, which made it difficult to obtain technological and other external FDI effects indicated in the work Trade and ..(2006).

The complexity and variety of factors in the productive relations formation between MNC and the local economy make this sphere a priority of the management system, designed to help creating the appropriate mechanisms.

The management system goals in the MNC potential implementation as an actor of modernization

Integration into global production chains can help to master knowledge, technical modernization and industrialization if appropriate policy tools are used as proved by Trade and.. (2016). Such a policy should take into account modern processes of global interaction transformation within the value chains framework, among which, in particular:

• high competition in the markets for simple products, which makes relying on export of such products less efficient today,

• the MNC attracting effect absence during cross-country competition in the situation of providing the excessive benefits and on the basis of low wages, which reduces the state resources,

• the need, for the formation of the effect of attracting FDI, in the formation of a balance of MNC relations outside and inside the economy.

The lack of economic ties can often reflect the lack of a strategy to strengthen such ties, examples of which are the economies of Mexico, Costa Rica and Honduras, where export growth was not accompanied by the simultaneous development of the local industrial base (see: Summary and.. (2002). A study conducted by UNCTAD / ECLAC suggested that merely attracting FDI is fraught with the preservation of statistical comparative advantages in export activities, which have minimal connection to the domestic industry.

Due to the importance of relations with foreign branches for the dissemination of vocational skills, knowledge and technology among domestic companies, the policy in this area needs such tools as: providing information; encouraging foreign affiliates to participate in technological modernization programs; encouraging the establishment of supplier associations; joint training activities. At the same time, for example, Ireland rejects the idea of establishing communication only between local companies and foreign branches, and encourages the participation of domestic companies in the supply chains of MNC located in any region of the world according to the WIR (2001, WIR (2002).

It is significant that both the MNC attraction and the formation of their relations with the national economy can be based not only on specific policies, but also on general measures of economic development, such as: ensuring demand, investment and a stable exchange rate; assistance to training processes in the form of research and development financing, institutions of formal education and vocational training; industrialization by replacing imported intermediate products. It is also justified to turn the export processing zones into integrated industrial development parks with stronger bonds with suppliers and consumers from other economy sectors at the local level (see: Trade and…(2016).

Incentives for the production localization played a particularly important role in the first generation NIC, and especially in the Republic of Korea and Taiwan: the decision-makers of these countries sought to maximize currency and technological returns from the cooperation with transnational corporations, as well as to ensure that their activities complement, rather than replace the efforts to strengthen domestic capacity according to the Trade and…(2002).

In order to achieve the competitiveness in the increasingly technically complex output production, the leading role of private enterprises should be complemented by the support policy as it is underlined in Trade and…(2006).

MNC in the Russian Black sea region: features formation of links with local economy

The Russian Black Sea region, which, after the USSR collapse, included such entities as the Rostov Region and the Krasnodar Region, has significant economic potential all over Russia). Both regions are highly populated (9.8 million people totally), have a diversified economic structure, specialize in agriculture (in total, providing 12% of production in the agricultural sector of the Russia). Both regions are important exporters of grain, oilseeds, vegetable oil. At the same time, industry is widely represented in both regions, including machine building, building materials industry, food industry, and metallurgy. A number of Russian companies based on the Forbes-200 largest private companies of Russia list are based here (Magnit, Neftegazindustriya, Novorossiysk Commercial Sea Port, Agrocom, Rostselmash, and other) (see in: Forbes-200..). In the two studied regions, there are 10 significant ports with a total cargo turnover in 2019 of 258.1 million tons.

From the beginning 2000s both regions became the areas of attraction for MNC from abroad, which contributed to the structural adjustment and renewal of the economy (Knauf, Claas, Metro Cash & Carry, Bonduelle, Danone, Auchan, Philip Morris, PepsiCo, Tetra Pak, Alcoa, PepsiCo, Guardian, IKEA, Leroy Merlin, Metro and others).

The MNC activities analysis in these regions based on the study of about 20 foreign MNC made it possible to draw a number of conclusions regarding the models and strategies for the MNC presence in these regions and their formation of bonds with the local economy. Modernization strategies of large Russian business in the South of Russia were investigated earlier (see the work of Gontar N. and Sapozhnikova A. (2019).

The factors of MNC production localization in the South of Russia in the studied regions were the concentration of demand (due to the population of the regions themselves, tourists, as well as the

orientation of companies to the demand of the neighboring CIS countries, and to supply their subdivisions in Russia). For the MNC in the agricultural sphere, the geographical position, the raw materials local suppliers' network, the developed business infrastructure, human resources and the positive attitude of the regional authorities have become important. A significant factor in the MNC's part localization was reliance on local natural resources (for example, building materials).

A feature of MNC investments in the Russian Black Sea region is their significant volumes. This is due to the fact that reckoning on a significant market has stimulated MNC to create significant production volumes capable of ensuring, among other things, exporting products from the territory of the Russian Federation.

In addition, clustering is a characteristic model of localization of the MNC network in the studied regions of the Russian Black Sea region, in particular, based on the use of the significant agricultural potential of both regions. So, for example, both enterprises were established for the primary processing and transportation of agricultural products, packaging production, and for the production of final food products.

At the same time, single companies over time formed local production clusters around the base activity. Thus, the «Air Products» plant in the Rostov Region, having started the production of a full range industrial gases, also proceeded to create a modern shipbuilding and ship repair complex on the Azov Sea coast.

In addition, the interaction between MNC based in the studied regions gradually developed among themselves: for example, Cargill supplies the Russian market with high-quality chicken nuggets, as well as other chicken products, at "McDonald's" restaurants.

The initial orientation of foreign companies in both regions of the Black Sea region towards their products export was realized in the form of exporting not only industrial products (industrial gases, Guardian float glass, Claas harvester sets), but also food products and food raw materials (corn grown by Bonduelle), which significantly expands and differentiates exports of the South of Russia.

Speaking about the actual formation of relations between MNC and local companies, two aspects can be noted: relations in the course of production localization and establishing relations with raw materials' suppliers.

For example, Claas TUCANO combines are considered to be the example of production localization: since 2018 Russian components have been installed in them (axles, combine cabins, threshing drums are next in line).

In the Krasnodar Territory packaging for Bonduelle products are produced: cans, labels, cardboard boxes. The company plans to organize the cans production for canning. **(see the work of** Kisin (2011).

GUARDIAN plant stimulated the development of satellite industries, small and medium businesses, and collaborates with more than 300 local companies (see: GUARDIAN..).

The most extensive bonds, however, were formed by foreign MNC in the field of processing agricultural products. Thus, the share of local suppliers of Krasnodar Territory in the assortment of METRO Cash and Carry in the Kuban is 21%; these are meat, dairy products, cheese, seasonal vegetables and fruits. 70 Kuban suppliers work with the company (see, for example Jerry Kalmis (2018).

"Nestle Kuban" actively cooperates with more than 600 companies supplying products and services. More than half of these companies are located in the Krasnodar Region.

About 30% of potato suppliers for the PepsiCo Azov plant are enterprises in the Rostov Region. 95% of the raw materials for Coca-Cola Hellenic in 2014 were purchased from the Russian suppliers. according to Coca-Cola (2015).

Currently, McDonald's purchases more than 90% of the products used from the Russian suppliers. In total, about 160 enterprises cooperate with the suppliers in Russia with McDonald's. Over the 27 years of operation, the company has localized almost all the deliveries of the main product categories.

Along with the establishment of broad ties in the supply of agricultural products, the considered MNCs are introducing the standards for suppliers. So, it is mandatory for the McDonald's suppliers to implement the HACCP risk analysis and the critical control point system, for agricultural producers - the basis of standards and requirements laid down in the MAAP program (see McDonald's.. (2017). A similar practice has also been established at Bonduelle.

The securing factor in the regions and strengthening ties for the companies is their cooperation with universities, vocational training, and the cognitive programs implementation ("KNAUF", "Nestle Kuban").

A characteristic feature of a number of companies' models is the change in the traditional business model to adapt to the conditions of the Russian Federation. So, "Bonduelle" today independently processes 10 thousand hectares of crops, as well as 1,5 thousand hectares - as a part of partnership programs with farmers. In Europe, "Bonduelle" has the largest share of all agriculture (99%) in partnership projects. The company's plant in the Krasnodar Region is the only one at which vegetables are also grown. "Bonduelle" factories in Europe are engaged only in processing. This is due to the farming underdevelopment. Also the company is trying to transfer the technologies to farmers, supporting them, buying seeds for them, providing agronomic advice, guaranteed the products' purchase. The experience of "Bonduelle-Kuban" was also taken over by the Russian canneries, which started assuming the functions of growing, which is unusual for the processors (see Kisin (2011).

A significant role in the formation of modern MNC relations in various sectors of the economy of both regions in the Russian Black Sea region is played by the management system for attracting MNC.

Perspective vectors of management system development in the interests of MNC integration and local economy

Achieving a sufficiently significant integration of transnational corporations that came to the Russian Black Sea region territory after 2000 became possible in many respects as a result of quite dynamic activity of the regional management in attracting foreign investments and supporting the investment projects' implementation. These efforts make a significant contribution to the economy modernization of both studied regions.

The most significant regional marketing tool is the annual Russian Investment Forum in Sochi, which brings together both the largest Russian and foreign companies. Also, the regional projects were presented outside the South of Russia, in particular, at the annual St. Petersburg Economic Forum, and abroad (Green Week in Berlin and others). At the same time, regional governors are actively involved in the presentation of proposals of their territories. Special zones prepared for the enterprises' location are being formed in the regions (industrial zones in the Rostov region, state industrial parks in the Krasnodar region).

Permanent bodies for working with foreign investors have been created and operate in the regions. The Advisory Council on Foreign Investment under the Governor has been functioning in Krasnodar region since 2004. Today, the Investment Development Agency has been operating in the Rostov Region and since 2018 the special service to support investment projects has been operating in the Krasnodar Region.

Among the permanent institutions supporting the large-scale projects in the Rostov Region is the list of «100 governor investment projects» of the Rostov Region. Thus, the «Air Products» project, being included in the list, received support from the governor and government at all stages of its implementation.

The expansion of the «KLAAS» plant in Krasnodar was also based on the Special Investment Contract concluded in 2016 with the Ministry of Industry and Trade of the Russian Federation, specifying the terms, volume of investments and the production localization level The regions regularly use a number of FDI support tools. So, in 2012, the Guardian plant was granted a subsidy for the cost part reimbursement of connecting to electricity and gas supply networks in the amount of 28.9 million rubles. In the Krasnodar Region, the administration assumes the coordination functions when connecting new enterprises to gas and electricity networks (the Swedish IKEA is an example (see: Khanova V. Kozlov V.(2011).

In connection with the effectiveness dependence of both FDI and the relations they form with local companies on the macroeconomic situation, as well as on the policies of regional authorities, the need to maintain a two-level system of measures for the participation of MNC in the modernization of regional economies can be pointed out.

So, the macro-level tasks include: stimulating demand in the economy, developing trunk infrastructure, limiting the monopolists' power in the field of energy, gas supply and facilitating administrative procedures.

It is necessary to preserve and maintain the measures in the field of mediation, dispute resolution, the formation of contacts between MNC and the scientific and educational sphere, informational assistance in establishing links between local producers and MNC at the regional level. Among the measures of assistance in the agricultural sector the following measures should be taken: educational and training programs for local farmers, provision of agricultural services with state support, establishment of certification standards and procedures, provision of financial assistance, intermediary services for establishing links between local farmers and MNC, support for farmers' organizations as it is underlined in WIR (2008).

Thus, the formation of strong ties between MNCs and local producers in the two studied Russian Black Sea regions allowed to fulfil the structural modernization of the both regions' economies. So, the new industries (industrial gas production, float glass) were formed and the range of existing industries' products (mechanical engineering, food industry, metallurgy, production of building materials) was expanded. The presence of multi-national companies also contributed to the modernization of technological processes, standards and production skills. In addition, the structure of regional exports has undergone modernization (the formation of non-resource exports, including engineering products). Both regions have successfully used the period of favorable commodity conditions of the 2000s to attract foreign transnational corporations, transform the structure of economies with their help and form the transnational corporations' relations with local companies.

Conclusion

The multi-national corporations' localization in developing and transition economies is an important tool for these economies' modernization, a subject to the formation of broad and strong connections of foreign MNCs with local producers. These connections play a significant role in the economies' industrialization, increasing the level of national value added in exports and increasing the country's competitiveness in the global economy. Obstacles to this scenario realization are the formation of an enclave economy, without establishing MNC connections with local producers, the lack of government requirements for localizing production, and the lack of significant domestic demand for products manufactured with the participation of MNCs.

Russia in the 2000s demonstrated a great demand potential, which attracted a lot of multi-national companies from Europe and the USA to the country. Numerous foreign MNCs have established their production in agriculture and the processing industry in the Russian Black Sea regions. The most notable results of their presence were the structural modernization of the economies in both regions, where a large number of transnational corporations are located. Due to the regional authorities' policies, as well as the MNC sectors' specifics (agriculture and processing of raw materials), numerous relations of MNCs with local suppliers, as well as with consumers throughout Russia, have been formed. MNCs also significantly affected the expansion of non-resource exports of both regions. Thus, the Russian Black Sea region has demonstrated the experience of successfully

attracting foreign MNCs, modernizing the economy and increasing its competitiveness by means of their potential.

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References

- Borensztein, E., De Gregorio, J. and Lee, JW. (1998), 'How does foreign Direct Investment Affect Economic Growth,'*Journal of International Economics*, 45 (1), 115–135.
- "Coca-Cola Hellenic increases investment in its project in the Rostov region", (2015), [Online], [Retrieved December 22, 2019], http://xn--b1aeckzdgwj.xn--p1ai/ru/news/new_element_658/ (in Russian)
- Fons-Rosen, C. et al (2013) 'Quantifying productivity gains from foreign investment '*Working Paper*, 18920, National Bureau of Economic Research, Cambridge, MA.
- "Forbes-200 largest private companies of Russia list" (2019), [Online], [Retrieved December 22, 2019], https://www.forbes.ru/rating/200-krupneishikh-chastnykh-kompanii-rossii-2016/2016#all_rating (in Russian)
- Gallagher, KP and Zarsky, L., (2007) 'The Enclave Economy: Foreign Investment and Sustainable Development in Mexico's Silicon Valley, Cambridge, MA, MIT Press.
- Gontar, N and Sapozhnikova, A. (2019) 'Modernization strategies of big business in the South Russia (on the example of the MNC «Novoe Sodruzhestvo»)' Proceedings of the 34th Inernational Business Information Management Association (IBIMA), ISBN: 978-0-9998551-3-3**,** 13-14 November 2019, Madrid, Spain
- "Guardian factory in the Rostov region shipped the first commodity glass" (2015), [Online], [Retrieved December 29, 2019], https://www.donland.ru/ (in Russian)
- "Jerry Kalmis: "METRO Cash and Carry is not going to leave Russia" (2018), [Online], [Retrieved December 19, 2019], https://kuban.rbc.ru/krasnodar/interview/01/03/2018/5a9785699a7947ec89de4e89 (in Russian)
- Khanova, V and Kozlov, V. (2011) 'What to cook from transnational, '*Expert South,* 39-40 (179), 45-48 (in Russian)
- Kisin, S. (2011) "Bonduel-Kuban": expansion of peas, '*Expert South,* 29-30 (319), 25-28 (in Russian)
- "McDonald's: "South farmers have great potential for cooperation" (2017), [Online], [Retrieved December 31, 2019], https://kuban.rbc.ru/krasnodar/interview/22/09/2017/59c4e6b19a79471e0407080a/ (in Russian).
- Oxford Analytica (2002) 'EastAsia: Manufacturing questions '*Daily Brief*, 14, January (www.oxweb.com/default.asp).
- Pavlinek, P. (2015) 'Whose success? The state-foreign capital nexus and the development of the automotive industry in Slovakia, '*European Urban and Regional Studies*. [Online], [Retrieved December 30, 2019], http://eur.sagepub.com/content/early/2014/12/09/0969776414557965.
- "Production of new energy-efficient glass started at Guardian plant in Rostov region (2014). [Online], [Retrieved December 25, 2019], http://www.glassnews.info/?p=6293 (in Russian).
- Structural change and productivity growth: A review of implications for developing countries (2009), '*Working Paper.* 8, UNIDO, Vienna.
- Summary and conclusions (2002), UNCTAD/ECLAC Joint Regional Seminar on FDI Policies in Latin America, Santiago, Chile, 7-9 January (www.ECLAC.org/).
- The Least Developed Countries '*Report 2015: Transforming Rural Economies*. UN Publication. Sales No. E.15.II.D.7, New York and Geneva.
- Trade and Development report 2002: Global Trends and Prospects, Developing Countries in World Trade Sales No. E.02.II.D.2 UN Publication New York and Geneva
- Trade and development report 2006: Global partnership and national policies for development Sales No: E.06.II.D.6 UN Publication New York and Geneva
- Trade and Development Report 2016: Structural transformation for inclusive and sustained growth Sales No: E.16.II.D.5 UN Publication New York and Geneva

- Tregenna, F. (2008) 'Sectoral engines of growth in South Africa: An analysis of services and manufacturing, '*Research Paper,* 98, UN University – World Institute for Development Economics Research (UNU-WIDER), Helsinki
- World investment Report 2001: Promoting linkages Sales No: E.01.II.D.12 UN Publication New York and Geneva
- World investment Report 2002: Transnational Corporations and Export Competitiveness. Sales No: E.02.II.D.4 UN Publication. New York and Geneva.
- World Investment Report 2005: Transnational Corporations and the Internationalization of R&D, United Nations publication, sales no. E.05.II.D.10, New York and Geneva
- World investment Report 2006: FDI from Developing and Transition Economies: Implications for Development Sales No: E.06.II.D.11 UN Publication New York and Geneva
- World Investment Report 2008: Transnational Corporations, and the Infrastructure Challenge Sales No: E.08.II.D.23 UN Publication New York and Geneva
- Xu, B. (2000) 'Multinational Enterprises, Technology Diffusion and Host Country Productivity Growth '*Journal of Development Economics,* 62 (2), 477–493.

Regional Digitalization in Russia and Model for its Evaluation

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Abstract

The article is devoted to the problems of diagnostics and increasing the efficiency of digital technologies use in regional management. The basic concepts associated with the digitization of management processes at the regional level are considered and the author's method of assessing the degree of regions' digital maturity is proposed. The method is based on the calculation and analysis of the complex index of regions' digital maturity and its components – integrated indicators (subindices) that characterize the main directions and factors of digital development. The methodology of the Index is based on a conceptual framework for assessing "digital readiness". Within the framework of this approach, the indicators of digital maturity are considered systematically, in an analytical perspective, allowing giving a comprehensive assessment of the processes of using digital technologies and the factors affecting them. Ranking by component indices, subindices and individual indicators allows to determine the region's lagging behind in the use of digital technologies and to assess the current conditions for digital maturity. The analysis can be carried out at different levels of indicators aggregation. The rating of digital maturity of Russian regions was formed using the method. According to the results of the study, the directions of increasing the efficiency of regions digitalization are proposed. The method can be used in the future to diagnose the digital maturity of regions in different countries

Keywords: Digital Region, Digital Maturity, Digital Society Development, Index Of Digital Maturity, Region Digital Readiness, Rating Of Digital Maturity, Russian Regions, Regional Management, Digital Technologies, Factors Of Digital Development.

Introduction

In recent years, the problems of digital technologies development in regions have become increasingly important for Russia. In this regard, the concept of "digital region" is growing in popularity in the domestic political and economic discourse. Members of the scientific community analyze international experience and discuss how to use this knowledge in practice, in the Russian realities.

The paradigm of the "digital region" is becoming increasingly popular for the management at the regional level. This paradigm (in the most general sense) is an interconnected system of communication and information technologies, equipped with the ability to interact with each other or with the external environment (Coyle, 2009). This simplifies the management processes in the region, which leads to an increase in the population's living standards. In other words, the "digital region" is the region with efficient economy and governance, high standard of living, mobility and respect for the environment for long-term sustainable development.

For effective management in the framework of the "digital region" concept it is necessary that the public authorities have reliable information about the level of penetration and specificity of digital

technologies use at the control object (Cortada, 2008). A scientifically based method of assessing the digital maturity of the region is required.

This article describes the basic methodological principles of such assessment by constructing the digital maturity index and its components for region. The article also presents the results of the assessment – the ratings of Russian regions on the overall digital maturity index.

Digital Region: Theoretical Framework

At the moment there is no single concept of "digital region", as there are no regions that experts could unanimously adopt as an etalon. This is largely due to the constant change in the technological landscape, the transformation of regions, the avalanche-like growth in the volume and diversity of data that can be used in the framework of the "digital region" concept (Duranton, Puga, 2004).

The Chinese government defines the digital region as "a new concept and model that uses the next generation of information technology, such as the Internet of things, cloud computing, big data, to promote smart planning, construction, management and services for the region" (Report: Digital Regions in China, 2015).

The largest Swiss telecommunications company, Swisscom Ltd. gives the following definition: "digital region is a region that has become more productive and/or cleaner and/or more socially engaged through the use of digital technologies. The purpose of the digital region is to increase the attractiveness for citizens and businesses by improving regional services" (Saxenian, 2016).

The European Commission defines the digital region as "a place where traditional networks and services become more efficient using digital and telecommunication technologies for the benefit of its residents and businesses" (Barrosso, 2010).

Smart Cities Council (USA) notes in its guidelines that "a digital city or region uses information and communication technologies to improve quality of life, working conditions and sustainable development. In the simplest terms, this activity has three components: information collection, communication and information processing" (Rabari, Storper, 2015).

In the monograph (Peacock, 2011) the digital region is considered "the region where information technologies are integrated into services for solving regional problems".

The UN defines the digital region as "an innovative region that uses information and communication technologies and other means to improve living standards, efficiency of activities and services in the region, as well as competitiveness, while ensuring that the needs of present and future generations in economic, social, cultural and environmental aspects are met" (Komninos, 2008).

Analysis of definitions of the digital region, including definitions from the report of the International telecommunication Union, shows that advanced digital technologies are the basis of the digital region.

The current stage of digital technologies development is characterized by the technologies of the third platform according to the classification of the consulting company International Data Corporation (USA): Social, (social network), Mobility, Big data/Analytics, Cloud (cloud computing). For this set of technologies, the company Cognizant (USA) introduced the acronym SMAC (SMAC Stack) (Visnjic, et al, 2016). In the report of the China-Britain Business Council technologies of social, mobile, internet, cloud designated as the SMIC. Switzerland Global Enterprise (Zurich) uses the acronym ACMS for digital technologies Analytics and Big Data, Cloud Computing, Mobile technologies and Social Media. Information and Communications Technology Council (Canada) offers definition SMAAC for these technologies, considering the interrelated Social, Mobile, Applications, Analytics and Cloud digital technologies. According to Ernst&Young the key factors of

digital transformation are determined by the interaction of digital technologies (SMACi): Social media, Mobility, Analytics, Cloud and Internet of Everything (Arigoni, et al., 2015).

Sogeti Research Institute for the Analysis of New Technology adds Internet of Things to the technological trends of the third platform and uses for this set of digital technologies definition SMACT (Van Manen, 2014).

Digital technologies are among the strategic priorities of the innovation component of the world's largest economies.

In the definition of digital in the region from IBM notes three characteristics: instrumented and interconnected, intelligent (Wernberg, Dexe, 2016). Such a model IBM can be briefly described as a model 3I.

According to (Wernberg, Dexe, 2016), instrumentation or digitalization of the regional system means that the functioning of this system is reflected in quantitative indicators and the system becomes measurable. Interconnection means that different parts of core systems can interact with each other, turning data into information. Intelligence refers to the ability to use established information, to form patterns of behavior or likely outcomes and convert them to real knowledge allowing for informed actions. At the same time, the six key systems of the region include population, business, transport, communications, water and energy.

Sustainable development of regions is associated with the introduction of energy-saving technologies and environmentally safe development of regional systems.

In the World Bank's 2016 world development report "Digital dividends" model 3I is presented in graphical form and is called a three-stage approach to solving regional problems. Sensor technologies and social networks are referred to the "instrumentality" stage in the report, the "interconnectedness" stage corresponds to the Internet of things and the "intelligence" stage includes digital technologies of big data and Analytics, predictive Analytics, data-driven optimization (World development report, 2016).

IBM's presentation (Jenkins, 2016) considers big data, cognitive analytics, cloud computing, the Internet of things and security to be the key technologies of the digital region.

Thus, given the fundamental model of IBM, the key technologies of the digital region can be called the Internet of things, mobility, social networks, cloud computing, big data, cognitive analytics.

Innovative ways of data collection and analysis are gradually taking the place of well-established mechanisms of regional governance. Unlike statistical samples, which are outdated at the time of analysis, "big data" can be processed in real time, which improves the quality and speed of decision-making.

"Big data" in the area of regional governance complements traditional types of information about the region and expands their scope. Thus, thanks to the "big data" it became possible to monitor behavioral models, to analyze regional lifestyle and such familiar categories as population, economic development, construction and infrastructure, etc. The digital revolution and the widespread use of the Internet have created a new phenomenon – data driven region (DDR) (Komninos, 2006).

The combining efforts of business, authorities and public organizations gives regions the possibility to create safer, more environmentally friendly and economically effective infrastructure. At the same time, regions and cities are experiencing a lot of problems. They face the task of ensuring equal access to digital systems as well as attracting investment and highly skilled professionals. The solution of these problems can be achieved through the implementation of smart digital technologies (Komarevtseva, 2017).

Modern regions are using the latest technology to support sustainable development and a high standard of living in conditions of rapidly growing population, increasing the territory of the region and the complexity of its infrastructure. Among the most urgent tasks we can distinguish the following:

- ensuring comfortable movement within the region;
- increasing the capacity of regional infrastructure (water, electricity, etc.);
- maintaining security in the face of increasing social tensions;
- reducing the negative impact on the environment;
- improving the quality of municipal services;
- equal access of all categories of the population to education, health care and other socially important services;
- involvement of residents in the management of the region.

The author supposes that the key components of the region's management based on digital technologies are the data itself, the technologies of their processing and the authorities using the results of the analysis for decision-making. The digital region is characterized by the ability of public authorities to use data collection, processing and analysis technologies to improve the socio-economic, environmental situation and improve the living standards of the population.

Decision-making based on digital data can become the main driving force of innovation and will dramatically change the regional governance. But the introduction of new technologies in each case should have clear goals. Without this, it is impossible to predict and evaluate the effect of innovation.

The Model of Region Digital Maturity Assessment

To speed up the implementation of the "digital region" concept the author proposes to start programs of digital changes with diagnostics. For this purpose, a diagnostic technique, a model of region digital maturity is developed.

The maturity model is a valuable tool for analysis that allows to assess the current situation in the region for the implementation of digital technologies, as well as to identify reasonable measures to improve the digitalization of management processes.

The model is based on the calculation and analysis of the complex Index of digital maturity of regions (hereinafter the Index) and its components – integrated indicators (subindices) that characterize the main directions and factors of digital development. On the basis of the Index and its components the rating of digital maturity of the Russian regions is constructed.

The Index is an important information and analytical tool for the formulation, implementation and adjustment of digital policy at the regional level. Comprehensive index is a single number characterizing the situation with digitalization. Its use helps to identify the main problems, strengths and weaknesses of a region in the field of digital technology and to set guidelines for further development.

The Index is based on the assessment of digital maturity factors. It characterizes the use of digital technologies for the development of the main spheres of society in regions, as well as the use of digital technologies in households.

The Index uses 77 indicators of digital maturity, including key indicators of access and use of digital technologies recommended by international organizations.

The Methodology of the Digital Maturity Index

The digital maturity index is a measure of regions preparedness for large-scale use of digital technologies for development. The methodology of the Index is based on a conceptual framework for assessing "digital readiness". Within the framework of this approach, the indicators of digital maturity are considered systematically, in an analytical perspective, allowing giving a comprehensive assessment of the processes of using digital technologies and the factors affecting them.

The Index is based on indicators that characterize the three key factors of digital development (human capital, economic environment, digital infrastructure) and indicators of access and use of digital technologies in six areas – public and municipal administration, business, education, health, culture, as well as the use of digital technologies by households (see Figure 1).

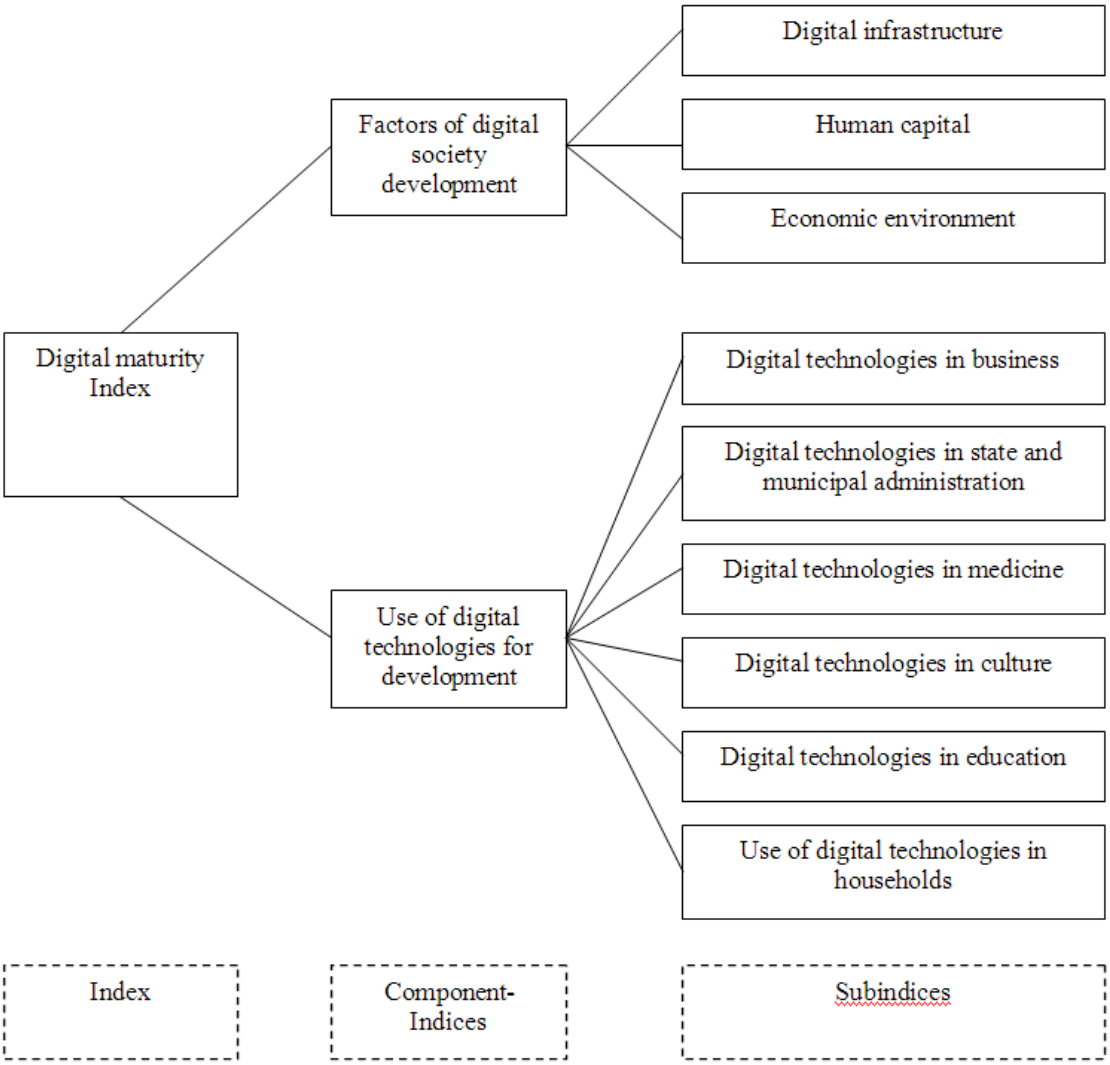

Figure 1: Structure of the digital maturity index

The Index is built on the basis of aggregating the indicators values. The aggregation is made at several levels, allowing building ratings of regions in different areas of digital maturity with varying degrees of detail.

To obtain an assessment of subject areas (subindices), sets of indicators are used, combined according to the parameters of the assessment of this area. Figure 2 shows, for example, the structure of the "digital technologies in culture" subindex, for which seven indicators were used.

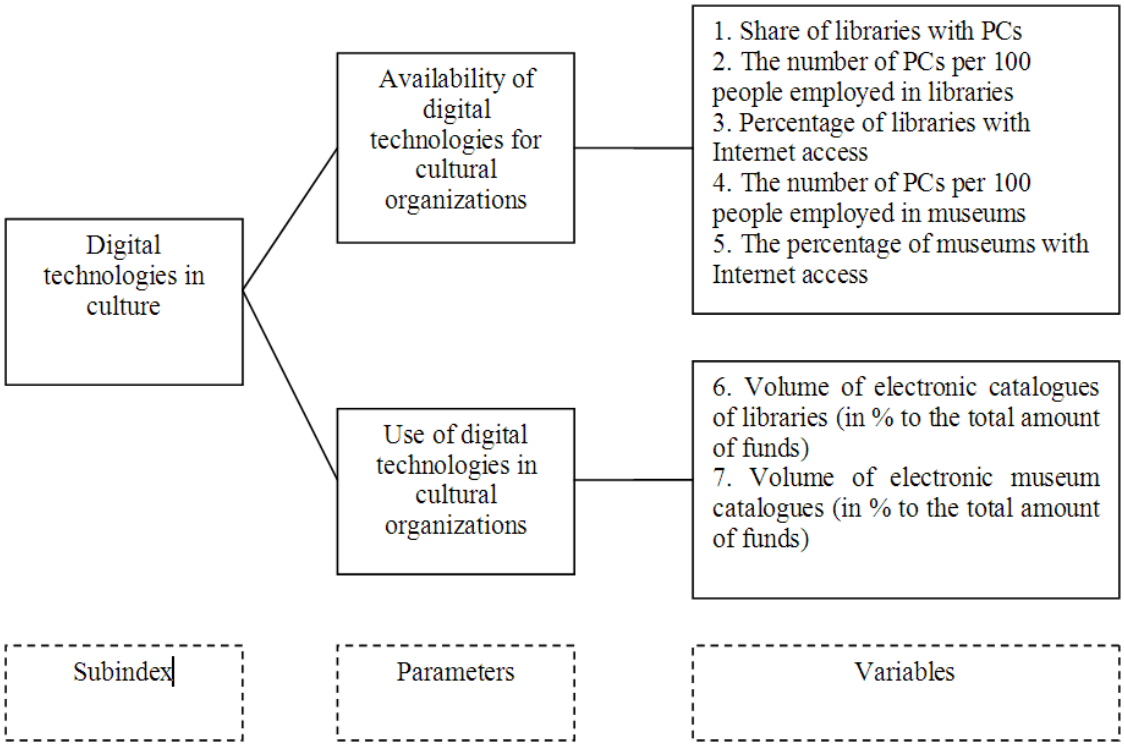

Figure 2: The structure of the subindex "Digital technologies in culture"

In a number of areas (Infrastructure of digital technologies, Economic environment, Use of digital technologies in households, Digital technologies in education), subindices were calculated directly on the basis of their constituent indicators without the introduction and calculation of intermediate parameters (as in the case of the subindex of "Digital technologies in culture", etc).

The Method of the Index Calculation

To calculate the indices, all the indicators used are normalized (transformed into an estimate in the range from 0 to 1). Our methodology of normalization is similar to the procedure used in the integrated development index of digital technologies developed by the International Telecommunication Union (ICT Development Index, IDI) (Measuring the Information Society, 2010).

This procedure is based on the calculation of the ratio of the current indicator value for the region to the "reference" (normalizing) value – usually the maximum possible for this indicator. The following formula is used:

normalized value (estimate) of region X = Rx / Rn, (1)
where Rx is the index value for region x,
Rn is normalizing ("reference") value of the indicator.

Thus, if the region has a "reference" (usually the maximum possible) value of the indicator, its score for this indicator is 1, if the value is less than the "reference", then its normalized value will be less than 1. The normalized value shows how the region lags behind the reference value.

Another formula is used to estimate indicators whose increase in value is negative (for example, the share of food in the structure of final consumption of households):

Normalized value of the indicator for region X = Rn / Rx . (2)

As normalizing ("reference") values of indicators in case of share indicators the maximum possible (100%) value is taken. In other cases, the normalizing value is chosen on the basis of the desired, sufficient and achievable values for the leading regions on the ten-year planning horizon. It is necessary to take into account the forecasts of the values for the leading regions, Russia as a whole and indicators values in the most developed countries.

If there is no indicator value for a particular region, its value is determined using statistical methods (correlation analysis, etc.).

The values of the subindices are calculated as a weighted average of the estimates of the parameters characterizing the corresponding subject area (if parameters were entered). The value of parameters and a number of subindices (if they were calculated without parameters) is defined as a weighted average of indicators characterizing this direction of digital development – each indicator is included with a certain weight coefficient (in most cases equal weights are used). The evaluation of the component indices ("Factors of digital maturity" and "Use of digital technologies for development") is calculated as an arithmetic mean of the subindices estimates. The overall digital maturity Index is obtained as a weighted average of the component indices (with weights 1/3 and 2/3, respectively), which is equivalent to the arithmetic mean of the estimates of all subindices included in the Index. The ratings of regions are formed on the basis of the General Index, component indices, subindices and estimates of individual indicators.

Sources of Information

Two types of data are used in the calculation of indicators and subindices:

1. Official data of international, state and industry statistics: Eurostat, International Telecommunication Union, Russian Federal State Statistics Service (Rosstat), as well as Russian ministries and agencies.
2. Opinion polls and surveys: results of evaluation of official web-sites of regional executive authorities, carried out according to the methodology of the United Nations; the data of the representative survey of Russian regions population, carried out by "Public Opinion" Foundation (the "Georating" project).

Calculation of indicators and subindex "infrastructure of digital technologies" was based on the data of the Ministry of Telecom and mass communications of the Russian Federation and Rosstat data. The calculation of the number of computers per 100 people was carried out using data on the availability of PCs in organizations (form of state statistical observation No. 3-inform) and Rosstat data on the availability of computers in households.

The assessment of the subject area "Human capital" was based on the published statistical data of Rosstat.

Indicators of the economic environment were calculated on the basis of the published data of Rosstat and data of population surveys in the regions carried out by the "Public Opinion" Foundation (the "Georating" project, autumn 2017).

The rating of digital technologies use by households was based on the results of the household budget survey conducted by Rosstat.

Indicators of digital technologies use by the authorities were calculated on the basis of the results of the state statistical observation.

To assess the use of digital technologies in business, indicators based on Rosstat databases (results of the survey of enterprises in form No. 3-inform, selected by economic activity in accordance with the recommendations of the OECD and Eurostat for similar surveys) were also used.

Evaluation of digital technologies use in culture was carried out on the basis of data published by the Ministry of culture of the Russian Federation.

Evaluation of digital technologies use in medicine was carried out on the basis of the results of the survey of health organizations in the form № 3-inform from the databases of Rosstat.

Evaluation of digital technologies use in education was based on the data obtained by Rosobrazovanie on the basis of the D-4 form.

Thus, all regions were ranked on the basis of complex indices based on a complete set of data for all indicators.

Interpretation of Results

Ranking by component indices, subindices and individual indicators allows to determine the region's lagging behind in the use of digital technologies and to assess the current conditions for digital maturity. The analysis can be carried out at different levels of indicators aggregation.

The normalization procedure makes it possible to interpret the digital maturity Indices of the regions in the following areas:

1. Normalized values of indicators and complex indices can be interpreted as distances from "reference" values. For example, the subindex value of 0.250 means that the region in this area of digital development is 4 times behind (its level is a quarter or 0.25) from the "reference" level.
2. Normalized values of indicators and complex indices allow to measure differences between regions on the level of digital maturity and thereby to trace values of the corresponding control indicator of digital development strategy.
3. If you save a set of indicators and their fixed "reference" (normalizing) values, it becomes possible to track changes in complex indices of the regions in time. With the chosen normalization procedure, the change in the index values and its components in different years is easily interpreted and becomes significant.

However, when interpreting data on the relative level of digital maturity of regions, their relative "advancement" in the use of digital technologies and in creating conditions for digital maturity, it is important to understand that there are two limitations in the analytical use of the Index and its components that need to be taken into account:

1. There are regions with very close values of the digital maturity Index, and their differences in the level of digital maturity are beyond the limits of statistical significance.
2. The use of complex indices to characterize the relative level of digital maturity and certain areas of use of digital technologies in the regions smoothes out certain problems with the quality of state and departmental statistics, but the existing defects of official data can have an impact on the results of the rating (especially at the level of individual indicators).

Main Results

The values of the digital maturity index of the Russian regions are presented in table 1 below.

Table 1: Rating of digital maturity index of the Russian regions

Position	Region	Index
1	Moscow	0.691
2	Saint-Petersburg	0.613
3	Khanty-Mansiysk Autonomous Okrug	0.545
4	Yamalo-Nenets Autonomous Okrug	0.531
5	Tomsk Oblast	0.511
6	Tyumen Oblast	0.485
7	Murmansk Oblast	0.477
8	Chuvash Republic	0.465
9	Chukotka Autonomous Okrug	0.459
10	Republic of Karelia	0.455
11	Khabarovsk Krai	0.450
12	Sakhalin Oblast	0.449
13	Moscow Oblast	0.440
14	Nizhny Novgorod Oblast	0.439
15	Samara Oblast	0.435
16	Sverdlovsk Oblast	0.432
17	Nenets Autonomous Okrug	0.431
18	Kamchatka Krai	0.430
19	Krasnoyarsk Krai	0.427
20	Novosibirsk Oblast	0.426
21	Yaroslavl Oblast	0.424
22	Chelyabinsk Oblast	0.424
23	Kaluga Oblast	0.423
24	Magadan Oblast	0.417
25	The Republic Of Tatarstan	0.414
26	Arkhangelsk Oblast	0.413
27	Leningrad Oblast	0.409
28	Perm Oblast	0.409
29	Kaliningrad Oblast	0.407
30	Belgorod Oblast	0.407
31	Primorsky Krai	0.407
32	Vladimir Oblast	0.400
33	Republic of Udmurtia	0.399
34	Irkutsk Oblast	0.398
35	Kemerovo Oblast	0.398
36	Penza Oblast	0.398
37	Krasnodar Krai	0.398
38	Stavropol Krai	0.395
39	Rostov Oblast	0.394
40	The Republic Of Sakha (Yakutia)	0.392
41	Republic of Komi	0.386
42	Nizhny Novgorod Oblast	0.386
43	The Republic of Khakassia	0.385
44	Vologda Oblast	0.384
45	Voronezh Oblast	0.380
46	Republic of Buryatia	0.379

47	Lipetsk Oblast	0.376
48	Orenburg Oblast	0.376
49	Saratov Oblast	0.375
50	Volgograd Oblast	0.371
51	Republic of Bashkortostan	0.368
52	Astrakhan Oblast	0.366
53	Omsk Oblast	0.365
54	Ryazan Oblast	0.361
55	Tula Oblast	0.357
56	Tver Oblast	0.356
57	Altai Krai	0.356
58	Ulyanovsk Oblast	0.355
59	Kirovsky Oblast	0.354
60	Jewish Autonomous Oblast	0.351
61	The Republic of Mari El	0.348
62	Pskov Oblast	0.348
63	Ivanov Oblast	0.347
64	Kurgan Oblast	0.346
65	Republic of Mordovia	0.345
66	Smolensk Oblast	0.339
67	Oryol Oblast	0.339
68	Kostroma Oblast	0.338
69	Amur Oblast	0.336
70	Tambov Oblast	0.334
71	Bryansk Oblast	0.333
72	Republic of Altai	0.328
73	Kursk Oblast	0.328
74	Republic Of Adygea	0.326
75	Republic of North Ossetia – Alania	0.325
76	Zabaikalsky Krai	0.323
77	Kabardin-Balkar Republic	0.307
78	Republic of Kalmykia	0.300
79	The Karachay-Cherkess Republic	0.281
80	Republic of Dagestan	0.256
81	Republic of Tuva	0.251
82	Republic of Ingushetiya	0.213

Capital cities - Moscow and St. Petersburg are in the first place in the ranking of digital maturity. The third and fourth places in the ranking are occupied by rich resource-producing regions: Khanty-Mansiysk Autonomous Okrug and Yamal-Nenets Autonomous Okrug. The fifth place belongs to the Tomsk Oblast, the level of digital maturity of which is determined by high rates of human capital development and the use of digital technologies in business and medicine (third place in the country). Rich resource-producing regions demonstrate a traditionally high level of digital maturity. First of all, this applies to the Khanty-Mansiysk and Yamal-Nenets Autonomous Okrugs (third and fifth places), Tyumen oblast (sixth place) and Chukchi Autonomous Okrug (ninth), in which a high level of gross regional product per capita production and high household income create economic opportunities for effective demand for digital technologies.

Five outsider regions in terms of digital maturity: the Republic of Kalmykia, Karachay-Cherkess Republic, the Republic of Dagestan, the Republic of Tuva, the Republic of Ingushetia.

The maximum gap between the Russian regions on the integral indicator characterizing digital maturity is 3.3 times.

The Factors of Digital Development

The rating of regions readiness by factors of digital development is presented in table 2. To build this component-index, we used, as already noted, indicators that characterize three groups of factors: the ICT infrastructure, human capital and the economic environment for the use of digital technologies.

ICT Infrastructure

ICT infrastructure is a set of geographically distributed networks and communication systems, subscriber equipment and computer equipment. The availability of modern high-tech ICT infrastructure is a prerequisite for the widespread use of information and communication technologies and the development of the information society.

The state of ICT infrastructure is one of the three most important determinants of digital development of regions and the country as a whole.

To assess the level of development of ICT infrastructure in the regions of Russia, a set of indicators characterizing the state of its four main segments: fixed telephony, mobile cellular communications, computers and data networks was used.

The following key indicators were used:

- fixed telecommunication telephone density (number of telephones per 100 population));
- distribution of mobile cellular communication (number of active SIM-cards per 100 people);
- number of personal computers per 100 population;
- share of Internet users in the age group of 16 years and older (semi-annual audience).

A system of indicators and a methodology developed in response to the recommendations of international organizations were used to calculate the ICT infrastructure sub-index, allowing for a number of cross-country comparisons of indicators.

Human Capital

The state of human capital, which, according to the classical definition, refers to the body of knowledge and skills that a person possesses and uses in the process of work, plays an important role in expanding the use of information and communication technologies (ICT) in various areas of life in the country and its regions. To compile the “human capital” sub-index, we used the indicators of its state, which have the highest correlation with the indicators of ICT development in various spheres of society:

- number of researchers per 10,000 population;
- share of employed population with higher education;
- number of University students per 1,000 population;
- admission of students in specialties (areas of training) of higher professional education in the field of ICT for 10,000 people;
- graduates of specialists, bachelors and masters in specialties (areas of training) of higher professional education in the field of ICT for 10,000 people.

The specific number of scientists characterizes the state of scientific and innovative potential of the region, which determines the degree of development and application of ICT. The share of employment with higher education and the proportion of students indicate the level of education of the population, which, in turn, has an impact on the extent of use of ICT by the population and the

dynamics of their spread. Specific indicators of admission of students in specialties (areas of training) of higher professional education in the field of ICT and the release of relevant specialists (bachelors, masters) reflect the state of human resources in the field of ICT, which is important for the expansion of production of ICT goods and services and their use for the development of various fields of activity.

Economic Environment

The state of the economic environment, which includes a set of economic conditions of the population, the functioning of economic and social structures, has a significant impact on the demand and supply of ICT. The "economic environment" sub-index shows how favourable economic conditions are for the production and consumption of digital technologies and reflects the maturity of the economic prerequisites for the digital development of the territory.

When constructing the sub-indices, as described above, the method of normalization was used. From the large number of indicators that characterize the state of the economic environment, the indicators that show the closest relationship with the indicators of ICT use by the population and organizations were selected. As a result, the assessment of the economic environment of digital development in the region is based on the following indicators:

- GRP per capita, reflecting the level of economic development that substantially determines the scale of ICT production and consumption;
- average annual growth rates of GRP volume, characterizing the General state of the economy, which, in turn, affects the dynamics of digital development of the territory;
- share of food costs in household final consumption expenditure, reflecting the potential purchasing power of the population for ICT-related goods and services;
- revenues of the consolidated budget of the region per capita, indicating the possibility of allocating budget funds for the development of ICT in the region.

Table 2: The Component Index of Digital Development Factors

Position	Region	Index
1	Moscow	0.839
2	St. Petersburg	0.724
3	Tomsk Oblast	0.566
4	Khanty-Mansiysk Autonomous Okrug	0.545
5	Yamalo-Nenets Autonomous Okrug	0.539
6	Tyumen Oblast	0.516
7	Nenets Autonomous Okrug	0.500
8	Moscow Oblast	0.489
9	Magadan Oblast	0.483
10	Sakhalin Oblast	0.477
11	Novosibirsk Oblast	0.477
12	Kamchatka Krai	0.475
13	Nizhny Novgorod Oblast	0.474
14	Chukotka Autonomous Okrug	0.459
15	Samara Oblast	0.451
16	Murmansk Oblast	0.451
17	Kaluga Oblast	0.449
18	Republic of Tatarstan	0.426
19	Chelyabinsk Oblast	0.422
20	Republic of Sakha (Yakutia)	0.418
21	Yaroslavl Oblast	0.414

22	Voronezh Oblast	0.413
23	Khabarovsk Krai	0.413
24	Sverdlovsk Oblast	0.411
25	Krasnoyarsk Krai	0.411
26	Primorsky Krai	0.410
27	Chelyabinsk Oblast Republic of Komi	0.409
28	Arkhangelsk Oblast	0.405
29	Perm Krai	0.400
30	Penza Oblast	0.394
31	Kaliningrad Oblast	0.390
32	Irkutsk Oblast	0.388
33	Rostov Oblast	0.386
34	Ryazan Oblast	0.379
35	Republic of Karelia	0.376
36	Belgorod Oblast	0.375
37	Leningrad Oblast	0.375
38	Vologda Oblast	0.372
39	Tver Oblast	0.372
40	Udmurt Republic	0.372
41	Vladimir Oblast	0.371
42	Omsk Oblast	0.368
43	Saratov Oblast	0.365
44	Ulyanovsk Oblast	0.365
45	Tula Oblast	0.365
46	Nizhny Novgorod Oblast	0.364
47	Volgograd Oblast	0.363
48	Republic of Bashkortostan	0.363
49	Chuvash Republic	0.363
50	Smolensk Oblast	0.355
51	Republic of Mordovia	0.353
52	Astrakhan Oblast	0.353
53	Republic of Buryatia	0.352
54	Kursk Oblast	0.351
55	Oryol Oblast	0.351
56	Republic of North Ossetia – Alanya	0.349
57	Stavropol Krai	0.348
58	Tambov Oblast	0.345
59	Kemerovo Oblast	0.345
60	Krasnodar Krai	0.342
61	Orenburg Oblast	0.340
62	Republic of Mari El	0.339
63	Pskov Oblast	0.337
64	Republic of Khakassia	0.334
65	Ivanovo Oblast	0.333
66	Altai Krai	0.333
67	Kurgan Oblast	0.329
68	Kirov Oblast	0.329
69	Bryansk Oblast	0.327
70	Amur Oblast	0.327
71	Lipetsk Oblast	0.325

72	Jewish Autonomous Oblast	0.324
73	Kostroma Oblast	0.323
74	Karachay-Cherkess Republic	0.312
75	Zabaikalsky Krai	0.304
76	Republic of Altai	0.304
77	Republic of Adygea (Adygea)	0.302
78	Republic of Kalmykia	0.301
79	Kabardin-Balkan Republic	0.300
80	Republic of Tuva	0.269
81	Republic of Dagestan	0.262
82	Republic of Ingushetiya	0.223

The component index of digital development factors in the Russian regions demonstrates a high degree of correlation with the use of digital technologies.

The five leaders according to the availability of the prerequisites for digital development consists mainly of the same Russian regions who occupy the leading positions in the overall Index of digital maturity, although the order slightly changed – Tomsk Oblast is in the third place, Khanty-Mansi Autonomous Okrug is in the fourth place, Yamalo-Nenets Autonomous Okrug is in the fifth. Moscow and St. Petersburg are in the first two places in the ranking.

The maximum gap between the Russian regions on the integral indicator characterizing the factors of digital maturity is 3.8 times.

Conclusion

In the article we stated the essence of method for calculating the digital maturity index for regions and presented the main results of testing the method on the example of Russia.

Regions were compared according to the degree of implementation of the concept of “digital region”. We compared:

1. The factors of the digital society development,
2. The use of digital technologies for development.

In order to assess the level of technology implementation in the regional management, we analyzed the existing experience in the selected regions. The applied technological solutions used are grouped according to the spheres of life of the region or the branch principle. The following areas were identified: business, state and municipal administration, medicine, culture, education, households.

The current situation in Russia is characterized by a significant difference in the economic opportunities of the capital (Moscow) and most regions, which on average have GRP per capita 4 times less than Moscow.

The degree of digitalization of the regions is heterogeneous, which allows us to identify four main groups and discuss the features of their further development.

1. The leaders of digitalization.

Despite the shrinking digital divide, Moscow and St. Petersburg remain the undisputed leaders. These are role models for other regions. Further growth can be achieved by increasing the penetration of online services and the overall increase in the involvement of citizens, business and the state in the digital economy.

2. Developing regions (the main group).

This group includes most of the regions of Central and Southern Russia, the Urals, as well as some regions of Siberia and the Far East. These regions have an average level of digitalization and over the past 5 years have significantly reduced their backlog from the leaders. We should also mention the Moscow and Leningrad regions (oblasts), the driver of the digital development of which are Moscow and St. Petersburg.

The regions in this group have potential for growth in all key areas – infrastructure and engagement.

In the current macroeconomic situation, the priority of development should be to maximize the use of existing infrastructure and access, as well as to increase the efficiency of processes through digital services and platforms.

3. Developing sparsely populated regions.

This group includes the Northern regions of Russia and sparsely populated regions of the Far East. They have a level of digitalization comparable to the previous group, but their further development in the field of digitalization has a number of features.

First, these regions are the centers of the mining industry. Best practices confirm that the introduction of digital technologies in the industrial sector can significantly improve efficiency and, consequently, added value.

Secondly, the low population density imposes a number of restrictions on the development of e-Commerce opportunities, as well as the availability of quality education and medicine. The introduction of online services in the social sectors will allow to neutralize the geographical features of these regions and provide access to quality services without significantly increasing costs.

4. Lagging regions.

This group includes some regions of the North Caucasus. Despite a relatively small lag from the main group in terms of infrastructure development, they are significantly behind the average in terms of involvement in the digital economy.

Regional governments should play a leading role in digitalization. This will not only improve the efficiency of public services, but also increase the involvement of citizens in the use of digital technologies.

References

Arigoni, D., Levofsky, A., Sprague, E., Vanakkeren, B., Bernstein, S., Blaha, K., Chen, D., et al. (2015), Getting to Smart Growth. International City/County Management Association (ICMA), 216.
Baily, M. N., & Lawrence, R. Z. (2001), Do we have a new e-conomy? Cambridge, MA: National Bureau of Economic Research.

Barrosso, J. M. (2010), Europe 2020 - A European strategy for smart, sustainable and inclusive growth. European Commission, 131.

Batagan, L. (2011). Smart Cities and Sustainability Models. Informatica Economica, 80-87.

Brynjolfsson, E., & Kahin, B. (2000), Introduction. In E. Brynjolfsson & B. Kahin (Eds.), Understanding the digital economy: Data, tools, and research (pp. 1-10). Cambridge, MA: MIT Press.

Cortada, J. W. (2008). 21st century business: Managing and working in the new digital economy. Upper Saddle River: Prentice Hall.

Coyle, D. (2009), The weightless world: Strategies for managing the digital economy. Cambridge, MA: MIT Press.

Duranton, G., & Puga, D. (2004), 'Micro-foundations of urban agglomeration economies.' *Handbook of regional and urban economics*, 4, 2063-2117.

Feldman, M. P., & Audretsch, D. B. (1999), 'Innovation in cities: Science-based diversity, specialization and localized competition,' *European Economic Review*, 43(2), 409-429.

Glaeser, E. L., Kallal, H. D., Scheinkman, J. A., & Shleifer, A. (1992), Growth in cities. Journal of Political Economy, 100(6), 1126-1152.

Hamilton, Daniel S. (2017), The Transatlantic Digital Economy 2017: How and Why it Matters for the United States, Europe and the World Washington, DC: Center for Transatlantic Relations.

Hohlov, Y. (2011), Architecture of Future Government // In Book: Future of Government: Lessons Learned From Around the World / Geneva: World Economic Forum, 2011. 52 p.

Jenkins, D. (2016). IBM Digital Region 10.07.2017 [Online]. 7 January 2019. Available: http://s3.amazonaws.com/nist-sgcps/digitalregionframework/files/GCTCTechJamKickoff/DavidJenkins_IBM_Digital_Region.pdf
Kenney, Martin, and John Zysman. (2015), "Choosing a Future in the Platform Economy: The Implications and Consequences of Digital Platforms." Discussion paper prepared for the Kauffman Foundation New Entrepreneurial Growth Conference. Amelia Island, Florida.

Komarevtseva, O. (2017), Smart city technologies: new barriers to investment or a method for solving the economic problems of municipalities? R-Economy, Vol. 3, Issue 1, 32-39.

Komninos, N. (2006), The Architecture of Intelligent Regions. Intelligent Environments. Athens: Institution of Engineering and Technology, 87.

Komninos, N. (2008), Intelligent Cities and Globalisation of Innovation Networks. Routledge, 119.
Lipsey, Richard G., Kenneth I. Carlaw, and Clifford T. Bekar. (2005). Economic Transformations: General Purpose Technologies and Long-Term Economic Growth. Oxford ; New York: Oxford University Press.

Measuring the Information Society. – International Telecommunication Union, 2010. [Electronic source] http://www.itu.int/ITU-D/ict/publications/idi/2010/index.html.

Ministry of Telecom and mass communications of the Russian Federation – Official website. [Online]. 15 January 2019. Available: http://minsvyaz.ru

Peacock, H. (2011), Cities In Competition: Branding The Smart City. TEDx Amsterdam – The City of the Future, 172.

Rabari, C., & Storper, M. (2015), 'The digital skin of cities: urban theory and research in the age of the sensored and metered city, ubiquitous computing and big data,' *Cambridge Journal of Regions, Economy and Society*, 8(1), 27-42

Report: Digital Regions in China. (2015). China Britain Business Council. EU SME Centre [Online]. 12 January 2019. Available: http://cbbc.org/cbbc/media/cbbc_media/KnowledgeLibrary/Reports/EU-SME-Centre-Report-Digital-Regions-in-China-Jan-2016.pdf (Date of access: 05.08.2018).

Russian Federal State Statistics Service – Official website. [Online]. 10 January 2019. Available: http://www.gks.ru/

Saxenian, A. (2016), The new argonauts: Regional advantage in a global economy. Harvard University Press, 132.

Shaping smarter and more sustainable regions: striving for sustainable development goals. (2016). ITU-T's Technical Reports and Specifications 05.07.2017 [Online]. 10 January 2019. Available: http://itu.int/pub/T-TUT-DIGITALREGION-2016-1

Storper, M., & Venables, A. J. (2004), 'Buzz: face-to-face contact and the urban economy,' *Journal of economic geography*, 4(4), 351-370.

The ICT Market in China. (2015). Sector Report. China-Britain Business Council. EU SME Centre, 35.

Thomas van Manen, Jaap Bloem, Menno van Doorn. (2014), SMACT and the Region. New Technologies in Urban Environments. VINT research report, 40.

Top of Digital Europe (2016). Towards a cross-border open data agenda. Joakim Wernberg. Report by BDF and Microsoft, 96.

Townsend, A. M. (2013), Smart cities: Big data, civic hackers, and the quest for a new utopia. WW Norton & Company, 117.

Visnjic, I., Neely, A., Cennamo, C., & Visnjic, N. (2016), 'Governing the City: Unleashing Value from the Business Ecosystem,' *California Management Review*, 59(1), 109-140.

Wernberg, J., & Dexe, J. (2016), Rewiring Europe: Five Priorities for a Lasting Digital Economy, Wilfried Martens Centre for European Studies, 129.

World development report (2016). Digital dividends. International Bank for Reconstruction and Development. The World Bank, 359 p. 05.07.2017 [Online]. 23 January 2019. Available: http://data.gov.ru/doklad-o-mirovom-razvitii-cifrovye-dividendy-2016-obzor-vsemirnogo-banka-2016-god

The Role of Social Transfers in Equalizing Income Inequalities in Poland. A Factor Component Decomposition

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Abstract

The aim of the paper is to assess the impact of various income sources on the level of inequality in Poland. Particular attention was paid to the role of social transfers, especially the "Family 500+" programme, and taxes in levelling income inequalities. The study refers to household disposable incomes from 2015-2016, i.e. the year of the programme "Family 500+" introduction and the previous year. The study was carried out on the EU-SILC data. To examine the extent to which different income components affect income inequality, we decompose the Gini coefficient according to the method introduced by Lerman and Yitzhaki. Our results indicate that, in 2016 compared to 2015, income inequality decreased in the groups of households with children, while in the groups of households without children increased. Taxes and social transfers, except old-age and survivor's benefits, reduced income inequality regardless of the household group. However, it was income taxes and social security contributions that were by far the most important factor in reducing income inequalities. Our study also revealed that in the group of single person with dependent children, the share of family and children related allowances in disposable income has increased, while their inequality-reducing effect has decreased.

Keywords: Income inequality, Income source, Decomposition, Households

Introduction

During the transitional years, the countries of Central and Eastern Europe, including Poland, have experienced a sharp increase in income inequality. Since 2007, in Poland, a gradual decrease in income inequality has been observed. Brzeziński (2017, p. 6) suggests the following reasons for the decrease in income inequality in Poland between 2007 and 2014: reforms of the tax-benefit system (in particular, the introduction of child tax credits in 2007), reforms of the family allowance system and a fall in earnings inequality. Moreover, in 2016 a government programme "Family 500+" was introduced.

"Family 500+" is a programme under which parents receive PLN 500 a month for the second and each next child, no matter how much they earn. It was introduced mainly to improve a demographic situation in Poland because of the fertility rate, which had changed significantly in the last 30 years. Currently, Poland has a very low fertility rate, lower than the majority of European countries (in 2016 it was 1.39). The opponents of the programme openly stated in many debates that they do not believe the programme will produce the desired results.

Therefore, the aim of this paper is the investigation how different income sources affect the level of inequality in Poland, with focus on the role of social transfers and taxes in decreasing income inequalities in 2015-2016. Our paper aims at examining the sources of income inequality in Poland by decomposing household income by factor sources at the micro level. In order to achieve the aim, a Gini coefficient decomposition analysis, according to the type of households is carried out. This paper uses data from the European Union Statistics on Income and Living Conditions (EU-SILC) to study the extent to which different components of household income affect total income inequality.

The analysis of redistributive effects of tax and social systems has a long tradition in economic and social science literature. Empirical studies on redistributive policies are based on two approaches. The first of these, called standard approach (see Fuest et al., 2010), is based on a certain income accounting framework. The analysis of the redistributive impact of income taxes and social transfers is based solely on direct comparisons of the income distribution before and after cash benefits and before and after income taxes. To assess the partial effects of specific social benefits and taxes on overall redistribution, a sequential accounting decomposition technique to the Gini is used by Fuest et al. (2010), Alves (2012), Guillaud et al. (2017), Caminada et al. (2019). Redistribution is simply the difference between primary income inequality and disposable income inequality (Caminada et al., 2019). This approach has been, among others, advocated by of Reynolds and Smolensky (1977), Kakwani (1984), Mahler and Jesuit (2006).

The second possibility to assess the impact of different income components such as taxes and transfers on income inequality is the factor decomposition approach as suggested by Shorrocks (1982). In this case, the inequality contribution of each factor component is determined simultaneously. Thanks to this approach to decomposition, it is possible not only to determine the impact of taxes and transfers on inequality, but also other sources of total income. This way of analysis was adopted, among others, by Fräßdorf et al. (2011), Garcia-Peñalosa and Orgiazzi (2013), Medgyesi (2014), Amarante (2016), Rani and Furrer (2016). In this article, we will refer primarily to such an approach to assess the impact of tax and transfer system on inequality reduction.

One of the most relevant studies concerning identifying the role of tax and benefit policies in Poland can be attributed to Myck and Najsztub (2016). They examined the dynamics of disposable incomes and their specific components in Poland, between 2005 and 2014. Their results show why at the time of rapid economic growth, which Poland experienced at the time, income inequality has remained relatively stable. The impact of different sources of income on income inequality in Poland was investigated by Wędrowska and Muszyńska (2019), who focused on income inequalities in the Visegrad Group countries in 2015. The impact of the "Family 500+" programme on the level of income inequality of Polish households was studied by Graca-Gelert (2018) and Jędrzejczak and Pekasiewicz (2019).

Data

Our analysis is based on EU-SILC database. The EU-SILC is an annual EU-wide household survey, that provides information on the income and living conditions for a sample of households. In this paper, we used micro-data extracted from the cross-sectional EU-SILC data set (EU-SILC CROSS-SECTIONAL UDB 2016, 2017 – version of September 2018). The data taken from 2016 and 2017 surveys refer to information on income from years 2015 and 2016, respectively, i.e. the year of the programme "Family 500+" introduction and the previous year. For the vast majority of countries, including Poland, the EU-SILC income reference period is a previous year (Eurostat, 2020). For 2016, the sample covers 11,982 households (with 2,609 persons) and for 2017 it includes 13,053 households, i.e. 34,832 individuals.

The unit of the study is the household which can be defined as a group of individuals living together and sharing expenditures. To account for differences in household size, we adjust household income, by dividing total income by the number of equivalent adults in the household and assigning this value to each

household member. This procedure was applied for all income components. When adjusting household incomes we used the OECD-modified equivalence scale. This scale assigns a value of 1 to the household head, of 0.5 to each additional adult member and of 0.3 to each child.

All results presented in this paper were calculated using the personal cross-sectional weights (available in the database) thus they correspond to an extrapolation of the measures to the whole population.

Three basic sources of income are included in this study: market income, social transfers and taxes. Total disposable income of household was defined as the sum of gross personal income components for all household members, plus gross income components at household level minus taxes and social insurance contributions. It is worth noting that on the basis of EU-SILC data, it is not possible to distinguish income taxes from social security contributions (Alves, 2012, p.42). In order to analyse the impact of income components on income inequality, we constructed seven variables. These were: earnings, self-employment income, residual category of market income, old-age and survivor's benefits, family and children related allowances, residual category of social transfers and taxes. Figure 1 presents the composition of household disposable income and detailed information on the components of income that create the variables.

Our analysis was conducted for all households, as well as for groups of households distinguished due to household composition and having dependent children. We distinguished four groups of households:

- single person without children (denoted as the first group),
- household without dependent children (second group),
- single person with dependent children (third group),
- household with dependent children (fourth group).

Households were assigned to the groups based on the types of households distinguished in the EU-SILC database The groups covered the following types of households:

- the first: H-5 - one person household,
- the second: H-6 - two adults, both under 65, with no dependent children, H-7 - two adults, at least one 65 years or more, with no dependent children, H-8 - other households without dependent children and H-16- other households,
- the third: H-9 - single parent with one or more dependent children,
- the fourth: H-10 - two adults with one dependent child, H-11 - two adults with two dependent children, H-12 - two adults with three or more dependent children and H-13 - other households with dependent children

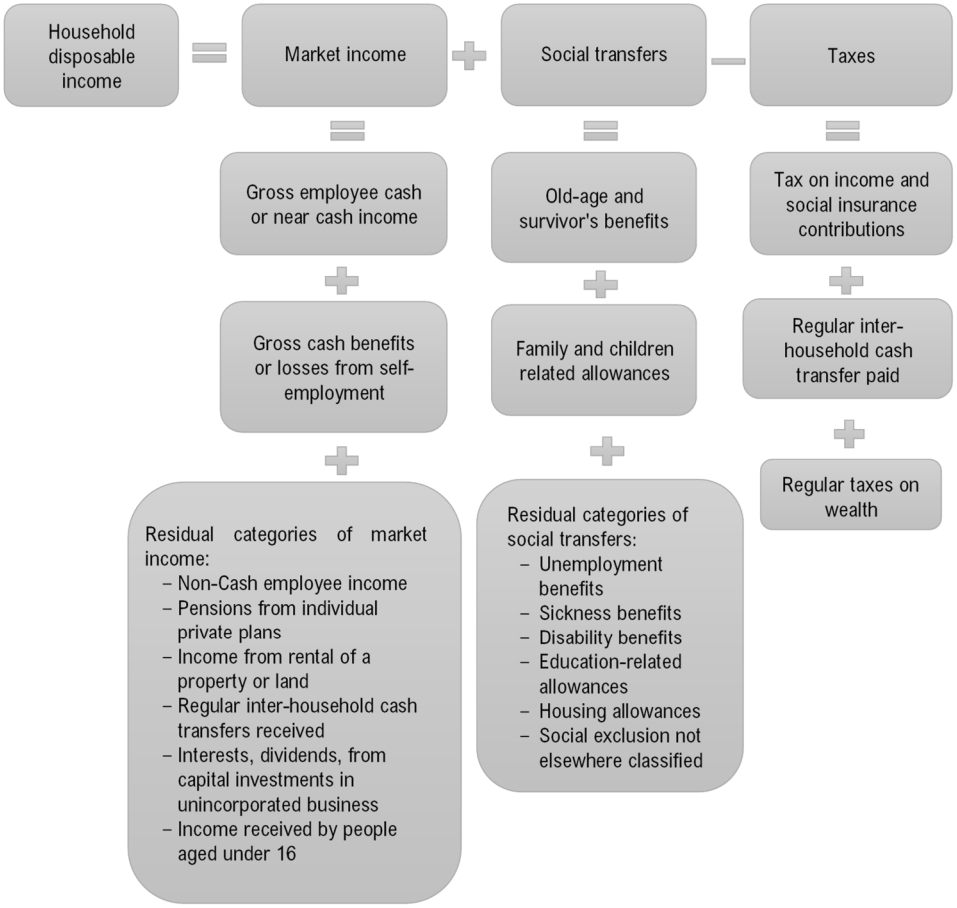

Fig. 1: Composition of household disposable income

Source: Authors' elaboration based on Description of SILC User Database Variables.

Methodology

The measure we applied in the analysis is the Gini coefficient, which is probably the most popular and most commonly used measure of income inequality. Its popularity can be attributed to the availability in many databases (e.g. Eurostat, World Bank) and widespread use in research and reports of international organizations such as OECD or Eurofound. The important virtue of the Gini index is that it meets the four main principles that any inequality metric should meet in order to be considered a reliable measure, namely: the Pigou-Dalton principle, scale independence, anonymity principle and population independence (Charles-Coll, 2011, p.26). Another advantage of the Gini coefficient is that it can be applied to compare different income distributions of different countries, regions or groups of populations, as in our case.

In this paper, we employed the Gini coefficient to assess the level of income inequality in various types of Polish households. To estimate the extent to which income components affect total income inequality, we decompose the Gini index according to the method introduced by Lerman and Yitzhaki (1985).

Decomposing inequality by factor incomes, we consider a population of n households denoted by i, with mean income μ and variance σ^2, and assume that the household income consists of K income components. The income from the source k $(k = 1, \dots, K)$ for the household i equals Y_{ik}. The distribution of incomes from source k is $Y_k = (Y_{1k}, Y_{2k}, \dots, Y_{nk})$, the distribution of total incomes is $Y = (Y_1, Y_2, \dots, Y_n)$, where the total income for the household i equals $Y_i = \sum_k Y_{ik}$.

Following Lerman and Yitzhaki (1985), the Gini coefficient for total income inequality, can be represented as

$$G = \sum_{k=1}^{K} s_k \, G_k R_k \tag{1}$$

where: s_k presents the share of source k in total income ($s_k = \mu_k/\mu$); $G_k$is the Gini coefficient of income source k; R_k is the Gini correlation between income source k and total income. The Gini correlation is a form of rank correlation coefficient. It estimates the extent to which the relationship between $\mathrm{Y_k}$ and the cumulative rank distribution of Y concurs with the relationship between $\mathrm{Y_k}$ and its own cumulative rank distribution $\mathrm{F_k}$. R_k ranges $[-1, 1]$ and is equal to zero if a particular component (k) and disposable income inequality are independent, and it is equal to 1 (-1) if they are perfectly positively (negatively) correlated.

Equation (1) permits us to assess the impact of any income source upon total inequality. The absolute contribution of each income source k to total inequality, C_k, can be estimated as the product of the share of that source in total income, s_k, the Gini coefficient of that income source, G_k, and its Gini correlation, R_k:

$$C_k = s_k G_k R_k \tag{2}$$

The proportional contribution of each income source to total inequality is then the ratio between C_k and Gini: $c_k = C_k/G$.

Although the decomposition analysis tells us the relative contribution of each income component to overall inequality, which is useful information for policy makers, it seems important to know how the marginal changes in each income component affect the level of inequality (Satya, 2004, p.436). Lerman and Yitzhaki (1985) also raised this issue. The effect of a marginal change in any source of the Gini coefficient equals to:

$$\frac{\partial G}{\partial e_k} = s_k(R_k G_k - G) \tag{3}$$

Dividing equation (3) by the overall Gini, Gini elasticity with respect to factor income components can be obtained. i.e. a percentage change in the Gini index as a result of a marginal percentage change in income component k can be determined:

$$\eta_k(G) = \frac{\partial G/\partial e_k}{G} = \frac{s_k R_k G_k}{G} - s_k \tag{4}$$

A negative sign of the factor's marginal effect means that a marginal increase in the source has an equalizing effect. The sum of relative marginal effects is zero.

Factor Inequality Decompositions

In the next section, before presenting the inequality decomposition results, we will briefly discuss the share of components in household disposable income in all surveyed groups.

Household income composition by source

In the first step of our analysis, we examine the structure of household income in all distinguished groups. Because we are analysing disposable income and taxes constitute its negative part (reflecting the tax redistributive effect) hence the share of market incomes and social transfers in total income adds up to over 100%. Figure 2 presents the structure of household disposable income for all surveyed groups of households

If we look at the shares of the various income sources in total household income, we can notice that, in 2015-2016, the main sources of income for all households were earnings, old-age and survivor's benefits as well as self-employment income. In addition, in all groups of households, except for single person households, earnings constituted the prevailing source of disposable income. A similar share of earnings and pensions in the income of the first group of households resulted from the composition of the group.

In 2016, due to the additional transfers of family benefits ("Family 500+" programme), the share of earnings in total income decreased in the groups of households with dependent children, while the structure of disposable income for households without children remained almost the same. It is worth noting that the decline in the share of earnings was nearly twice as large in the third group (one-person household with children) than in the fourth group.

In 2016 compared to 2015, the share of family benefits in total income rose from 1.9% to 4.8%, on average. For one person with dependent children there was an increase from 8.7% up to 18.2% while for other households with children - from 3.3% to 8.6%.

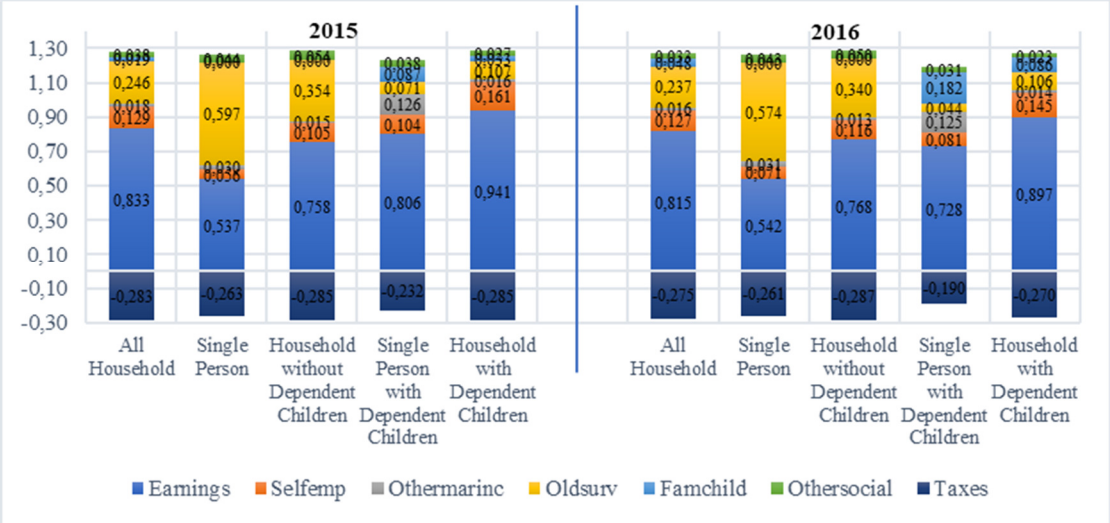

Fig. 2: Household income composition

Source: Authors' calculation using EU-SILC data.

Factor Inequality Decompositions

In the current section, we examine how different income sources affect total income inequality in the group of all households and in the four distinguished groups, using Lerman and Yitzhaki's decomposition method. Table 1 reports the results of the Gini coefficient decomposition for Polish households in 2015 and 2016. In our analysis, we compare the shares of various components in inequality with their shares in total income (s_k) in order to reveal which income components are relatively strengthening, and which are rather smoothing inequality.

In group of all households we find that disposable income inequality is lower than earnings inequality, which in turn is much lower than inequality in the other factors. However, within the four groups of surveyed households, the level of earnings inequality varies significantly. In first group the Gini coefficient was the highest and it rose from 80.98 in 2015 to 80.27 in 2016, while in the fourth group it increased from 44.02 to 44.75 over the period of 2015-2016. Earnings had a dominant positive impact on total inequality, both in all households and in four distinguished groups, which means that they increased the inequality the most. In the first group the relative contribution of earnings to total inequality was disproportionately high compared to its share in disposable income. It should be noted that this group of households is the most diverse in terms of demographics. One could hence expect that differences in the demographic composition play a significant role in explaining inequality. In conclusion, earnings were a disequalising source of income in all the groups, but with the highest marginal effect in the group of single person (figure 3). It is not a surprise, because it needs to be highlighted that, in the decomposition of inequality by factor components, three dimensions are taken into consideration: inequality observed within each income source, relative shares of income sources in total income, and the correlation between income sources and total income.

The other income components that made positive and significant contributions to inequality in all groups were income from self-employment and the residual categories of market income, however their marginal effect was very small over the whole period. The contributions of self-employment income to total inequality increased for the group of all households (from 9.99% to 12.07%). The increase in the contribution of self-employment was particularly large and important for the first and the second group (the groups of households without dependent children). The positive effect of the residual categories of market income on inequality was particularly large in the first group. The highest relative contribution of the residual categories of market income to total inequality is observed in the group of single person with dependent children (9.62% in 2015 and 14.37% in 2016). This is due to the fact that regular inter-household cash transfers received were an important component of this income.

As mentioned in the previous section, old-age and survivor' benefits were the next largest components of all households' income. This income source contributed positively to the inequality of disposable household income in both years. In 2015 and in 2016 old-age and survivor' benefits accounted for 11.03 and 8.52 percent of overall inequality. What is more, the marginal effect of old-age and survivor' benefits on inequality was negative and significant during the studied period and its highest value was noted in 2016.

Table 1: Gini coefficient decomposition results

	Year	All Household	Single Person	Household without Dependent Children	Single Person with Dependent Children	Household with Dependent Children
Total disposable income						
Gini	2015	29.78	33.36	28.50	30.92	29.53
	2016	29.19	33.98	28.57	25.05	28.47
Gross employee cash or near cash income (Earnings)						
Gini	2015	52.17	80.98	55.85	55.94	44.02
	2016	52.33	80.27	55.23	51.98	44.75
Gini correlation	2015	0.7619	0.7728	0.7235	0.7857	0.8370
	2016	0.7735	0.7803	0.7262	0.7062	0.8434
Relative contribution to overall inequality (%)	2015	111.20	100.70	107.47	114.61	117.41
	2016	113.09	99.93	107.88	106.72	118.90
Gross cash benefits or losses from self-employment (Selfemp)						
Gini	2015	87.10	97.13	89.23	93.77	83.48
	2016	87.77	97.11	89.38	95.28	84.38
Gini correlation	2015	0.2649	0.2810	0.2744	0.3760	0.2612
	2016	0.3173	0.5973	0.3506	0.3402	0.2629
Relative contribution to overall inequality (%)	2015	9.99	4.55	9.02	11.89	11.86
	2016	12.07	12.13	12.68	10.45	11.29
Residual categories of market income (Othermarinc)						
Gini	2015	95.62	94.86	97.46	68.85	94.66
	2016	95.92	95.22	97.67	68.91	94.97
Gini correlation	2015	0.4129	0.2411	0.5834	0.3428	0.4400
	2016	0.4160	0.2848	0.5690	0.4176	0.4693
Relative contribution to overall inequality (%)	2015	2.39	2.05	3.02	9.62	2.27
	2016	2.17	5.50	2.49	14.37	2.12
Old-age and survivor's benefits (Oldsurv)						
Gini	2015	73.32	53.21	63.93	90.71	78.04
	2016	73.10	53.98	64.57	93.54	76.78
Gini correlation	2015	0.1824	0.2806	0.2026	0.1374	0.0887
	2016	0.1437	0.2601	0.1650	0.1132	0.0873
Relative contribution to overall inequality (%)	2015	11.03	26.71	16.05	2.87	2.50
	2016	8.52	23.72	12.67	1.84	2.49
Family and children related allowances (Famchild)						
Gini	2015	90.60	-	-	79.47	84.01
	2016	78.77	-	-	65.23	61.25
Gini correlation	2015	-0.0909	-	-	-0.2630	-0.0237
	2016	-0.1163	-	-	-0.1028	-0.0959
Relative contribution	2015	-0.54	-	-	-5.86	-0.22

to ov□rall i□□quality (%)	2016	-1.49	-	-	-4.88	-1.77
Residual categories of social transfers (Othersocial)						
Gi□i	2015	87.77	92.68	83.77	85.76	87.74
	2016	88.54	92.93	84.15	88.52	88.85
Gi□i corr□latio□	2015	-0.1831	-0.3850	-0.2217	-0.2380	-0.1965
	2016	-0.2020	-0.3981	-0.2444	-0.1852	-0.1748
R□lativ□co□tributio□ to ov□rall i□□quality (%)	2015	-2.04	-4.70	-3.49	-2.50	-1.60
	2016	-2.05	-4.67	-6.62	-2.00	-1.26
Tax on income and social insurance contributions (Taxes)						
Gi□i	2015	40.10	51.97	38.61	52.08	38.28
	2016	39.93	51.39	38.29	50.44	38.22
Gi□i corr□latio□	2015	0.8412	0.7147	0.8293	0.7824	0,8726
	2016	0.8575	0.8499	0.8352	-0.6915	0.8761
R□lativ□co□tributio□ to ov□rall i□□quality (%)	2015	-32.03	-29.32	-32.07	-30.63	-32.21
	2016	-32.32	-33.60	-32.10	-26.51	-31.77

Source: Authors' calculation using EU-SILC data.

The elasticity of the Gini coefficient with respect to old-age and survivor' benefits was -0.15 in 2016 which implies that 1% increase in old-age and survivor' benefits would lead to 0.15% decrease in the inequality of household income distribution. What's more, old-age and survivor' benefits contribute positively and significantly to the inequality of disposable income only in households without dependent children and in the group of single persons. In Poland the statutory pension insurance still is the main pillar of old-age provision for the majority of the population. That is why it is important to increase pensions in order to reduce overall inequalities

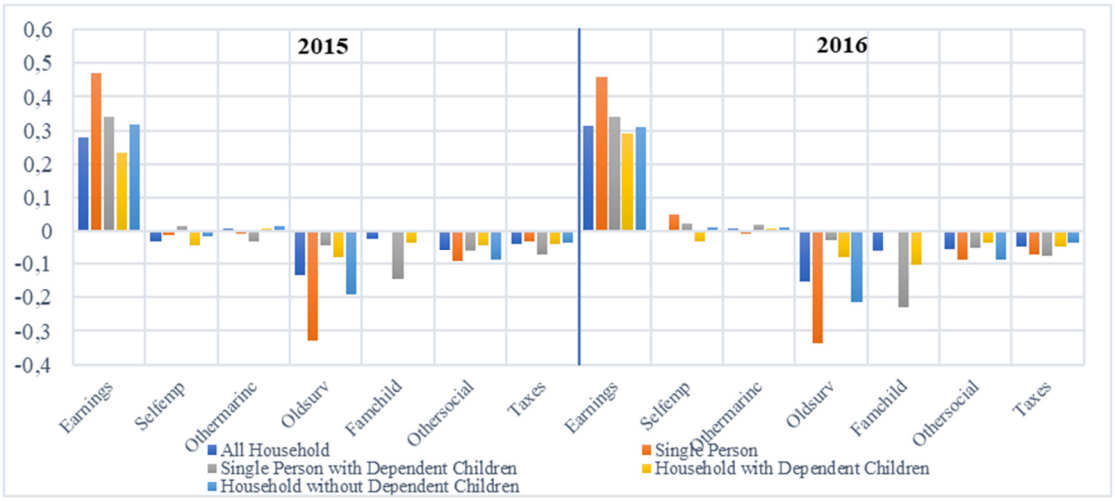

Fig. 3: Marginal effects of income components

Source: Authors' calculation using EU-SILC data.

In 2016, due to the implementation of the "Family 500+" programme, family and children related allowances constituted a higher proportion of income compared to 2015, and the level of inequality in this income component has significantly decreased. Family and children related allowances contribute negatively to the inequality of household disposable income in all groups. An inequality-reducing effect caused by family and children related allowances was higher in 2016 than in 2015, however only in the group of all households and in the fourth group. It is surprising that in the group of single persons with dependent children, in 2016, inequality-reducing effect caused by this income component was lower than the year before. This is because the correlation between disposable income and family and children related allowances was weaker in 2016 than in 2015. It should be noted that the child support benefit from the "Family 500+" programme does not depend on household income. Under the programme parents can receive a tax-free benefit of PLN 500 (about EUR 120) per month for the second and any consecutive children until they reach the age of 18. Families are also eligible to receive the benefit for their first child if the family income is under PLN 800 (about EUR 180) per family member or under PLN 1200 per family member in the case of families with a disabled child (European Commission, 2018). The marginal effect of family and children related allowances was negative in all groups. Moreover, it increased significantly in 2016 compared to 2015 (Figure 3).

The residual categories of social transfers generated negative contributions in all groups of households. Throughout the period of the study, the relative contribution of these transfers was higher in the first and second group of households than in the third and fourth. However, the correlation between disposable income and social benefits was weak.

As it was expected, taxes on income and social insurance contributions negatively contributed to income inequality, decreasing their level. The decomposition of the Gini shows that their contribution to overall inequality was about -32% in all households in both years. Note that the relative contribution of taxes was throughout the period higher in the first group. Income taxes and social insurance contributions are by far the most important factor of income inequality reductions in each surveyed group of households. Taxes, on the other hand, show a substantial correlation with disposable incomes, and the income share of social benefits was smaller than the share of taxes and social insurance contributions, in absolute terms. It's worth mentioning that in Poland the personal income tax system is characterised by low progressivity.

Conclusions

The article has attempted to examine the income distribution of Polish households, focusing on the impact of various sources of income on the level of inequality in disposable income. We have investigated to what extent labour income, social transfers and taxes have contributed to total inequality, using the micro household income data from the European Union Statistics on Income and Living Conditions.

Our results have shown that income inequality decreased in the groups of households with children in 2016, while in the groups of households without children increased. The largest decrease in income inequality took place in the group of single person with dependent children.

The decomposition results have demonstrated that gross employee cash (earnings) contributed to household disposable income inequality at the highest extent in all groups of households in both years. This factor, as well as self-employment income, residual categories of market income and old-age and survivor' benefits, was the disequalising source. Family and children related allowances, residual categories of social transfers and taxes reduced income inequality irrespectively of the households' group.

As expected, due to the "Family 500+ programme, we observed an increase in the share of family benefits in disposable income among households. An inequality-reducing effect caused by family and children

related allowances was much higher in group of single person with dependent children than in household with dependent children in both years. Using the Gini decomposition, we can conclude that the share of family and children related allowances in disposable income has increased in group of single person with dependent children, while the inequality-reducing effect has decreased.

With respect to inequality-reducing effect, income taxes and social insurance contributions were by far the most important factor of income inequality reductions, while the contribution of social benefits was irrelevant. It can be argued that taxes and social insurance contributions are significantly correlated with disposable income, whereas the correlation between social benefits and disposable income is insignificant. While taxes and contributions decreased income inequality by 32% on average, social benefits do not seem to have any significant impact on inequality (<7% in all groups of households).

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References

Alves, N. (2012) 'A view on income redistribution in Portugal and in the European Union', *Economic Bulletin and Financial Stability Report Articles and Banco de Portugal Economic Studies*. [Online], [Retrieved January 28, 2020], https://www.bportugal.pt/sites/default/files/anexos/pdf-boletim/bol_winter_e.pdf.

Amarante, V. (2016) 'Income inequality in Latin America: a factor component analysis', *Review of Income and Wealth,* 62, Supplement 1, S4-S21.
Brzeziński, M. (2017) 'Is high inequality an issue in Poland?', *IBS Policy Paper*. [Online], [Retrieved January 28, 2020], https://ibs.org.pl/en/publications/is-high-inequality-an-issue-in-poland/

Caminada, K., Goudswaard, K., Wang, C. and Wang, J. (2019), 'Has the redistributive effect of social transfers and taxes changed over time across countries?', *International Social Security Review*, 72 (1), 3-31.

Charles-Coll, JA. (2011) 'Understanding income inequality: Concept, causes and measurement', *International Journal of Economics and Management Sciences*, 1 (3), 17-28.

European Commission (2018), 'First results of Poland's Family 500+ programme released' [Online], [Retrieved January 28, 2020], https://ec.europa.eu/social/main.jsp?catId=89&furtherNews=yes&newsId=9104&langId=en#navItem-1

Eurostat (2020), EU-SILC data reference periods. [Online], [Retrieved January 28, 2020], https://ec.europa.eu/eurostat/web/income-and-living-conditions/data.

Fräßdorf, A., Grabka, MM. and Schwarze, J. (2011), 'The impact of household capital income on income inequality – a factor decomposition analysis for the UK, Germany and the USA', *The Journal of Economic Inequality,* 9 (1), 35-56.

Fuest, C., Niehues, J. and Peichl, A. (2010), 'The Redistributive Effects of Tax Benefit Systems in the Enlarged EU', *Public Finance Review*, 38 (4), 473-500.

Garcia-Peñalosa, C. and Orgiazzi, E. (2013), 'Factor components of inequality: a cross-country study', *Review of Income and Wealth*, 59 (4), 690-727.

Graca-Gelert, P. (2018), Income Inequality and Poverty in Poland in 2010-2016 with Particular Focus on Aspects of Urbanization, Poland. Competitiveness Report 2018. The Role of Cities in Creating Competitive Advantages, Weresa, MA. and Kowalski, AM (eds), SGH Warsaw School of Economics, Warsaw.

Guillaud, E., Olckers, M. and Zemmour, M. (2017), 'Four levers of redistribution: The impact of tax and transfer systems on inequality reduction', *LIS Working Paper Series*. [Online], [Retrieved January 28, 2020], http://www.lisdatacenter.org/wps/liswps/695.pdf.

Jędrzejczak, A., and Pekasiewicz, D. (2019), 'Analiza nierówności dochodowych i ubóstwa w Polsce w gospodarstwach domowych z dziećmi', *Przegląd Statystyczny*, LXVI, (2), 105-125.

Kakwani, NC. (1984) '*On the measurement of tax progressivity and redistributive effect of taxes with applications to horizontal and vertical equity',* Advances in Econometrics, 3, 149-168.

Lerman, RI. and Yitzhaki, S. (1985), 'Income Inequality Effects by Income Source: A New Approach and Applications to the United States', *The Review of Economics and Statistics,* 67 (1), 151-156.

Medgyesi, M. (2014) 'Components of income inequality and its change in EU countries, 2004-2010', *ImPRovE Discussion Paper.* [Online], [Retrieved January 28, 2020], http://improve-research.eu/?page_id=37.

Mahler, VA and Jesuit, DJ. (2006), 'Fiscal redistribution in the developed countries, new insights from the Luxembourg Income Study', *Socio-Economic Review,* 4 (3), 483-511.

Myck, M. and Najsztub, M. (2016), 'Distributional consequences of tax and benefit policies in Poland: 2005-2014', *CenEA Working Paper Series.* [Online], [Retrieved January 28, 2020], https://cenea.org.pl/wp-content/uploads/2019/02/20160201-distributional-consequences-of-tax-and-benefit-policies-in-poland-working-paper.pdf.

Rani, U. and Furrer, M. (2016), 'Decomposing income inequality into factor income components: Evidence from selected G20 countries', *ILO Research Paper.* [Online], [Retrieved January 28, 2020], https://www.ilo.org/global/research/publications/papers/WCMS_499918/lang--en/index.htm.

Reynolds, M. and Smolensky, E. (1997) Public Expenditure, Taxes and the Distribution of Income, The United States 1950, 1961, 1970, Academic Press, New York.

Satya, P. (2004) 'Income sources effects on inequality', *Journal of Development Economics,* 73, 435–451

Wędrowska, E. and Muszyńska, J. (2019), 'Decomposition of Income Inequality by Income Sources: Evidence from the Visegrad Group Countries', Proceeding of the 13-th International Days of Statistics and Economics, ISBN: 978-80-87990-18-6, 5-7 September 2019, Prague, Czech Republic, 1660-1669.

New Paradigm of the Strategy of Advanced Development in the Digital Economy: Prerequisites, Contradictions and Prospects

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Abstract

Outsider countries can implement various catch-up and advance development strategies to overcome their lag behind the leaders of the global economic system. The scale of natural potential, the ability to accumulate available resources and their forced use in the production process were factors of the country's advanced development during the industrial period. However, in the digital environment, there is a shift in priorities and a change in the mechanisms for ensuring long-term advance. It is proved that the strategy of advancing in the digital economy for outsider countries should change the goals of accelerated development in the short term. Instead, it should be aimed at ensuring a new quality of factors of production, increasing the efficiency of their use and implementing the policy of creating an inclusive digital society in the long term. Methods used in the study: economic analysis (absolute difference, relative value, comparison, grouping of indicators, analytical tables), observation, analysis and synthesis, system approach, induction and deduction, graphic, and dialectical method. The information base of the research is the materials of reports of international organizations and reports of consulting groups, including IMD, TED, European Commission, Bank of England, OECD, USnews, HDR etc.

Keywords: Digital Economy, Advanced Development, Catch-Up Development, Strategy, Innovation, Productivity Paradox.

Introduction

The transition to a new stage of the global economy development requires changing the mechanisms for overcoming the socio-economic gap, ensuring the advance and retention of leadership positions. Thus, at the stage of industrial development, the state's position in the system of world economic relations was determined by the scale of its natural potential, the ability to accumulate available resources and opportunities for their use in the production process, and the availability of an effective institutional framework. The country's lag behind world leaders in these conditions could be

overcome by adapting the positive experience of other countries in the framework of a catch-up development strategy or using its own breakthrough technologies in the process of accelerated development.

In the digital space, traditional economic relations and business models are changing, the uncertainty of digital environment factors is increasing (due to the inability to accurately assess and predict the impact of new digital technologies on certain aspects of human life, production and consumption processes), which causes new unforeseen contradictions of an economic, social and environmental nature that can undermine the leadership positions of developed countries and make changes in the ratio of leading countries to outsiders (Sukharev 2013, Rajnert 2011).

In this situation, the study of the problem of overcoming the socio-economic and technological gap, the search for effective tools for advancing and maintaining leadership in the digital economy is particularly relevant.

Materials and Methods

The scientific hypothesis of the study is the assumption that the transition to the digital stage of the world economy's development transforms ideas about leaders and outsiders, about mechanisms and strategies for overcoming the gap, making the previous strategies of catching up and advancing development less effective. The strategy of achieving qualitative indicators of human development and factors of human well-being in the long term replaces the strategy of accelerated development on the basis of achieving the effect of increasing returns on the scale of the world economic system in the short term. Advance in the digital environment becomes possible by ensuring a new quality of production factors, increasing the efficiency of their use and implementing the policy of forming an inclusive digital society in the long term.

The theoretical and methodological basis of the research is the works of Hess and Ross (1997), Shishkov (2006), Ray (1998), Sukharev (2013), Nureyev (2001), Gerschenkron (1962), Rajnert (2011), Karpunina and Gjorchev (2019), reflecting the specifics of overcoming the gap in socio-economic development and strategies to ensure it (catch-up development strategy, advanced development strategy).

The development of the digital economy differs significantly depending on the historical and socio-economic conditions of each country and is reflected in the following studies:

- the analysis of patterns and dynamics of development of the ICT sector and related sectors taking into account country specifics is reflected in the works of Perez and Soete (1988);

- structural changes in production and employment, changes in the productivity of factors of production, as well as the relationship between technological changes and the dynamics of economic growth are presented in the works of Hempell (2006), Gilbert et al. (2016);

- research aimed at revealing the reserves of economic growth and shaping the development strategy of the world's countries in the new technological order belongs to Shin (1996).

The information base of the research is made up of reports of international organizations and consulting groups, including IMD (2019), TED (2019), European Commission (2014, 2019), Bank of England (2018), OECD (2019), USnews (2018), HDR (2018) etc.

The research was carried out using the methodology of economic analysis (absolute difference, relative value, comparison, grouping of indicators, analytical tables), observation, analysis and synthesis, system approach, induction and deduction, graphic, and dialectical method.

In the industrial economy, differentiation in the level of socio-economic development of the world's countries was manifested in the form of clear leadership of some countries that set standards for the

development of science, production, consumption and social well-being, and lagging behind other countries, the so-called periphery.

The leading countries (Switzerland, Denmark, Sweden, the United States, and others) have dominated the world stage due to their ability to develop their own resource potential, historically strong institutional framework, and implementation of a leadership strategy for lagging countries that involves shifting the costs of development to their economies.

In turn, lagging countries mastered technological achievements and implemented institutions created in the leading countries, independently adapting them to their own specific economic conditions (Japan, Singapore, China) (Volpi 2012, Rodrik 2004), or carried out large-scale borrowing of created technologies and knowledge and completely subordinated the development processes to the goals of developed countries (South Korea, Taiwan, Brazil, Mexico) (Sukharev 2013).

At the same time, they relied on one of the recognized development strategies: a strategy of catch-up development or a strategy of advanced development, depending on the initial level of economic development, access to knowledge and technology, the state of the fundamental institutions, and their natural resource potential. These strategies differ both in their meaning and in the system of government actions being implemented.

For example, the catch-up strategy is aimed at reducing the gap between countries based on the concentration of their own resources or by borrowing the missing technologies in the framework of industrialization and economic modernization, while maintaining the movement of the lagging country along the chosen trajectory (List 1930). This strategy responds to protectionist views and can be useful in the context of a sharp expansion of international trade.

The advanced development strategy is based on the possibility of accelerated development by achieving the effect of increasing returns in the global economic system through the intensive introduction of new technologies based on new knowledge, taking into account country specialization. In other words, to overcome the lag, the country chooses a parallel development trajectory based on investing in the creation of new technologies that will allow it to achieve competitive advantages and occupy its own niche in the world market due to high product (income) growth rates that exceed the growth rate of economic leaders.

As practice has shown, some countries implementing a strategy of advanced development (for example, Canada, Australia, New Zealand, etc.) used their own natural resource potential, formed an institutional system and provided acceleration by removing foreign economic barriers and creating a more favorable internal and external environment(Anderson 2006).

Other countries that have unique natural resources and conditions for rapid economic growth (for example, Kuwait, the UAE, Saudi Arabia, Iran, etc.) were able to ensure rapid development by implementing a coordinated policy in the field of production, trade, prices and a sharp strengthening of their own foreign economic positions in oil trade with its main importers (Aker and Aghaei 2019).

The third option for achieving advanced development was chosen by countries that had limited resource potential and were able to create a developed manufacturing sector that produces competitive products based on the gradual development of new technologies (Japan, South Korea, Taiwan, Hong Kong, Singapore), as well as implement an export strategy for promoting finished products to world markets (Volpi 2012, Rodrik 2004).

However, the transition to a new digital stage of development transforms the perception of leaders and outsiders, mechanisms and strategies for overcoming the gap, making the previous strategies of catch - up and advanced development less effective, despite the successful reduction of the income gap between rich and poor countries in the global economy. After all, catching up on one parameter (for example, technical and technological equipment), it is likely to sharply worsen the overall quality of another parameter (for example, environmental pollution), even despite the effect associated with changing the productivity function, when technologies allow you to spend less resources and produce less waste (Sukharev 2013).

Results and Discussion

According to the European Commission, the digital economy can be characterized by a set of key characteristics: mobility, network effects, and data usage (European Commission 2014).

Indeed, digitalization allows companies to benefit from reducing labor costs per unit of cost by automating the production process. Digitalization reduces the marginal cost of products and prices (van Ark et al. 2014). Rapid growth to a large scale is a necessary feature of the business models of modern companies, which becomes sustainable due to the reduction of geographical barriers. New digital companies are actively innovating to create new product lines. This is because small differences in quality can cause consumers to switch to other manufacturers and lead to potentially huge differences in profits (European Commission, 2014).

ICTs reduce the cost of collecting, storing, and analyzing data in accordance with Moore's law, this reduces transaction costs (Kholod,et al. 2019). ICTs have also reduced consumer costs in terms of price and choice by creating competing online markets that offer a wide range of products. In addition, big data has helped companies develop innovative products and services with less innovation-related costs in terms of measurement, experimentation, exchange, and replication than in the pre-digital era (Byrne et al. 2013, Syverson 2013).

The presented research and the dynamics of digital development on a global scale allow us to say that today the world's countries are at different stages of digital development: some demonstrate strong growth rates of added value in the field of creating new technologies based on expanded reproduction of human capital, while others are faced with the problem of overcoming the technological and economic lag behind advanced countries (Karpunina 2011, Simcoe and Timothy, 2015).

I. The leaders in terms of digital competitiveness in 2019 according to IMD World Digital Competitiveness Ranking are the United States, Singapore, Sweden, Denmark, and Switzerland. These countries have the greatest potential and readiness to implement and study digital technologies as a key factor of economic transformation in business, government and society as a whole (IMD 2019). The top 5 countries share common features in terms of their focus on knowledge generation (emphasizes the process of digital transformation through the discovery, understanding and study of new technologies), but each of the leading countries has a different approach to digital competitiveness. For example, the United States and Sweden have a balanced approach to building knowledge, creating an enabling environment for technology development, and being willing to innovate.

The top ten most developed countries in the world in terms of digital competitiveness in 2019 also include the Netherlands (6th place), Finland (7th place), Hong Kong (8th place), Norway (9th place) and the Republic of Korea (10th place).

Several Asian economies - China, Indonesia, Korea, and India – have made significant progress in developing their technology infrastructure and business dynamics in 2019 (IMD 2019).

Average indicators of digital competitiveness are also increasing in South Asia and the Pacific region, as well as in the former CIS and Central Asia (according to the rating methodology, digital competitiveness is calculated based on 51 ranked criteria that assess three main factors: knowledge (talent, training and education, scientific concentration), technology (regulatory framework, capital, technological base), and readiness for the future (adaptive settings, business flexibility, it integration) (IMD, 2019). At the same time, the values of similar indicators for Western Asia, Africa and Eastern Europe correspond to the indicators of 2018. The economies of South American countries lag behind other subregions, experiencing a decrease in digitalization compared to 2018.

Conclusion: in general, countries with high digital competitiveness indicators are more likely to maintain their leading positions as global knowledge centers and remain the main digital centers (due to the predominance of human capital in their wealth structure and the ability to provide new quality of factors of production), in contrast to outsider countries (which are characterized by capital

accumulation and redistribution of resources). For example, several Asian economies in 2018 narrowed the digital divide through technology development and future readiness factors. However, they remain dependent on Western economies for knowledge production.

II. Despite the growth of many indicators of digital competitiveness in the developed economies of the world, in the last decade there has been a decline in global productivity growth (that is, labor productivity (including output per worker or per working hour) and factor productivity (which takes into account investment in capital and labor force skills) (The Total Economy Database 2019).

Using the example of countries in the top 10 of the digital competitiveness rating, we will show the dynamics of GDP growth per hour worked and the contribution of the digital production sectors (table 1).

Table 1: Indicators that reflect the dynamics of GDP growth per hour worked and the contribution of digital production sectors, in % (2000-2017) (created by authors, source: Conference Board calculations using data from Eurostat; BEA; BLS и European Commission 2019)

Country / Indicator	GDP per Hour Worked, annual average percent change			Digital producing (this includes investments in ICT, intermediate purchases of ICT goods and services, a stock of robots for one hundred employees, ICT specialists in the total number of employees, and turnover from online sales)	
	2000-2007	2007-2017	2018	2000-2007	2007-2017
USA	2,6	1,0	0,9	0,78	0,51
Singapore	3,4	3,2	3,7	0,74	0,83
Sweden	2,7	1,2	0,2	0,98	0,32
Denmark	1,3	1,4	0,6	0,46	0,29
Switzerland	1,7	0,8	1,6	0,68	0,75
Netherlands	1,6	0,8	0,3	0,43	0,12
Finland	2,6	1,1	-0,3	0,71	0,34
Hong Kong	3,7	2,7	1,5	0,93	0,81
Norway	1,6	0,7	-0,2	0,76	0,38
South Korea	4,6	2,6	2,8	0,69	0,74

These tables show that the slight increase in labor productivity that is still occurring in some of the leading countries may be due to the intensification of information and communication technologies, automation, or innovation activity.

Country assessments show that the contribution of the digital manufacturing sector to productivity has declined significantly in all countries, including the United States, European and Asian countries, especially in Finland and Sweden. The most intensive growth of the digital usage sector was observed in some countries of Northern Europe (great Britain) and Eastern Europe (Czech Republic, Poland and Slovenia) (European Commission 2019).

At the same time, an exception to the identified trend of slowing labor productivity growth in mature economies can be found in Poland, Slovakia and Hungary, where in 2018, compared with 2017, there was a positive trend in the growth rate of production per hour: in Poland, the value of the "GDP per

Hour Worked" indicator increased to 6.2% (in 2017 – 4.5%), in Slovakia-3.1 % (in 2017 – 2.5 %), in Hungary-4.4% (whereas in 2017 – 3.2%) (The Total Economy Database 2019).

Note that these countries are not among the leading countries in terms of digital competitiveness, and occupy 33, 47 and 43 places in the ranking, respectively. However, they may experience increased side effects from integration with Western European economies and pressure from wage costs that stimulate business, which may explain the strong growth in labor productivity in these countries. As for the dynamics of the digitalization process in these countries, it should be noted that in Poland there is an annual growth of the digital production sector (on average from 0.21% of GDP in 2000-2007 to 0.3 % in 2007-2017), while in Slovakia and Hungary the share of digital production tends to decrease (by 1.8 and 3.8 times, respectively).

In addition, according to The Total Economy Database, productivity growth in emerging markets has also slowed since 2010 (in Brazil, China, India, Indonesia, Mexico, Russia, South Africa, and Turkey, output growth per worker slowed from 5.5% between 2000 and 2007 to 4.4% between 2010 and 2017), in all developing countries, output per worker increased by 2.6% in 2018, compared to the average of 1% for mature economies. All of these developing countries, with the exception of China (22nd place), did not rise above 38th place in the ranking on the level of digital competitiveness (The Total Economy Database 2019).

At the global level, overall growth in factor productivity (including investment in capital and labor skills), which reflects overall efficiency, was negative again in 2018 at -0.1 percent, compared with a slight increase of 0.2 percent in 2017 (TED, 2019). At the same time, the maximum decrease in the overall growth of factor productivity was observed in 2016 in the economies of emerging and developing economies (-0.8), while the maximum decrease in the leading countries ranged from -0.2 to -0.1 (TED, 2019).

Conclusion: the decline in productivity growth of factors of production (labor productivity, investment in capital and skills of the labor force) is typical for both leading and outsider countries. However, the leading countries that ensure the growth of the digital production sector (investments in ICT, intermediate purchases of goods and services, robotics, training of specialists with ICT skills) demonstrate greater stability. Researchers try to explain the productivity paradox of the new digital economy by various factors, including slower growth in the amount and quality of capital available to each employee, changes in the quality of the workforce or human capital, changes in the efficiency of capital and labor use adjusted for quality, and the consequences of the financial crisis (Bank of England 2018, Simcoe 2015, Gilbert et al. 2016, Hempell 2005).

III. The slowdown in real GDP growth is another factor of uncertainty that affects the choice of a strategy for advanced development in the digital economy (Fig. 1).

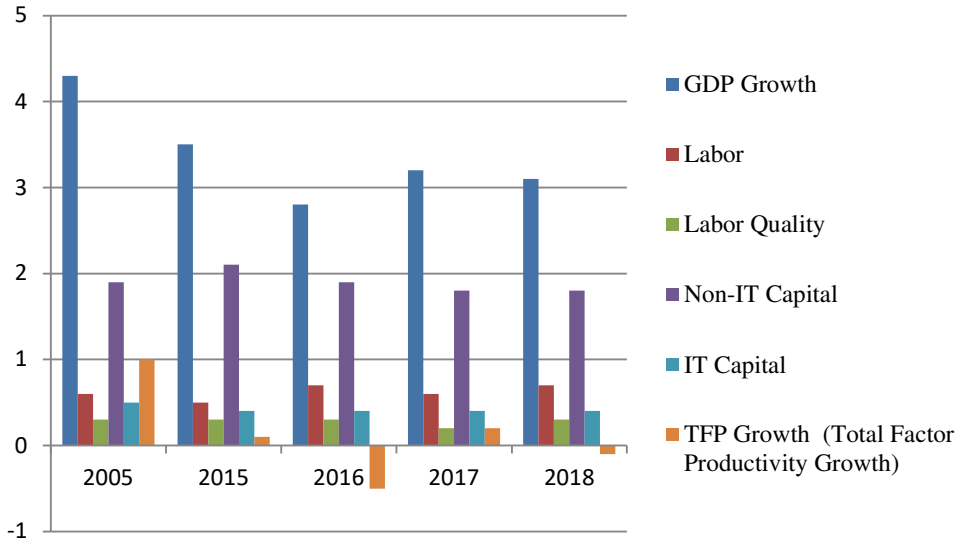

Fig. 1: Dynamics of GDP growth in the world and the contribution of growth sources to its creation, 2005-2018 (compiled by the authors according to data The Conference Board Productivity Brief 2019)

As can be seen from the figure, in the period 2005-2018, there is a significant drop in GDP in the context of the global economy. Of course, when looking at the dynamics in the context of Mature and emerging economies, it becomes obvious that the largest drop was due to the decline in GDP in emerging markets, which began in 2010, and by now emerging markets have lost most of their potential for catching up with productivity growth over the past decade (almost 2 times, from 6.1% in 2005 to 3.7% in 2018) (The Total Economy Database 2019).

But even in the G20 countries, where overall GDP growth was relatively stable and the average annual growth rate remained at 2.9%, in 2010 it fell sharply to 2.1%, and the decline continued to 1.8% in 2016. In 2018, after a slight increase in 2017, mature economies as a whole again showed a drop to 2.4%.

The beginning of 2019 was characterized by positive dynamics, but in the third quarter of 2019, GDP growth remained stable only in the United States, France and Italy (by 0.5%, 0.3% and 0.1%, respectively). In the European Union, it fell slightly (to 0.3%, from 0.2%), in the UK and Germany (to 0.3% and 0.1%, respectively, after a 0.2% reduction in each country in the previous quarter) (OECD 2019).

Conclusion: the slowdown in real GDP growth is stronger in the outsider countries than in the leading countries, which may be a consequence of their digital development strategies, which were adopted in order to integrate into digital processes as quickly as possible, taking into account their national characteristics (Karpunina et al. 2019).

Note that this decline is taking place against the background of digital development strategies implemented by many countries, which were adopted in order to be included in digital processes as quickly as possible, taking into account their national characteristics (Karpunina et al. 2019). For example, since the beginning of 2000, Sweden has been implementing The digital agenda for Sweden, the UK - The digital economy Act, Japan - The New information and communication technology strategy, Australia - The Australian national digital economy strategy, Austria - The research, technology and innovation strategy, Canada - Canada's digital economy strategy is built on the government's economic plan for Canada, and so on.

IV. An integral characteristic of the socio-economic development of the state is the growth of the level and quality of life of the population. On the one hand, the analysis of the dynamics of human development index (a composite index that measures a person's ability to lead a long and healthy life, the ability to obtain knowledge and skills to achieve a decent standard of living) and gender development index and multidimensional poverty index allows us to conclude that developed countries with mature economies, occupying the leading position on a global scale, are currently created conditions for the formation of an inclusive digital society (HDR 2018).

These countries have the highest level of human development. For example, in 2018, the value of the human development index in Norway was recorded at 0.953, in Switzerland-0.944, in Australia-0.939, in Ireland-0.938, in Germany-0.936, in Iceland-0.935, in Hong Kong-0.933, in Sweden-0.933, in Singapore-0.932, in the Netherlands - 0.931. This means that these countries not only have high per capita income, but also high standards of health and education. Note that 6 of the 10 leading countries in terms of digital competitiveness occupy the highest positions in terms of human development (Singapore, Sweden, Switzerland, the Netherlands, Hong Kong, Norway). Such indicators can be achieved by increasing spending on human development, i.e. education, science, health, social services, and environmental well-being.

For example, the leading countries analyzed by us, both in terms of digital competitiveness and human development, Singapore, Sweden, Switzerland, the Netherlands, Hong Kong, and Norway, have consistently high values of the indicator “public spending on education” (Fig. 2).

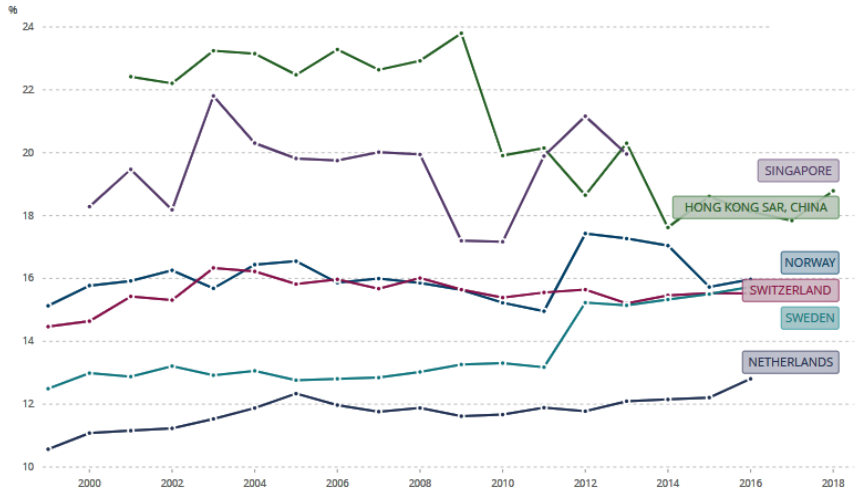

Fig. 2. Government expenditure on education, total (% of GDP), 2000-2018 (compiled by the authors according to the data The World Bank 2019)

As for R&D spending, two leading countries in terms of digital competitiveness occupy the top positions in the world ranking : the United States (2.84 % of GDP in 2018 was invested in this sector), and South Korea (in 2018, it spent 88.2 billion dollars on R&D, which is about 4.3 percent of GDP) (USNews 2018).

According to the World health organization, health expenditures are calculated (the Global Health Expenditure indicator), which are considered one of the key indicators of social development, since they reflect the degree of attention paid by the state and society to the health of citizens. The leading countries analyzed by us mostly have high values of the Global Health Expenditure indicator, % of GDP in 2017, which allows them to maintain a decent level of national health and ensure the full realization of human potential: the United States - 17.1, Switzerland -12.2, Sweden - 10.9, Norway - 10.5, Denmark -10.4, the Netherlands – 10.4, Finland – 9.5. However, in this aspect, South Korea and

Singapore show a significant lag behind the leaders, traditionally having low indicators of public financing of the health system - at the level of 7.3 and 4.5 percent, respectively.

Despite the fact that the report "Human development Indices and indicators. Updated statistics 2018 " it is noted that countries with very high levels of human development contribute the most to climate change, with average carbon dioxide emissions of 10.7 t per capita, compared to 0.3 t per capita in countries with low levels of human development (HDR 2018), environmental Finance remains critical to the success of collective efforts (OECD 2019). The commitment of governments in developed countries to allocate $ 100 billion a year by 2020 is both symbolic and essential for improving their environmental sustainability.

In general, despite the fact that the leading countries pay significant attention to human capital development, statistics show that they have also experienced a slowdown in HDI growth over the past decade. However, this is primarily due to reversals caused by conflicts, epidemics, and economic crises, as well as the achievement of growth limits for individual components of HDI (for example, the biological limit of life expectancy, learning duration, and educational coverage).

Conclusion: the leading countries have fully created conditions for an inclusive digital society due to high spending on education and science, health, social services, and environmental well-being, which is an absolute competitive advantage and a guarantee of sustainable development in the digital environment.

Conclusions

It is proved that during the transition to the digital stage of development, ideas about leaders and outsiders, about mechanisms and strategies for overcoming the gap are transformed, and previous strategies for catching up and advancing development become less effective in the global economy.

The analysis showed, first, that countries with high indicators of digital competitiveness are easier to maintain leadership positions as global centers of knowledge and remain the main digital centers (due to the predominance of human capital in the structure of their wealth and the possibility of providing a new quality of factors of production), in contrast to outsiders (which are characterized by capital accumulation and redistribution of resources).

Second, in the leading countries and outsiders, there is a decrease in the growth of productivity of factors of production (labor productivity, investment in capital and skills of the labor force). However, the leading countries that ensure the growth of the digital production sector (investment in ICT, intermediate purchases of goods and services, robotics, training of specialists with ICT skills) have greater stability.

Third, the slowdown in real GDP growth is more pronounced in outsider countries than in leading countries, which is a consequence of their digital development strategies, which were adopted in order to integrate into digital processes as quickly as possible, taking into account their national characteristics.

Fourth, the leading countries have fully created conditions for an inclusive digital society due to high spending on education and science, health, social services, and environmental well-being, which is an absolute competitive advantage and a guarantee of sustainable development in the digital environment.

Thus, the strategy of advancing in the digital economy for outsider countries should not pursue the goals of accelerated development in the short term, but should be aimed at ensuring a new quality of factors of production, increasing the efficiency of their use and implementing the policy of forming an inclusive digital society in the long term.

References

- Aker, S. and Aghaei, I. (2019), 'Comparison of Business Environments in Oil-Rich MENA Countries: A Clustering Analysis of Economic Diversification and Performance', *Emerging Markets Finance and Trade*, January 2019.

- Anderson, R. (2006), 'Indigenous Land Claims in New Zealand and Canada, from Grievance to Enterprise', [Online], [Retrieved December 15, 2019], https://ssrn.com/abstract=2495624

- Bank of England (2018), 'The fall in productivity growth: causes and implications', *Bankofengland,* [Online], [Retrieved December 15, 2019], https://www.bankofengland.co.uk/-/media/boe/files/speech/2018/the-fall-in-productivity-growth-causes-and-implications

- Byrne, D., Oliner, S., and Sichel, D. (2013), 'Is the Information Technology Revolution Over?', *International Productivity Monitor*, 25, Spring.

- European Commission (2014), 'Commission expert group on taxation of the digital economy', *Ec.europa.eu*. [Online], [Retrieved October 21, 2019], https://ec.europa.eu/taxation_customs/business/company-tax/tax-good-governance/expert-group-taxation-digital-economy_en

- European Commission (2019), 'Productivity & Innovation Competencies in the Midst of the Digital Transformation Age: A EU-US Comparison', *Ec.europa.eu,* [Online], [Retrieved November 14, 2019], https://ec.europa.eu/info/publications/fellowship-initiative-2018-2019-productivity-and-innovation-competencies-midst-digital-transformation-age-eu-us-comparison_en

- Gerschenkron, A. (1962), Economic Backwardness in Historical Perspective: A Book of Essays, The Belknap Press of Harvard University Press, Cambridge.

- Gilbert, C., Fernald, J. and Mojon, B. (2016), The Pre-Great Recession Slowdown in Productivity, Working Paper 2016-08, Federal Reserve Bank of San Francisco, Goldfarb.

- HDR (2018), 'Indeksy i indikatory chelovecheskogo razvitiya. Obnovlennye statisticheskie dannye 2018', *Hdr.undp.org,* [Online], [Retrieved December 5, 2019], http://hdr.undp.org/sites/default/files/2018_human_development_statistical_update_ru.pdf

- Hempell, T. (2005), 'Does Experience Matter? Innovations and the Productivity of ICT in German Services', *Economics of Innovation and New Technology*, 14(4), 277-303.

- Hess, P. and Ross, C. (1997), Economic development: Theories, Evidence and Policies, Philadelphia.

- IMD (2019), 'The IMD World Digital Competitiveness Ranking 2019 results', *Imd.org,* [Online], [Retrieved October 30, 2019], https://www.imd.org/wcc/world-competitiveness-center-rankings/world-digital-competitiveness-rankings-2019/

- Karpunina, E. (2011), 'Operezhayushchaya postindustrial'naya transformaciya hozyajstvennoj sistemy Rossii: usloviya realizacii, *Vestnik Tambovskogo Universiteta. Seriya: Gumanitarnye Nau*ki, 12-2 (104), 468-473.

- Karpunina, E. and Gjorchev, J. (2019), 'Cifrovye izmeneniya ekonomicheskoj sistemy: ot strategii dogonyayushchego razvitiya k institutam operezheniya', *Drukerovskij vestnik*, 3, 28-41.

- Karpunina, E., Derkacheva E., Lisova, E., Nazarchuk, N., and Abalakin, A. (2019), 'Social orientation of the digital economy: a critical analysis of information development concepts' Proceedings of the 34nd International Business Information Management Association (IBIMA), 13-14 November 2019. Madrid, Spain.

- Kholod, M., Golubtsov, P., Varlamov, A., Filatov,S. and Yada,K. (2019), 'Modeling Customers Speed of Movement from POS- and RFID-Data', *Smart Innovation, Systems and Technologies*, 143, 101-112.

- List, F. (1930), National system of political economy. Verlag von Reimar Hobbing, Berlin.

- Nureev, R. (2001), Ekonomika razvitiya: modeli stanovleniya rynochnoj ekonomiki, Infra-M, Moskva.

- OECD (2019), 'G20 GDP Growth - Third quarter of 2019', *Oecd.org,* [Online], [Retrieved December 25, 2019], http://www.oecd.org/economy/g20-gdp-growth-third-quarter-2019-oecd.htm

- OECD (2019), 'Statement by OECD Secretary-General Angel Gurría on the outcome of COP 25', *Oecd,* [Online], [Retrieved December 12, 2019], http://www.oecd.org/environment/statement-by-oecd-secretary-general-angel-gurria-on-the-outcome-of-cop-25.htm

- Perez, C. and Soete, L. (1988), Catching-up in technology, Dosi, G. et al. (eds.), Technical Change and Economic Theory, London and New York, Pinter.

- Rajnert, E. (2011), Kak bogatye strany stali bogatymi, i pochemu bednye strany ostayutsya bednymi / per. s angl. N. Avtonomovoj; pod red. V. Avtonomova; Gos. un-t - Vysshaya shkola ekonomiki, Izd. dom Gos. un-ta—Vysshej shkoly ekonomiki, Moskva.

- Ray, D. (1998), Development Economics, Princeton University Press, Princeton.

- Rodrik, D. (2004), Industrial policy for the twenty-first century. Centre for Economic Policy Research, CEPR.

- Shin, J.-S. (1996), The Economics of the Latecomers: Catching-up, Technology Transfer and Institutions in Germany, Japan and South Korea. London and New York, Routledge.

- Shishkov, Y. (2006), Dogonyayushchee razvitie v epohu globalizacii, GOU VPO VAVT Minekonomrazvitiya Rossii, Moskva.

- Simcoe, T. (2015), 'Modularity and the Evolution of the Internet', in Goldfarb, S., Greenstein, M., and Tucker, C. (eds), Analysis of the Digital Economy, University of Chicago Press, Chicago.

- Suharev, O. (2013), 'Adekvatnost' strategii operezhayushchego razvitiya ekonomiki Rossii v global'nyh izmeneniyah', *Ekonomicheskij analiz: teoriya i praktika*, 47 (350), 2-15.

- Syverson, C. (2013), 'Will history repeat itself? Comments on 'Is the Information Technology revolution over?', *International Productivity Monitor*, 25, 25-36.

- The Total Economy Database (2019), 'The Conference Board Productivity Brief 2019', *Ted*, [Online], [Retrieved November 24, 2019], https://conference-board.org/retrievefile.cfm?filename=TED_ProductivityBrief_20191.pdf&type=subsite

- USNews (2018), 'The Big Spenders in Research and Development', *Usnews.com,* [Online], [Retrieved December 15, 2019], https://www.usnews.com/news/best-countries/articles/2018-11-09/these-countries-are-the-top-spenders-on-research-and-development

- van Ark, B., van Welsum, D., and Overmeer, W. (2014), 'Unlocking the ICT growth potential in Europe: Enabling people and businesses - Using Scenarios to Build a New Narrative for the Role of ICT in Growth in Europe', [Online], [Retrieved December 25, 2019], https://docplayer.net/3698405-Unlocking-the-ict-growth-potential-in-europe-enabling-people-and-businesses.html

• Vol'pi, V. (2012), Aziatskaya ekonomicheskaya model' i Zapad: revansh «vidimoj ruki». Vol'pi, V., Maccei, F.: per. s ital. N. Tyukalova; nauchnaya redakciya Taranuhi, Y. Moskva.

Mechanisms of Self-Development of Subsidized Regions

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Abstract

The high level of socio-economic differentiation of the territorial development of Russia actualizes the problem of finding new effective tools for its alignment. The disclosure of the region's self-development potential can become a condition for the transition of a poorly developed subsidized region to the category of self-developing ones. This requires a review of the mechanism for the formation and implementation of regional policy based on the identification and assessment of the potential for self-development of the region. The features of Russia's socio-economic development in the context of its territorial division are revealed, contradictions and existing restrictions on the country's uniform territorial development are systematized. The concept of "potential for self-development of the region" was identified and its structural components were clarified. The method of identifying and evaluating the self-development potential of the subsidized region in accordance with its structural features is proposed (in the context of economic and social, dynamic and static, internal and external components). The mechanism of transition of the subsidized region to self-developing regions based on regional policy adjustments is proposed.

Keywords: Regional Differentiation, Self-Development Potential, Subsidized Region

Introduction

Russian regions have a high degree of differentiation in terms of economic development and quality of the population life. This unevenness is determined by different availability of natural resources, historical infrastructure, natural and climatic conditions, the mentality of the population, and other factors. According to the world Bank, Russia is one of the top three countries in terms of regional inequality in Europe and Central Asia (RBC, 2018).

Taking into account the existing problem of poverty in some regions (according to the Ministry of Economic development of Russia, its level varies from 6 to 40% of the population of regions) and the intensive development of other regions (regions-leaders), the key task of the public administration system is to ensure territorial alignment (RBC, 2019).

As practice shows, the implementation of various socio-economic development programs in subsidized regions is difficult for various reasons, starting with the lack of a resource base for territorial development, and ending with the inefficiency of the existing management system in the region.

Thus, modern economic conditions dictate the need to find new tools for regional policy development of underdeveloped regions that can ensure the transformation of subsidized regions into self-developing ones.

Materials and Methods

The scientific hypothesis of the research is based on the assumption that in the conditions of significant socio-economic differentiation of regions and imperfection of their state regulation, the only way to overcome the lag and ensure their dynamic development is to reveal the potential of self-development of the region. This process can be achieved through the use of regional policy tools that can transform underdeveloped regions into self-developing ones.

Main purpose of the study:

1. To reveal the features of Russia's socio-economic development in the context of its territorial division, to identify contradictions and existing restrictions.
2. Identify the concept of "self-development potential of the region" and clarify its structural components.

3. Propose effective regional policy tools aimed at identifying and realizing the potential for self-development of subsidized regions.

The theoretical basis of the research consists of publications that reflect the specifics of regional development (Shekhovtseva, 2005).

Tyunen's research is devoted to the analysis of regional differentiation problems (Tyunen, 1926). The author has shown that the differentiation of territories occurs on the basis of the location of production and areas around the city and depending on the impact of transport costs on production.

Lyosh proposed a typology of regions, highlighting market zones that are formed by selling products, and the economic landscape that unites market zones (Lyosh, 2007).

The problems of regional disproportion, as well as the emergence of centers of economic growth and channels for spreading growth in space are reflected in the concept of "center-periphery", presented in the works of Friedmann, 1973, Hägerstrand, 1966. The authors proved that regional differentiation does not completely disappear, and individual territorial entities can relatively converge in terms of socio-economic development.

Features of state regulation of regions are presented in the works of Granberg, 2001.

The information base of the research is the official materials of the Federal state statistics service of the Russian Federation, the Ministry of Finance of the Russian Federation, EMISS, World Bank data, expert opinions of RBC, Garant, and RIA.

Methods that were used to implement the study: the method of economic analysis, grouping, induction and deduction, expert assessments.

Results and Discussion

The spatial development of Russia has a pronounced specificity, which is manifested in the following.

Firstly, *85 regions (subjects of the Russian Federation) are allocated as part of the state)* (Statedata, 2020), that is, relatively independent territorial units that have clear internal borders and a specific resource and material base, infrastructure, as well as a unique production complex with a certain specialization.

The presence of such a large number of territorial units creates prerequisites for their significant differentiation in terms of socio-economic development.

Martin revealed a specific trend in the formation of regional development inequality: the increase in regional differentiation occurs even despite the positive dynamics of the country's economic growth (Martin, 2005).

In Russia, regions that have clear competitive advantages due to the powerful natural resource potential or developed Metropolitan regions traditionally show economic growth. This phenomenon can be explained by a more developed infrastructure and greater capacity of the consumer market, respectively, lower business costs, investors prefer to invest in initially economically developed regions.

If we consider the Russian regions by the level of differentiation, a pattern is highlighted: the presence of a significant gap between the upper and lower borders, which at certain stages of development tended to increase. For example, the value of this gap was 10 times in 1996 and 13 times in 2016 (Midov, 2018) (table 1).

Table 1: Differentiation of Russian regions in terms of GRP per capita in 2014 and 2017

2014		2017	
Regions with the highest GRP per capita			
Sakhalin region	29022,2	Tyumen region	32991,7
Tyumen region	26424,7	Sakhalin region	27394,3
Chukotka Autonomous district	20318,4	Chukotka Autonomous district	24064,0
Moscow	18701,0	Moscow	21939,2
The Republic Of Sakha (Yakutia)	12245,1	Magadan region	18894,9
Magadan region	11555,1	The Republic Of Sakha (Yakutia)	16514,2
Republic of Komi	9917,2	Saint Petersburg	12625,2
Saint Petersburg	9168,7	Republic of Komi	11791,0
Krasnoyarsk region	8785,1	Krasnoyarsk region	11363,1
Kamchatka territory	8137,2	Kamchatka territory	11108,5
Regions with the lowest GRP per capita			
Republic of Dagestan	3154,8	Republic of Buryatia	3555,0
Adygeya Republic	3003,4	Republic of Dagestan	3545,1
Republic of Kalmykia	2951,3	Republic of Tuva	3204,7
Ivanovo region	2597,1	Republic of North Ossetia-Alania	3168,7
Karachay-Cherkess Republic	2474,8	Ivanovo region	3166,6
Kabardino-Balkar Republic	2418,4	Sevastopol	2864,2
Ingush republic	2013,6	Karachay-Cherkess Republic	2779,7
Republic of Chechnya	1950,0	Kabardino-Balkar Republic	2779,1
Republic of Crimea	1787,8	Republic of Chechnya	2178,3
Sevastopol	1387,3	Ingush republic	1993,8

(created by authors, source: Gks, 2020)

The table shows that the positions of highly developed and underdeveloped Russian regions do not change over time. The maximum value of GRP per capita in the Tyumen region is the main oil-producing region of Russia. This situation will continue in the coming years, and the prospects for reducing this indicator can only be associated with the intensification of economic development of more backward regions. In 2014-2017 there was a redistribution within the group of regions with the lowest GRP per capita: the Republic of Crimea and Sevastopol improved their performance, moving to higher positions in the ranking.

Disparities in economic development between regions lead to social development inequalities, which, in turn, limit the opportunities for economic development of the regional economic system (for example, due to the outflow of the working-age population).

For example, the upper limit of the average monetary income per capita differs from the lower limit by more than 5 times (Fig. 1).

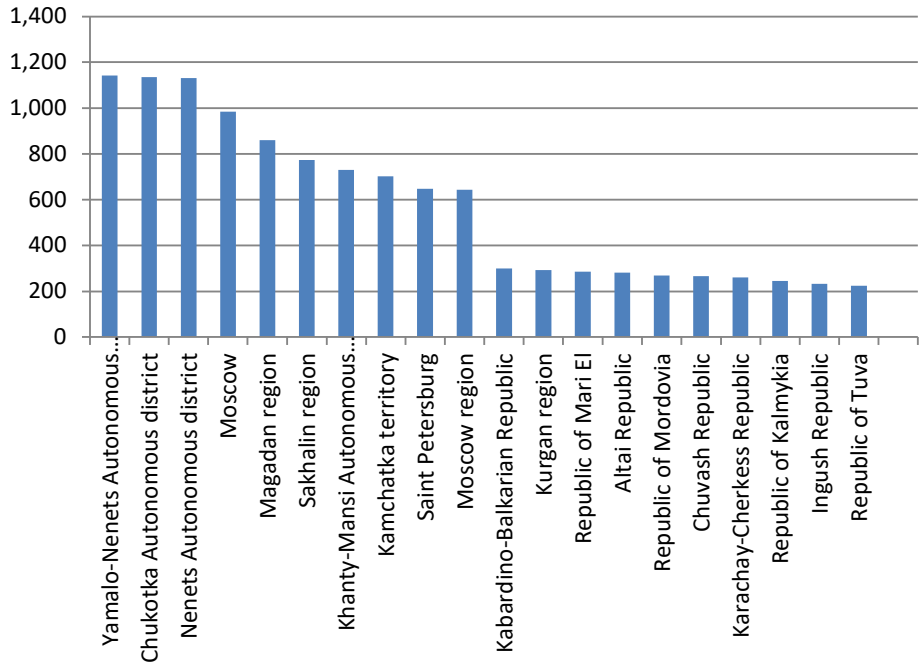

Fig. 1: Differentiation of Russian regions by average per capita income in 2018

(created by authors, source: Gks, 2019)

The Gini coefficient and decile coefficient are used to measure social and economic inequality in regions. The values of the Gini coefficient (income concentration index) in the period from 2014 to 2017 ranged from 0.42 to 0.41(EMISS, 2019), this allows us to conclude that the dynamics of the coefficient has a weakly expressed positive character in the analyzed period.

The decile ratio (the ratio of the minimum income of the 10% of the most affluent population to the maximum income of the 10% of the least affluent population) remained at 7.1 between 2014 and 2017 (EMISS, 2019). Note that the value of the decile coefficient in Germany in recent years is 1.8, in France - 1.4, in Italy - 2.1, in China - 2.93, which indicates the evenly developed economies of these countries.

Secondly, the typology of regions used in Russian regional management practice also has distinctive features.

In the European Union, the typology of regions is based on the principle of "center-periphery" and Central, peripheral and transitional regions are distinguished (depending on their "accessibility index"). Depending on the nature of socio-economic development, Friedman's typology is also used (division of regions into main, ascending, and descending development corridors). The first three of these types of regions are growing or developing, and the last one is a problem region that requires some effort on the part of the authorities (Friedmann and Alonso, 1964).

In Russian scientific research on regional Economics, the Bandman's typology is used, according to which traditionally backward, depressed, developed industrial, industrial-agrarian, agricultural, raw material, resource developing regions are distinguished (Bandman et al., 1984). Granberg reveals the specific features of various types of regional economic systems, highlighting: crisis; underdeveloped, old-industrial, agricultural, mining regions, depressive in nature of their development, border regions (Granberg, 2001).

However, the most suitable for Russian business practice is the typology of regions into donor and recipient regions.

The basis of the classification of the subjects of the Russian Federation into "donor regions" and "recipient regions" is the nature of their development and the degree of its dependence on the assistance of the Federal center (Egorov and Kuznecov, 2018). According to this classification, the donor region has its own funds for sustainable development, while the amount of tax revenues to the Federal budget exceeds the amount of funds received from the Federal budget for the development and support of a specific territory. Recipient regions or subsidized regions are characterized by the lack of sufficient budget funds to ensure their own development and a decent standard of living for the population, which is the basis for receiving subsidies from the Federal budget. These regions usually include crisis, backward and depressed regions.

From the standpoint of this approach, crisis regions with indicators of socio-economic development lower than the national average are recipient regions (for example, in Russia, these are regions of the Ural belt, which are characterized by a decline in production, unemployment, low living standards, budget security, etc.). Backward regions are regions with pronounced features of stagnation due to the poorly diversified structure of the economy, unrealized scientific and technical potential (in Russia, this is the majority of the republics of the Caucasus, the districts of southern Siberia, and Kalmykia (Rkgovru, 2018).

Depressed regions are regions that are in a state of depression under the influence of a certain set of factors, but previously have traditionally high indicators of socio-economic development (for example, reduced product competitiveness, lack of government orders and reduced demand, exhaustion of the mineral resource base, structural changes in the economic complex of the country (Cito-web, 2019).

The list of subsidized regions in accordance with the Order of the Ministry of Finance of the Russian Federation dated 15.11.2019 No. 1032 in 2020 includes 72 Russian regions. These include regions that have 40% of their own revenues from the consolidated budget of the region made up of subsidies from the Federal budget (Garant, 2019).

As a rule, the budgets of subsidized regions tend to slow down the growth rate of their own income, exhaust the sources of growth of the tax base, the state of deficit, debt dependence, imbalance and dominance of social obligations (Filatov, 2017). Investments in fixed capital in subsidized regions tend to fall in growth rates due to stagnation of production, damping of business activity, exhaustion of the reserve strength and resources of the basic enterprises of the region, slowing the growth rate of GRP, increasing the separation of production and economic potential from other regions.

As a result, the working population moves to more developed regions, informal employment zones grow, and the subsidized region reduces the residual competitive advantages.

Thirdly, the implemented policy of inter-budgetary alignment is low-effective. This occurs as a result of the regional economic system's disequilibrium (Karpunina et al., 2018a): under the influence of impulses, they change randomly over time, mostly in leaps and bounds (Zagulyaev, 2011); the time

period required for diagnosing the internal structure and state of the regional economic system is quite long and limited by the inertia of the economic system itself. Nonequilibrium regional economic systems of subsidized regions neutralize the results of management actions of authorities and do not provide a response from the economic complex of the region (Karpunina et al., 2018b). The failure to ensure a budget surplus and its own socio-economic sustainability is the final result.

In 2017, we can see a positive trend in the reduction of regions with budget deficits: from 74 in 2014 to 30 in 2017 (table 2).

Table 2: Execution of the consolidated budgets of the Russian Federation subjects in 2014-2017, billion dollars

Name	2014	% by 2013	2015	% by 2014	2016	% by 2015	2017	% by 2016
REVENUE	158,3	109,1	127,6	104,5	136,1	106,6	178,1	103,4
Tax and non-tax revenues	127,6	108,9	104,6	106,2	113,7	108,7	149,8	104,1
Gratuitous receipts	30,7	109,6	23,1	97,4	21,5	97,8	28,3	104
EXPENSES	166,3	106,2	130,0	101,4	136,3	104,8	179,0	103,8
Surplus (+)/ Deficit (-)	- 8	69,8%	- 2,3	38,3	- 0,2	7,3	-0,9	
From them:								
The deficit (the number of regions)	-9,3 (74)		-5,1 (76)		- 2,8 (56)		-0,7 (30)	
The surplus (the number of regions)	+1,4 (11)		+2,7 (9)		+ 2,6 (29)		+ 11,7 (55)	

(created by authors, source: Ministry of Finance of Russia, 2017)

We can see that the size of inter-budget transfers in the period 2017-2020 tends to decrease, however, the alignment is mainly due to a massive budget policy, and not due to the intensive economic development of weaker regions (table 3).

Table 3: Inter-budget transfers to the budgets of the Russian Federation subjects

in 2017-2020, billion dollars

Indicator	2017	Limit volumes 2018	Change in %	Limit volumes 2019	Change in %	Limit volumes 2020	Change in %
1. Inter-budget transfers, total	28,3	27,7	97,7	26,6	96,2	25,6	99,7
including:							
1.1. Grants, including:	12,9	13,2	102,6	13,3	100,6	13,5	101,1
Equalization grants	10,7	11,0	103,0	11,0	100,0	11,0	100,0
1.2. Subsidies	7,4	6,7	91,0	5,9	88,7	5,9	99,4
1.3. Subventions	5,4	5,4	100,0	5,5	102,6	5,6	101,0
1.4. Other inter-budget transfers	2,7	2,4	88,8	1,9	78,5	1,6	87,0

(created by authors, source: Ministry of Finance of Russia, 2017)

Thus, today we need a new methodological approach to unlocking the potential for self-development of subsidized regions and developing regional policy tools that can ensure the transformation of underdeveloped subsidized regions into self-developing ones. This will eliminate the socio-economic differentiation of Russian regions.

A self-developing region is a region with an economic system that can ensure the growth of production volumes along with expanded reproduction of the gross regional product, optimize the use of all available resources in the region, and prevent the negative impact of factors on individual sectors of the economy and territories (Fedolyak, 2014).

The self-development potential of region this is the unity of its economic and social components, static (a set of available resources that provide simple reproduction based on the use of extensive factors and management methods) and dynamic components (opportunities and target orientations that the region accumulates, replenishes, restores, transforms and implements throughout the entire period of its operation in order to obtain economic and social results), internal (effectiveness of the implemented regional policy) and external (institutional conditions and restrictions from the outside world) components that serve as a source of regional economic development (Fig. 2).

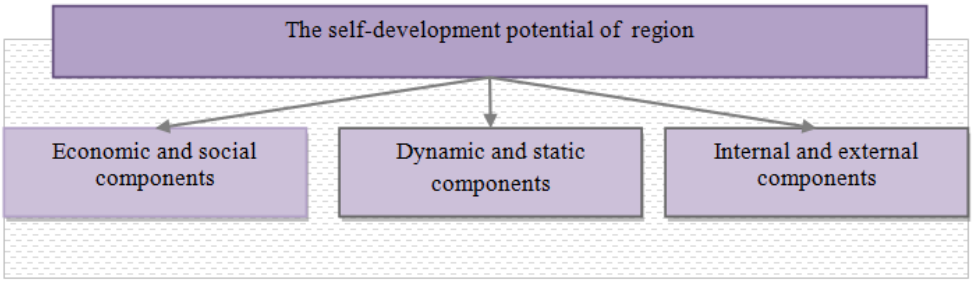

Fig. 2: Structural features of self-development potential of the region

(created by authors)

It is possible to identify the self-development potential of region by using indicators of national ratings (external), or by analyzing the internal characteristics of regional development (internal) (Yur'ev and Bludov, 2013).

External assessment of self-development potential of the region is based on expert assessments, which are reflected in the form of regional ratings. For example, the rating of the socio-economic situation of Russian regions, built by experts of the "RIA Rating" on the basis of aggregation of key indicators of regional development (indicators of the scale of the economy; indicators of economic efficiency; indicators of the budget sector; indicators of the social sphere) allows you to answer the question about the positions of a region on the economic map of Russia, to determine the disparities in the level of regional development.

External rating approach to the assessment of self-development potential of Russian regions shows that in 2018 the smallest size potential of self-development possess such highly subsidized regions: Republic of Tuva, Jewish Autonomous district, Altai Republic, Ingush Republic and Chukotka Autonomous districts (RIA Rating, 2019). The decrease in rating points and lower the position of these regions was due to the reduction in the share of profitable enterprises, lower tax and non-tax revenues of the consolidated budget, rising debt burden, a rise in infant mortality.

However, such ratings are widely used to compare regions, but do not allow you to identify and assess the self-development potential of the region.

We believe that the identification and objective assessment of the self-development potential of the region should be based on the calculation of the average value of the rate of change of indicators that

characterize the effectiveness of the regional economic system (Yur'ev and Bludov, 2013):

1) indicators of development: the volume of investments in social infrastructure (investments in social projects), investment in human capital; investment in non-financial assets (as intellectual property), the volume of innovative goods and services (%of total volume), the amount of tax revenues to the budget, payments to social and pension funds.
2) indicators of overall socio-economic situation in the region: average annual number of employed in the economy of the region, average monthly real wages by region, the number of business structures during the reporting period, the average annual turnover.
3) indicators of deceleration (their increase indicates an increase in negative trends in the region's economy): the degree of depreciation of fixed assets; shadow turnover; the share of "gray" wages.

Let's group these indicators in accordance with the features of the structure of the self-development potential of region:

- economic (average number of people employed in the economy of the region; the number of business structures during the reporting period; the degree of validity of fixed assets (indicator, reverse indicator of the degree of depreciation of fixed assets); volume of innovative products and services; the average monthly real gross wage; the amount of tax revenues in the budget) and social (payments to social and pension funds; investment in human capital; investment in social infrastructure; the share of "white" wages (the inverse of the share of "gray" wages in the region's economy));

- static (number of business structures for the period; average annual turnover; average number of people employed in the region's economy) and dynamic (the amount of payments to social and pension funds; investment in human capital; investment in social infrastructure; the share of "white" wages; the degree of validity of the fixed assets; the volume of innovative products and services in the total volume of goods and services; average monthly real wages in the region; the volume of tax payments to the budget) ;

- internal (the number of business structures for the period; average annual turnover; the proportion of "white" wages; the degree of validity of the fixed assets; the volume of innovative products and services in the total volume of goods and services; average monthly real wages by region; average number of people employed in the region's economy; investment in human capital; investment in social infrastructure) and external (the amount of tax revenues to the budget; the amount of payments to social and pension funds; the amount of tax payments to the budget).

The final assessment of the existing self-development potential of the region is made by calculating the average value of generalizing indicators that characterize the dynamics of economic and social effects of the region's activities and its contribution to the development of the national economy. If the index value exceeds 100%, this demonstrates the high self-development potential of the region, in the case of the indicator value equal to or less than 100%, we are talking about low level implementation of the self-development potential of the region.

Conclusions

Economic systems of subsidized regions that have non-equilibrium properties and have a self-development potential more than 100% require a special system of state regulation and support aimed at stimulating. In this case, the traditional mechanism of creation and implementation of regional socio-economic policy of the subsidized region must be enabled in the unit identify and evaluate the self-development potential of the region, which will provide flexible regional management in accordance with a pre-ranked in order of importance, the target system functions in pursuit of the complex index (Fig. 3).

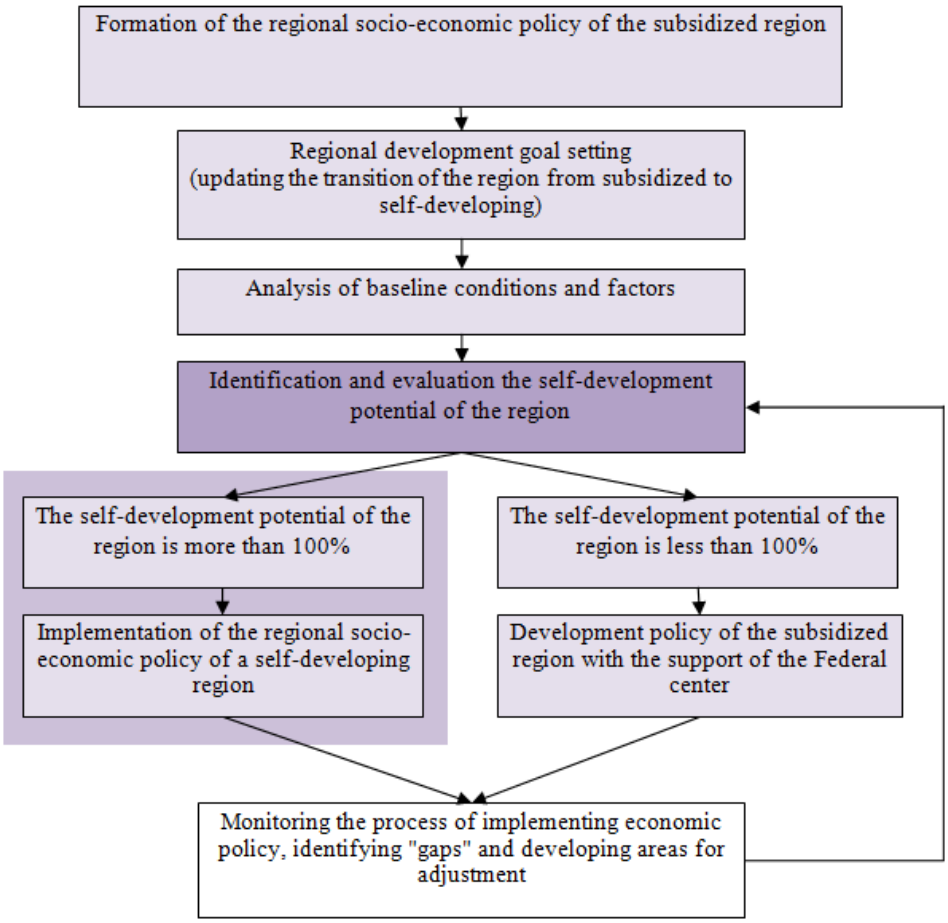

Fig.3: The mechanism of transfer of a subsidized region into a self-developing

(created by authors)

When a subsidized region moves to self-development, its lowest goal is self-sufficiency, and the highest goal is to achieve full financial independence of the region from the budget subsidies of the Federal center at the expense of:

1) improving the efficiency of using regional factors (natural, material, financial, intellectual);

2) application of financial incentives and levers that contribute to the growth of production and increase the income of economic entities in the region;

3) realization of human potential on the basis of activation of creative abilities, initiative, self-development of the individual;

4) development of economic relations of the region with other territorial systems and countries that can meet its production and final social needs.

Thus, the study allowed us to identify the features of the territorial development of Russia, to systematize the existing contradictions that prevent the alignment of regions in terms of socio-economic development. The dynamics of development of subsidized regions and the factors that

constrain their ability to build development potential are analyzed. The disclosure of the concept of "self-development potential of the region", as well as the developed methodological approach to its identification and evaluation, allowed us to propose new mechanisms for the development of subsidized regions.

References

- Bandman, M., Larina, N. and CHerevikina M. (1984), Territorial'no-proizvodstvennye kompleksy: planirovanie i upravlenie, Nauka, Sibirskoe otdelenie, Novosibirsk.

- Cito-web (2019), 'Vidy regionov-donorov i regionov-recipientov. Osobye ekonomicheskie rezhimy', *Cito-web.yspu.org*, [Online], [Retrieved June 10, 2019], http://cito-web.yspu.org/link1/metod/met119/tema7/Ex7.3.html

- Egorov, S. and Kuznecov, I. (2018), 'Politika samorazvitiya dotacionnyh regionov', *Vestnik Severo-Kavkazskogo federal'nogo universiteta*, 3 (66), 60-66.

- EMISS (2019), 'Raspredelenie naseleniya po velichine srednedushevyh denezhnyh dohodov i raspredelenie obshchego ob"ema denezhnyh dohodov naseleniya', *Fedstat.ru,* [Online], [Retrieved January 10, 2020], https://www.fedstat.ru/organizations/?expandId=1292865#fpsr1292865

- EMISS (2019),' Koefficient Dzhini (indeks koncentracii dohodov)', *Fedstat.ru,* [Online], [Retrieved January 15, 2020], https://www.fedstat.ru/indicator/31165

- Fedolyak, V. (2014), 'Teoreticheskaya model' regional'nogo vosproizvodstva, *Izvestiya Saratovskogo universitetata. Nov. ser. Ser. Ekonomika. Upravlenie. Pravo*, 1 (14), 123-129.

- Filatov, S. (2017), 'O sostoyanii social'no-ekonomicheskogo razvitiya dotacionnyh regionov i varianty upravleniya izmeneniyami', *Cscb.su*, [Online], [Retrieved December 15, 2019], http://cscb.su/n/021401/021401011.htm

- Friedmann, J. (1973), Urbanisation, Planning and National Development, Beverly Hills, London.

- Friedmann, J. and Alonso, W. (1964), Regional Development as a Policy Issue, Regional Development and Planning, Cambridge (Mass.).

- Garant (2019), 'Opublikovan perechen' dotacionnyh sub"ektov RF na 2020 god', *Garant.ru,* [Online], [Retrieved December 25, 2019], https://www.garant.ru/news/1304783/

- Gks (2019), 'Srednie dushevye denezhnye dohody naseleniya',*Gks.ru*, [Online], [Retrieved January 2, 2020], https://www.gks.ru/folder/13397?print=1

- Gks (2020), 'Valovoj regional'nyj produkt na dushu naseleniya', *Gks.ru*, [Online], [Retrieved January 20, 2020], https://www.gks.ru/folder/210/document/13204

- Granberg, A. (2001), Osnovy regional'noj ekonomiki, GU VSHE, Moskva.

- Hägerstrand, T. (1966), 'Aspects of the Spatial Structure of Social Communication and the Diffusion of Information', *Papers and Proceedings of the Regional Science Association*, Vol. 16, 27–42.

- Karpunina, E., Egorov, S. and Radyukova, Y. (2018a), 'Modernizaciya mekhanizma formirovaniya i realizacii regional'noj social'no-ekonomicheskoj politiki: ot dotacionnosti k samorazvitiyu, *Izvestiya YUgo-Zapadnogo gosudarstvennogo universiteta*, 3 (28), 18-28.

- Karpunina, E., Yakunina, I. and Yurina, E. (2018b), 'Realization of the National and State Economic Interests of Russia in the Conditions of Formation the 4.0 Industry' Proceedings of the

31st International Business Information Management Association Conference (IBIMA), 25-26 April 2018, Milan, Italy, 1488-1494.

- Lyosh, A. (2007), Spatial organization of the economy, Science, Moscow.

- Martin, P. (2005), 'The Geography of Inequalities in Europe', *Swedish Economic Policy Review*, Vol. 12, 83–108.

- Midov, A.(2018), 'Differenciaciya regionov Rossii po urovnyu strategicheskih konkurentnyh preimushchestv: metodologicheskie podhody i strategicheskij analiz', Upravlencheskoe konsul'tirovanie, 7, 165-173.

- Ministry of Finance of Russia (2017), 'Zadachi obespecheniya sbalansirovannosti regional'nyh byudzhetov i razvitiya mezhbyudzhetnyh otnoshenij na 2018-2020 gg.', *Cmokhv.ru,* [Online], [Retrieved December 10, 2019], http://cmokhv.ru/media/cms_page_media/2017/9/22/Zadachi_na_2018-2020_gody%20(1).pdf

- RBC (2018), 'Rossiya operedila Kitaj, Indiyu i Braziliyu v neravenstve regionov', *Rbc.ru.* [Online], [Retrieved December 22, 2019], https://www.rbc.ru/economics/26/09/2018/5baa58cd9a7947f649eea8fa

- RBK (2019), 'Minekonomiki opredelilo regiony — lidery i autsajdery po rostu ekonomiki', *Rbc.ru.* [Online], [Retrieved December 12, 2019], https://www.rbc.ru/economics/04/10/2019/5d95b59e9a79477d5633cb4e

- Riarejting (2019), 'Rejting Social'no-Ekonomicheskogo Polozheniya Sub"ektov Rf Itogi 2018 Goda', *Vid1.rian.ru*, [Online], [Retrieved December 30, 2019], http://vid1.rian.ru/ig/ratings/rating_regions_2019.pdf

- Rkgovru (2018), 'Strategiya social'no-ekonomicheskogo razvitiya Respubliki Krym do 2030 goda (proekt)', *Rk.gov.ru,* [Online], [Retrieved April 10, 2019], http://rk.gov.ru/file/strategiya_sotsialjno_ekonomicheskogo_razvitiya_respubliki_krim_do_2030.pdf

- Shekhovceva, L. (2005), Metodologicheskie podhody k issledovaniyu regiona: formirovanie strategicheskih celej, Kaliningrad.

- Statedata (2020), 'Spisok regionov (sub"ektov, oblastej) Rossii 2020 RF s kodami soglasno dannym FNS po alfavitu', *Statedata*, [Online], [Retrieved January 10, 2020], http://www.statdata.ru/spisok-regionov-rossii-s-kodamy

- Tyunen, I. (1926), The isolated state in its relation to agriculture and national economy, Vol. 1., Economic life, Moscow.

- Yur'ev, V. and Bludov, A. (2013), 'Metodicheskie aspekty ocenki realizacii predprinimatel'skimi strukturami social'no-ekonomicheskogo potenciala samorazvitiya', Materialy VI Ezhegodnoj Vserossijskoj nauchno-prakticheskoj konferencii, Tambovskij gosudarstvennyj universitet imeni. G. R. Derzhavina, Tambov, 2013, 391-398.

- Zagulyaev, D. (2011), 'Metodika analiza ekonomicheskogo yavleniya «impul's», primenyaemogo v ramkah situacionno-impul'snogo metoda upravleniya neravnovesnymi ekonomicheskimi sistemam', *Vestnik YURGTU (NPI)*, 3, 83-88.

The Moldovan Free Economic Zones and Their Effects on the Republic of Moldova's Economy

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Abstract

The main purpose of the paper is to identify the strategic importance that the Free Economic Zones (FEZ) have for the economy of the Republic of Moldova. Although, the definitions of said zones differ from country to country, the main incentives are the same: socio-economic growth and business and trade facilitation. One of the objectives of the paper is to determine the current state of the Moldovan FEZs and understand how their usage has translated into numbers, regarding growth and economic and commercial potential. Using statistical data on trade, foreign direct investment inflows and employment we were able to quantify some of the main effects the FEZs had during the last 10-15 years on the national economy as a whole. In the last part of the paper, the main focus is on future research directions and recommendations to take into consideration in order to obtain more viable and impactful results regarding the proposed subject.

Keywords*:* Special Economic Zones, Free Economic Zones, Foreign Direct Investment, Trade Facilitation

Introduction

Despite its rapid economic growth since the beginning of the century, the Republic of Moldova still remains one of the poorest countries in Europe and in the world. Since its economy still relies on a small variety of goods and services and shows a great deal of vulnerability when it comes to external factors, its trade performance and potential is of great interest for the academia and the society as a whole.

Within the new globalized economic framework, it is very hard to ignore the importance of trade and foreign investment for such small and relatively newly formed countries like the Republic of Moldova, especially taking into consideration its soviet past. Thus, the policy-makers should rather focus on reducing the gap between Moldovan producers and the global and regional markets like the EU and CIS, but also allow the foreign investors gain access to the internal market in order to facilitate trade, know-how transfers and development when it comes to management efficiency.

That is why the role of the Free Economic Zones present a massive interest and might prove to be a great way to achieve all of the above, or at least be the push that is so needed in order to finally surpass the transition period between a formally centralized economy and a free-market one. Although, the implications are more complex than it might seem at first, we would like to begin with identifying the Moldovan Free Economic Zones, how much investment comes through them and how do they effect the Moldovan economy in terms of trade, employment and production diversity. In the end, we hope to be able to identify new ways for further research that would allow us to come with empirical data and possible suggestions for future policies.

A Review of The General Framework. Incentives and Typology

The Free Economic Zones (FEZ) are basically a type of Special Economic Zones (SEZ), which are designated territories of a country where the applied economic rules differ from the rest of the economy. Usually the main objectives of any Special Zone might be summed as following: attracting FDI; act as a catalyst for unemployment reduction programs; diversifying exports and develop a less vulnerable economy, especially when it comes to global economic shock; and last but not least, they might act like experimental grounds for new policies, before applying them on a larger scale (World Bank, 2011).

There is no single and universally accepted classification of special economic zones, but the commonest approaches group them according to key factors such as their development objectives, their location and the types of activities they house. According to the classification used by the World Bank there are six zones, based on the main focus of the policies used within said zones. The main incentives may vary from free-trade facilitation in the case of the Free-Trade Zones (FTZ) to boarder regional development in the case of Free ports or wider Special Zones those which include a wide variety of commercial and industrial activities (OECD, 2017). The former represents a traditional model used widely throughout the developing world for almost four decades. The latter represents a more recent form of economic zone, originating in the 1980s in China and gaining in popularity in recent years. At the same time, the presented models do not necessarily exclude each other, most of the SEZs actually include FTZ in itself and the definition of each typology might differ from country to country. It is also quite difficult to find one generally accepted opinion when it comes to the positives that the establishment of the SEZs might bring for a country's economic growth, the results and the incentives being varied as well.

Moldova's Free Economic Zones and Their Effect on The Economy

The Moldovan government defines its Free Economic Zones as parts of the customs territory of the Republic of Moldova, economically separated, strictly delimited throughout their perimeter, where for domestic and foreign investors are allowed, preferentially, genres of the entrepreneurial activity. Meanwhile the main incentives are stated to be the acceleration of the socio-economic development of certain territories and of the country as a whole. In order to achieve this, the authorities hope to attract foreign investment; implement new technology; develop export-oriented production; apply the advanced management and production policies and create new jobs.

Moldova is known for its reliance on the Free Economic Zones. At the moment, there are 7 active Zones in the whole country, which are further divided into 34 subzones. More than a half of them were created during 2018. The number of active enterprises in the said territories has been constantly growing during the 2015-2018 period after years of stagnation and failed attempts to attract more investors the years prior. The total number of residents has reached over 200 units at the beginning of last year, which represent a 10% growth in comparison to the prior 12 months (Fig 1).

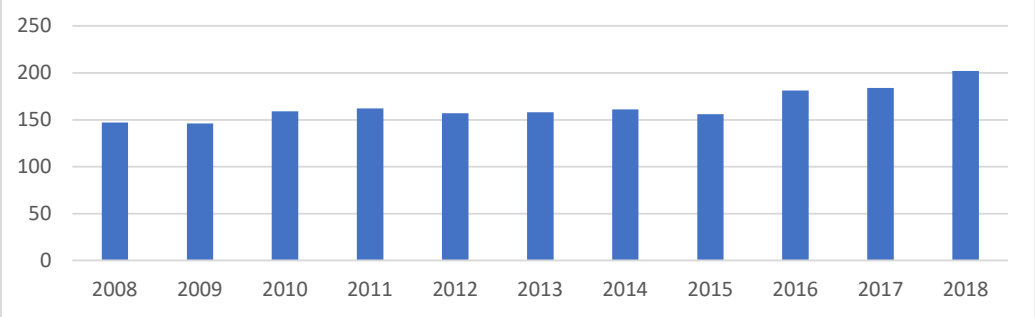

Fig. 1: Number of active enterprises within the Moldovan FEZs (2008-2018)

Source: Ministry of Economy and Infrastructure of the Republic of Moldova

When it comes to investing in the FEZs, the total value of the inflows constituted 402.4 million US dollars, increasing in 2018 by more than 15% in comparison to 2017, generally retaining an upward trend since the inception of the free zones (Fig 2). During the last 1ast 17 years, the total value of the investment has reached ten times the numbers from 2002. Most of the investment it is, however, absorbed by the Balti Zone, situated in the north of the country (around 46% of the total), second being the capital city of Chisinau with a little more than 18%. In 2018, on average, a resident total investment was around 247 thousand US dollars. As a whole, the FEZs are estimated to attract almost 30% of all FDI inflows of the country.

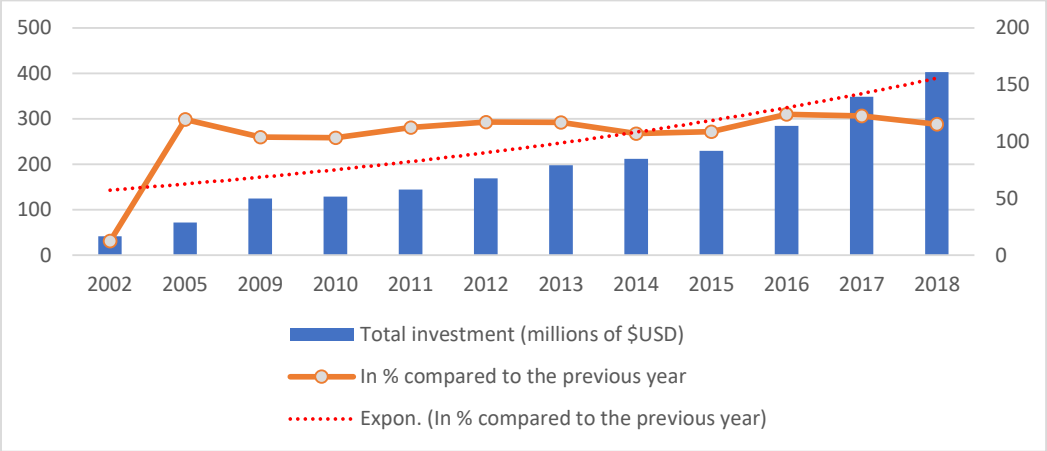

Fig. 2: The evolution of total investment towards the Moldovan FEZs (2002-2018)

Source: Ministry of Economy and Infrastructure of the Republic of Moldova

Another clear tendency that becomes easy to spot during the last decade is the growth of the industrial output within these economic zones. As far as the government is concerned, this can be considered a nice trend to follow, because the economy is quite vulnerable to external shocks as it still depends a lot on the agricultural sector. Once again, it seems that the overall income from industrial activities has grown tenfold within the last decade (Fig 3). The latest estimates show that at least 18% of the total industrial production was generated by the FEZs.

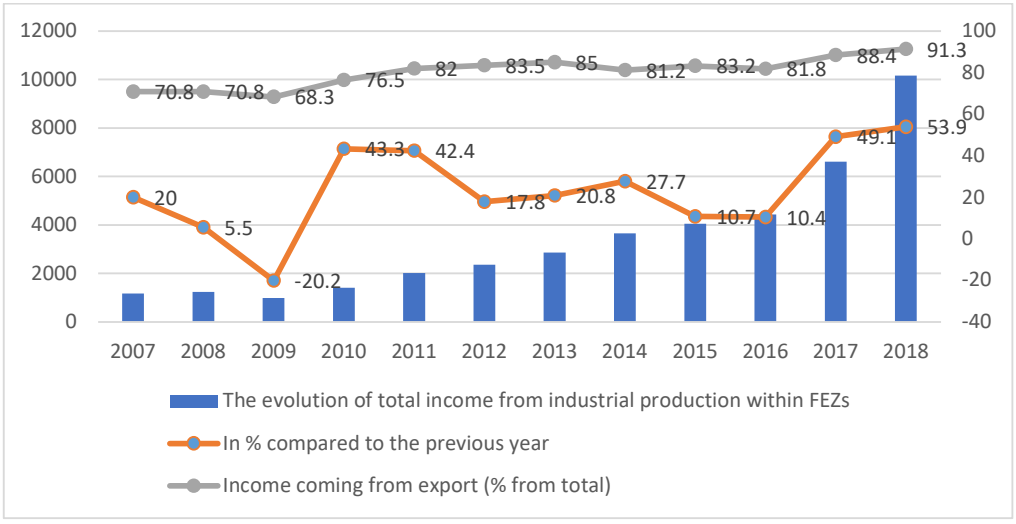

Fig. 3: The evolution of total income from industrial activities within FEZs (2007-2018)

Source: Ministry of Economy and Infrastructure of the Republic of Moldova

Apart from the effects all this might have on the structure of the economy, it is also worth mentioning that these activities generate an increased income as a result of their general orientation to the external markets. It is safe to guess that foreign investment in the zones has brought new technologies and know-how, but also new methods of conducting affairs, that might eventually increase the standards of the local production and make Moldovan exports more competitive. In 2018, more than 90% of the total revenue obtained in said territories from industrial activities came from export (Fig 3). At the same time, when compared to the economy as a whole, almost 21% of the total exports for 2018 came from the FEZs.

Table 1: Evolution of number of employees and average wages within FEZs

	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Number of people employed	3586	3018	5177	5875	6512	6896	6620	6502	8024	11926	15867
Average salary (MDL)	-	-	-	-	-	-	4900	5300	5600	8300	7500

Source: Ministry of Economy and Infrastructure of the Republic of Moldova

The continuously growing activities within the Free Economic Zones have lead to a greater number of people getting employed by the economic agents who do business here. Also, the average salary of the people working here, although still low by the Western standards, are higher than the national average. In fact, the average salary within the FEZs is at least 11.3% higher than the national average value. This is most definitely a result of the higher added value of the production that is obtained by said enterprises. It is estimated that almost 2.5% of all the employed Moldovans are working within the FEZs. The same number of employees consists more than 13% out of all people working in the secondary sector of the economy. At the same time, an increase in income for the people and the active firms means more money collected from taxes, which can only bring positive long-term effects and further upward trend when it comes to work remuneration and increasing living standards for the residents.

Conclusions and Further Recommendations

The Free Economic Zones seem to maintain a really important role for the economy of the Republic of Moldova. In general, the activities that take place within these territories and the enterprises that choose to settle here bring a lot of positive effects on the country and its economic potential. The number of said enterprises is constantly increasing, bringing more foreign investment and technological and soft skills know-how to the table. This also act as a catalyst for a slow, but needed change when it comes to economic structures and lowering vulnerabilities in front of shocks and imbalances. And, at the same time, the FEZs actually has a social impact, by countering long-term unemployment and low living standards.

Although the data proves the utility of said zones and that the results are in-line with the government intentions of economic and social growth, it is hard to quantify yet how big the impact really is. Further research is definitely required in order to identify if there are differences between the zones and subzones themselves, since most of the activities are taking place in three main units (Balti, Chisinau and Ungheni). We would also like to identify the main factors that determine the attractivity of each territorial unit and what were the results so far in comparison with all the others. At the same time, it is also important to see how the FEZs acted as experimental grounds for policies and which policies work or didn't work in the past and if there are any new ideas in order to boost the FEZs positive effect on the economy.

Acknowledgment

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References

- Farole, T. and Gokhan, A. (eds.) (2011), Special Economic Zones: Progress, Emerging Challenges, and Future Directions, *World Bank, Washington*, DC.
- Farole, T. (2011), Special economic zones: What have we learned?, *World Bank Poverty Reduction and Economic Management Network*, No. 64, World Bank, Washington, DC.
- Odainîi, D. (2017), The Role of Free Economic Zones in the Insurance of Developing the Regional Economy in the Republic of Moldova*, Technical University of Moldova*, Chisinau.
- *(2017). Tracking Special Economic Zones in the Western Balkans*. OECD.*
- ** Ministry of Economy and Infrastructure of the Republic of Moldova
- ** *National Bureau of Statistics of the Republic of Moldova*

Impact of Social Media Marketing and e-Commerce on The Performance of SMEs in UAE: A Structural Equation Modelling

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Abstract

This research is on the impact of social media marketing and e-commerce on the performance of SMEs in UAE: A structural equation modelling. The research papers investigate the social media marketing impact on SMEs performance. Data were collected from the SMEs in UAE. The research employed quantitative approach and used questionnaire to collect relevant data from the respondents. The model was developed using SPSS and AMOS software as the research is quantitative in nature.

Keywords: Facebook, WhatsApp, Twitter, Social Media, SMEs and UAE

Introduction

The usage of online marketing technologies in SMEs does not stretched out to the required level (Ahmad et al., 2019). In study conducted by Sarah, (2012) on the social media marketing in a small business. The results of this study found that SMEs are not using social network marketing to its full potential and scope. SMEs have been struggling to follow a sequence of stages in their adoption of Internet technologies. These staged models were also termed to be ladders postulate that businesses move in stages from basic use of the internet as an e-mail or marketing tool to a more sophisticated use that integrates business systems and redesigns business processes (Fernando, 2005).

Online social channels offer connectivity and transparency for SMEs to gain a competitive advantage. Among the 83% of marketers indicated that social media network is very important for their business (Nuseir, 2018). A report by Orient Planet Research found that social media channels such as Facebook, YouTube, WhatsApp and LinkedIn are increasingly being used by SMEs and have become major business enablers. The report also revealed that social media in U.A.E presents itself as an invaluable tool for SMEs due to the range of benefits that it has to offer and at a reasonable cost. The report also showed that SMEs represent 95 per cent of all local establishments, accounting for 42 per cent of the workforce and contributing around 40 per cent to Dubai's economy (Basri, 2016).

Today the penetration of social media network is huge in U.A.E. However, it is not being used for marketing purposes (AlSharji, 2018). Even though, the U.A.E is among the top countries in the world, with high percent smartphone penetration (78%) and more social media adoption even higher than the United States (Zaidan, 2017). This shows that UAE citizen does not make use full advantages of social network especially with broad coverage wider penetration for the online user persuade them to become online buyers.

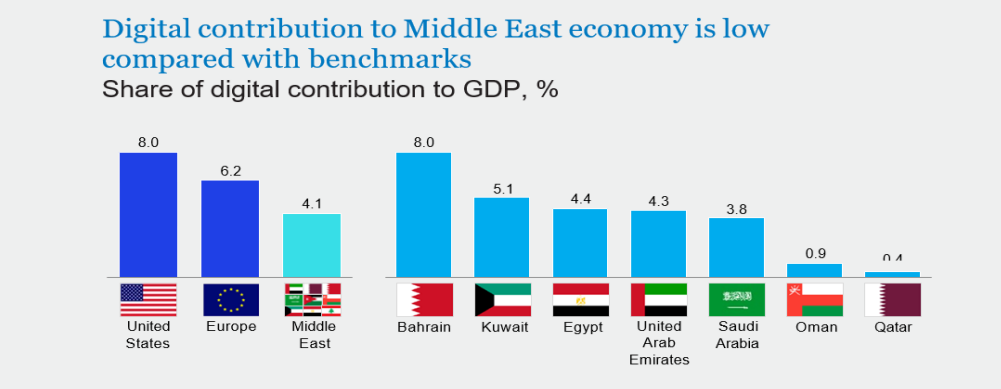

Figure 1: The digital distribution in Middle East economy

Source: James et al (2016)

In addition to that, the UAE government ranks number one in digital and internet adoption among Middle Eastern countries and matches the digital frontier countries. Nonetheless, using social media as marketing agent for SME in U.A.E is not encouraging (Makki, et al., 2015). It is found that 73% of small businesses are now using social media. Furthermore, four fifths (81 percent) of these plans to further increase their social marketing efforts, and 62% of SME not currently using these channels have said that they plan to do so in the next year (Basri, 2019) Based on the survey conducted by IPSOS, of those UAE online adults polled, 63% had shopped online in the last 12 months with almost half (49%) of these shopping both domestically and cross-border and the top three countries that UAE online shoppers opt to buy from are revealed as the United States (30%), United Kingdom (18%) and India (18%). These statistics shows how online shopping give impact to the businesses locally and globally. The statistics highlighted that UAE citizen are still not satisfied with the quality of the e-commerce website locally whereby they prefer to shop from other countries instead of their local website. Hence, it is important to increase the economic growth specifically among SME's in U.A.E that have interest to involve with e-commerce and social media marketing activities. The presence of SME's in UAE economy is trivial For example SMEs contribute around 40% to the total value-add generated by the Dubai's economy, with the trading accounted for 47% of the total value-add by SMEs; the share of Service SMEs is around 41% and that of Manufacturing SMEs is estimated at around 13% (Abu Bakar et al., 2019).

The consumers in U.A.E are primed and ready to lead digitally enhanced lives, businesses and governments have not fully embraced the digital opportunity yet. A recent survey revealed that just 18 percent of small and midsize enterprises (SMEs) in the United Arab Emirates have an online presence through social media network (Olanrewaju et al., 2020). Despite The following figure shows SMEs percentage of presence in online business.

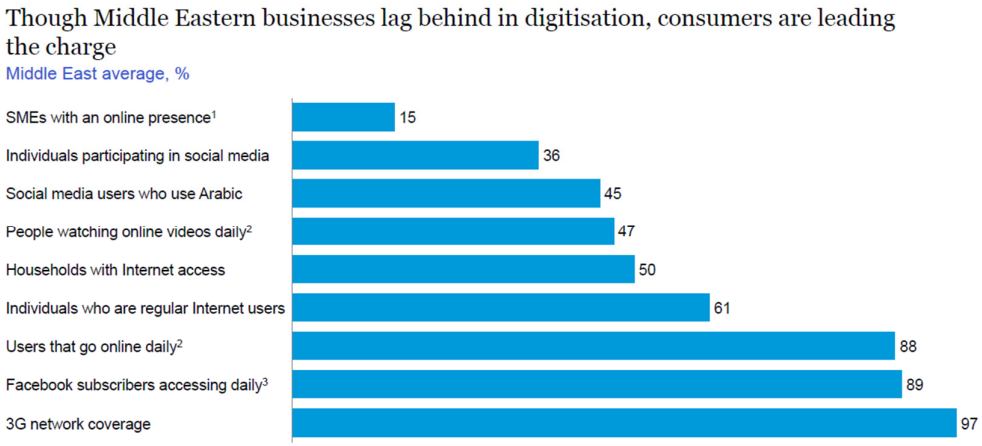

Figure 2: SMEs percentage of presence in online business

Source: Networked Readiness Index (2015)

It is evident that the presence of SMEs through social media network is facing big challenges due to several obstacles, whereby 2019, projections estimate that the Middle East and Africa will have the world's highest cloud traffic growth rate at 41% (Global Cloud Index forecast, 2016). Large corporations as well as SMEs in U.A.E often struggle to drive innovation from inside the company. Today, many companies have yet to tap into social media opportunities to innovate in business and expand (Kareem, 2015). Social media adaption by firms creates a great network among businesses, customers and suppliers. However, less attention has been paid to the social media marketing values for SMEs performance (Odoom et al., 2018). Given that small and medium sized enterprises are economic engine of most of countries, previous studies mainly have focused on the adaption (Durkin, McGowan, & McKeown, 2013; Wamba & Carter, 2016) and benefits and barriers (Michaelidou, Siamagka, & Christodoulides, 2011) of social media in SMEs context. SMEs in U.A.E do not fully make the best use of the potentials and opportunities offered by online marketing. The application of mobile devices, and social media networks (SMNs) such as Facebook has revolutionalised the e-commerce adoption process in SMEs. However, research into this area is still developing and there is a dearth of knowledge on how SMEs in UAE enact and apply this phenomenon.

There is a growing body of academic literature on the use of social media marketing among SME's. However, most of the existing studies focus on larger enterprises that have a higher propensity for adopting new and innovative technologies. There have been modest studies on social media marketing in the context of SMEs explicitly (Ahmed et al. 2018). It is widely known that SMEs are often less likely to use emerging technologies due to their limited capabilities, lack of resources, absence of technical expertise, unstable organization structure, small number of employees and lack of capacity (Al Tawara et al., 2017). Additionally, Karjaluoto (2015) found out that SMEs look like not utilising the social media and online tools to maximum potential marketing, and therefore SMEs are not getting any benefits offers by these tools. This result is matched with a study conducted by Alaa, (2016) in U.A.E. They found that SMEs' average sales from online marketing are 32.2% and it is "somewhat very low" due to low attitude of customers to rely on social media ads of SME, he found a positive correlation between sales of SMEs and the efficiency of social media marketing.

Based on the above argument, the problem statement of the current study is that SMEs in U.A.E are unable to achieve a significant increase in their sales through social media network due to several obstacles such as weak attitude of customer to use social media ads, subjective norm of customers, information quality of ads on social media pages, and behavioral intention to use social media network as a marketing agent for e-commerce in U.A.E. This problem will be investigated in this study and suggesting the appropriate recommendations.

Methodology

The study used quantitative approach to achieve the research objectives. The use of quantitative methodology provides a concrete manifestation of the findings on an actual setting. In the same light, the use of this type of research allows the researcher to measure the parameters held in the objective of this research. (Benz, 2011).

The collection of data for analysis was conducted through questionnaire as the main tools for collecting data. Quantitative research based on the statistics was used to evaluate the impact of social media marketing and e-commerce on the performance of SMEs in UAE. Also, SPSS and AMOS software were employed to analyse the data collected from the respondents.

Result

Demographic Information

Table 1 shows the firm information provided by the respondents. About 40 percent of the respondents indicated that their firms had 6-20 employees while a slightly above 10 percent indicated that their firm had 101-250 employees. Only 2 respondents indicated that their firm had more than 251 employees. Exactly 29 percent indicated that their firm had 21 to 100 employees while the remaining 19 percent showed that their firms' employee capacity was between 1 to 5 employees.

Information on the type of activities undertaken by the firm indicated that majority were in the service sector (42.4 %). This was followed by manufacturing (25.3 %), research and development (19.6 %). The remaining firms either engage in wholesale, retailing or distribution as the case may be.

Regarding the number of years, the firm spend doing business about 47 percent indicated that they spent more than 15 years in business, 44.1 percent spent 7 to 15 years while the remaining indicated that they spent between 1 to 7 years in business.

Considering the position of the respondents, 42.4 percent indicated that they were owner managers, about 40 percent indicated that they were managers while about 13 percent mentioned that they were supervisors. The remaining 5 percent indicated that they were employees.

On sectorial distribution of the respondents' firm, about 67 percent indicated that they were in private sector while the remaining 33 percent were in public sector. Regarding the social media use, the analysis revealed that all the respondents indicated that they use social media.

More than 50 percent of the respondents indicated that they use social media for networking for more than 5 years. Another 30 percent of the respondents indicated that the had been using social media for networking for about 3-4 years while 8.2 percent indicated that they had been using social media for networking for the period of 1-2 years. Less than 3 percent indicated that they spend less than a month using social media for networking.

When asked about the effect of online networking, more than the three-quarter of the respondents indicated that it somehow has effect on face to face communication. Some 16 percent believed that online networking could replace face to face communication while 6 percent of the respondents believed that online networking had no effect on face to face communication.

Majority of the respondent agreed that social media is important (38.8 %) while exactly 32.2 percent strongly agreed that social media is important. More than one-quarter (29 %) had a fair opinion about the importance of social media.

Table 1: Demographic characteristics

	Frequency	Percent
	Number of employees	
1-5	47	19.2
6-20	97	39.6
21-100	71	29.0
101-250	28	11.4
251 and above	2	.8
Total	245	100.0
Firm Type		
Manufacturing	62	25.3
Service	104	42.4
Research & Development	48	19.6
Wholesale	21	8.6
Retailing	6	2.4
Distribution	4	1.6
Total	245	100.0
	Years in business	
Less than 3 years	5	2.0
3-7 years	18	7.3
7-15 years	108	44.1
More than 15 years	114	46.5
Total	245	100.0
	Job Position	
Owner manager	104	42.4
Manager	97	39.6
Supervisor	31	12.7
Employee	13	5.3
Total	245	100.0
	Sector	
Private	163	66.5
Public	82	33.5
Total	245	100.0
	Social media use	
Yes	245	100.0
	Years of social media use for networking	
Less than a month	7	2.9
1-2 years	20	8.2
3-4 years	74	30.2
More than 5 years	144	58.8
Total	245	100.0
	Effects of online networking	
Does not have any effect on face to face communication	15	6.1
Somewhat has an effect on face to face communication	190	77.6
Replaces faces to face communication	40	16.3

Total	245	100.0
	Importance of social media	
Strongly agree	79	32.2
Agree	95	38.8
Fair	71	29.0
Total	245	100.0

After explaining the demography of the respondents above and also achieving the validity and model fitness of the individual latent variables, there is need to evaluate the validity and overall model fitness. The reliability and validity of the entire measurement model was assessed by running CFA involving the entire constructs in the research. The purpose was to establish the convergent and discriminant validity of the model prior to proceeding with the structural model evaluation.

Convergent Validity

Convergent validity is a measure of the degree to which the items or indicators of a construct are correlated with the construct. Gaffen and Straub (2005) defined convergent validity as the extent the proposed measures within the construct are strongly correlated. Convergent validity is normally established by determining the standardized factor loading, average variance extracted and construct reliability.

Hair et al (2010) stated that factor loading that are statistically significant indicate the achievement of convergent validity while indicators with factor loading of .50 and above are regarded sufficient to establish convergent validity. Convergent validity is also assessed using the Bentler-Bonett coefficient (NFI). Recommended threshold for convergent validity using the NFI index is .90 (Hair, et al, 2010; Kline, 2011; Byrne, 2010). In this research, the convergent validity of the measurement model was assessed using the standardized factor loading and the NFI criteria. Table 2 shows the standardized factor loading and the NFIs of the individual latent constructs in the research. As shown in the table, the entire individual measurement models achieved convergent validity.

Table 2: Convergent validity measures of final measurement models

S/N	Construct	Residual items number	Factor loading		NFI Index
			Lowest FL	Highest FL	
1	Marketing	5	.727	.946	.990
2	Time	6	.517	.899	.972
3	Human resource	6	.547	.789	.967
4	Finance	7	.623	.783	.957
5	Flexibility	6	.518	.806	.968
6	Facebook	6	.583	.680	.947
7	Whatsapp	5	.717	.922	.991
8	Twitter	5	.720	.796	.984
9	Email	5	.574	.822	.975
10	National culture	7	.518	.743	.964

Discriminant Validity

Hair et al., (2014) described discriminant validity as the degree to which a construct is distinct from other constructs in the model. Fornell and Larcker (1986) suggested that the square of the correlation between two constructs should be less than their corresponding average variance extracted (AVE). Discriminant validity was examined by comparing the squared correlation between constructs with the average variance extracted of the individual constructs (Hair, et al. 2014). Table 3 shows the AVE of

each construct at the diagonal while the off-diagonal values represent the correlation coefficients between the constructs. Based on the recommended threshold, all the AVEs are greater than .50 and each AVE value is higher than any correlation with other construct, hence indicating the achievement of discriminant validity.

Table 3: Discriminant validity

	MKT	TM	HMR	FIN	FLX	FB	WA	TW	EM	NC
Marketing	**.779**									
Time	.046	**.566**								
Human resource	.050	.029	**.660**							
Finance	.086	.028	.500	**.514**						
Flexibility	.049	.051	.091	.038	**.726**					
Facebook	.112	.071	.005	.080	.010	**.647**				
Whatsapp	.036	.046	.025	.044	.052	.015	**.673**			
Twitter	.037	.142	.066	.003	.044	.004	.038	**.590**		
Email	.138	.162	.127	.006	.072	.072	.028	.365	**.521**	
National culture	.006	.026	.038	.066	.021	.189	.062	.115	.152	**.658**

Multicollinearity Assessment

Checking for multicollinearity is an important requirement when evaluating structural equation models. Pallant (2011) described multicollinearity as the presence of a strong correlation between predictor variables. Hair et al., (2010) stated that multicollinearity is a threat to the validity of multivariate analysis which could led to potential error in hypotheses testing. Hair et al., (2010) recommended that correlations between constructs should not be greater than .90. Table 3 shows the correlations among the constructs in the research model. It is shown that the highest correlation occurred between email and twitter with a Pearson's Product Moment correlation coefficient (r) of .365 while the lowest correlation was between national culture and marketing r = .006. This suggests that there is absence of excessive multicollinearity.

Table 4: Correlation matrix of research constructs

	MKT	TM	HMR	FIN	FLX	FB	WA	TW	EM	NC
Marketing										
Time	.046									
Human resource	.050	.029								
Finance	.086	.028	.500							
Flexibility	.049	.051	.091	.038						
Facebook	.112	.071	.005	.080	.010					
Whatsapp	.036	.046	.025	.044	.052	.015				
Twitter	.037	.142	.066	.003	.044	.004	.038			
Email	.138	.162	.127	.006	.072	.072	.028	.365		
National culture	.006	.026	.038	.066	.021	.189	.062	.115	.152	

Table 5 shows the measure of construct validity for the final measurement model. The respective standardized factor loading, the composite reliability (C.R.) and the AVEs all met the desired thresholds of reliability.

Table 5: Construct validity of the overall research measurement model

Construct	Items	Estimate	CR	AVE
Marketing	mkt1	.894	.946	.779
	mkt2	.902		
	mkt3	.946		
	mkt4	.926		
	mkt5	.727		
Time	tm1	.844	.884	.566
	tm2	.820		
	tm3	Item removed		
	tm4	.899		
	tm5	.517		
	tm6	.690		
	tm7	Item removed		
	tm8	.680		
Human resource	hmr1	.628	.907	.660
	hmr2	.547		
	hmr3	.658		
	hmr4	.690		
	hmr5	.789		
	hmr6	.649		
Finance	fin1	.623	.881	.514
	fin2	.722		
	fin3	.706		
	fin4	.775		
	fin5	.667		
	fin6	.783		
	fin7	.731		
Flexibility	flx1	.518	.923	.726
	flx2	.798		
	flx3	.806		
	flx4	.755		
	flx5	.752		
	flx6	.728		
	flx7	Item removed		
Facebook	fb1	.583	.903	.647
	fb2	.629		
	fb3	.680		
	fb4	.640		
	fb5	.677		
	fb6	.674		
Whatsapp	wa1	.753	.911	.673
	wa2	.717		
	wa3	.876		
	wa4	.922		
	wa5	.817		
Twitter	tw1	.720	.878	.590
	tw2	.758		

	tw3	.780		
	tw4	.796		
	tw5	.783		
Email	em1	.597	.785	.521
	em2	.822		
	em3	.574		
	em4	Item removed		
	em5	.632		
	em6	.613		
National culture	nc1	.709	.913	.658
	nc2	.743		
	nc3	.670		
	nc4	.645		
	nc5	.750		
	nc6	.518		
	nc7	.573		
	nc8	.709		

Structural Model Evaluation

Once the validity of the constructs was assessed and proposed measurement model achieved and model fit was confirmed then the next step was to test the hypothesized relationships among the constructs using structural model. In other way, when a measurement model fulfills the model fit criteria then hypothesized relations between constructs can be confirmed by building a structural model. According to Hair et al., (2010) a structural model represents the theory with a set of structural equations and is usually depicted with a visual diagram. After confirming the measurement model as model fit, the hypotheses were tested by investigating the strengths of proposed relationships among its constructs. This includes testing the hypothesised theoretical framework and the relationships between latent constructs. Latent constructs are unobserved variables measured by their respective items or indicators. Endogenous and exogenous are the two types of latent variables (Kline, 2011; Hair et al., 2010). In the current research the exogenous latent constructs were FB, WA, TW, EM and NC while the endogenous constructs were marketing, time, human resource, finance and flexibility.

To test the proposed hypotheses, structural model was tested using all ten constructs which were used in measurement model. In measurement model, constructs were associated using two sided arrows "covariance" (↔) whereas in structural model, constructs were associated using single sided arrow (→) which represents the "path relationship" between the constructs (Hair et al., 2010). In structural equation modeling (SEM), structural model assessment results produce estimated path coefficient, standard errors, critical ratio (C.R.) or t-values, and p-values. The t-values is the critical ratio (C.R.) achieved by dividing path coefficient by standard errors. Hypothesized relationship is considered significant when C.R. or t-value (>=1.96). Non-significant path coefficient can be considered unimportant in the model and can be eliminated from the model (Hair et al., 2010).

Figure 3 shows the first-round output of the structural model. From the figure it is shown that while other fitness indexes were achieved, however, some indexes failed to meet the acceptable level. For example, all the observed factor loading and their corresponding square multiple regression meet the required thresholds of .50 and .30 respectively. In respect of the fit indexes, however, none satisfied the requirement for model fitness which was an indication that model re-specification was required.

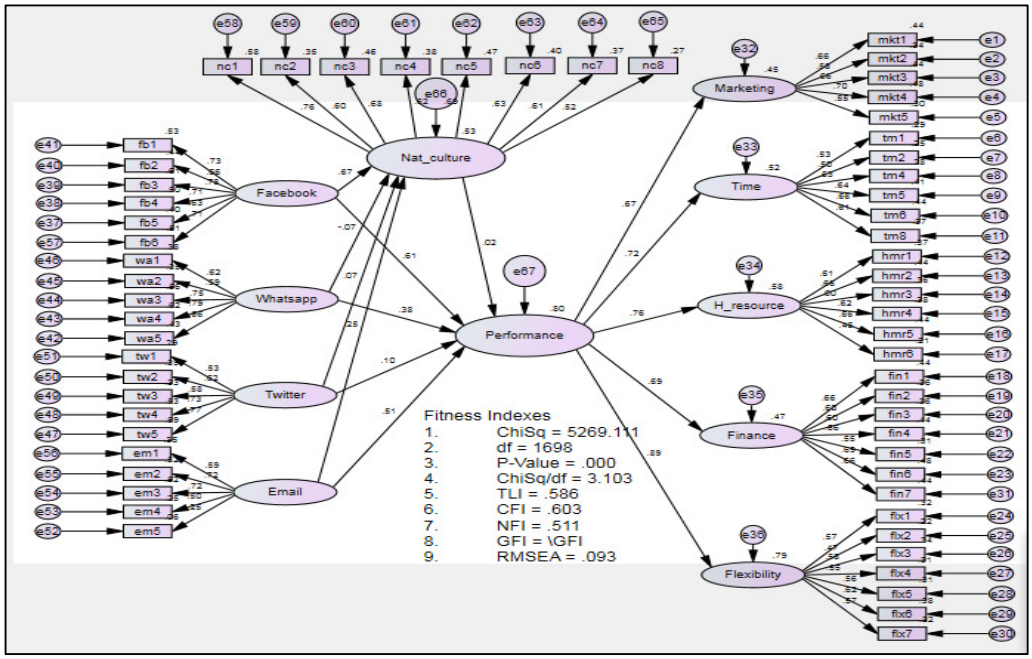

Figure 3: Initial structural model

A re-specified model is presented in Figure 4. The final structural model was achieved after a reiterative process of re-specification based on the examination of the standardized factor loading, SMCs, and other relevant fitness indices. In the process the latent construct, twitter had to be removed entirely from the model due to insufficient loading. Similarly, two items were deleted from the latent construct, flexibility. The final model had achieved model fitness

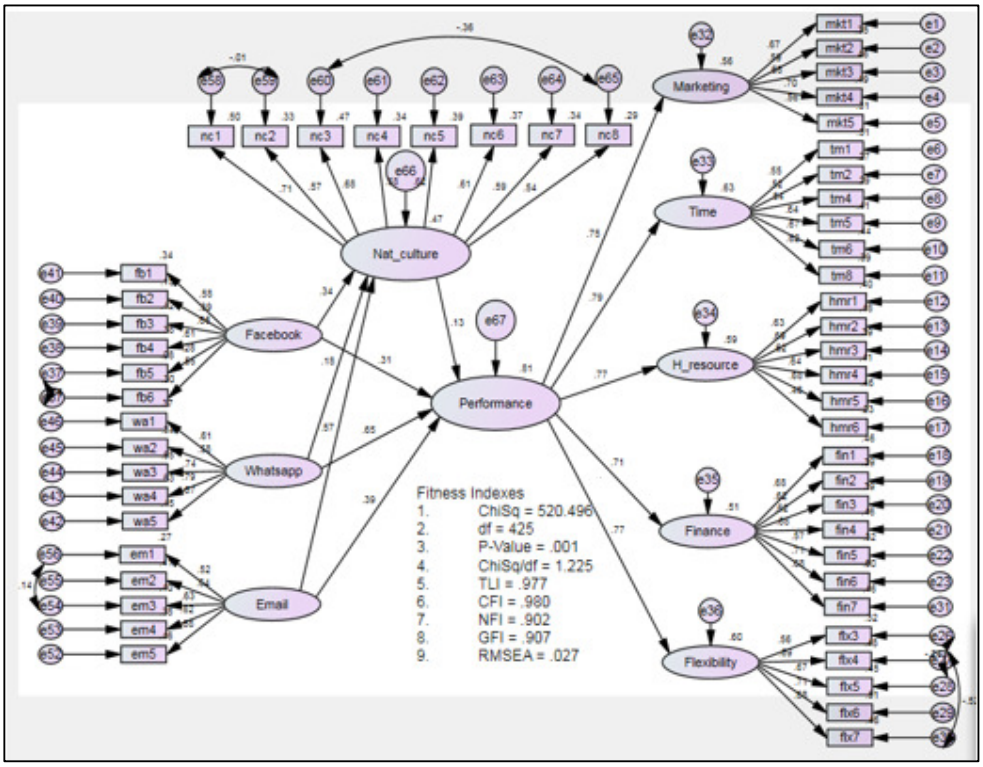

Figure 4: Final structural model

Table 6 shows a summary of the fitness indexes obtained from the initial and final structural model. The analysis indicated that the final model satisfied all the necessary requirements for model acceptance.

Table 6: Fitness indexes for structural models

Category	Parsimonious fit	Absolute fit	Incremental fit	Incremental fit	Absolute fit	Comment
Fitness Indexes	Chisq/df	GFI	CFI	NFI	RMSEA	
Acceptance Threshold	Chisq/df ≤ 30	GFI ≥ .90	CFI ≥ .90	NFI ≥ .90	RMSEA ≤ .08	
Initial Structural Model	3.128	Na	.598	.507	.093	Fitness level not achieved; model not accepted
Final Structural Model	1.225	.907	.980	.902	.027	Fitness level achieved; model accepted

Evaluation of Direct Relationships

The structural path for the relations between the exogenous and endogenous constructs is presented in Table 7. The table shows that the direct relationships between SME Performance and the four exogenous constructs. The standardized regression weight for the path indicated that only one of the path coefficients was non-statistically significant. Thus, the paths reported the following statistics: Performance←National culture (β= .130; C.R. = 1.458; p = .145); Performance←Facebook (β= .315; C.R. = 3.585; p < .05); Performance←Whatsapp (β= .654; C.R. = 6.158; p < .05), Performance←Email (β= .385; C.R. = 3.935; p < .05) which collectively explained about 81 percent variation in SME

Performance.

Similarly, the path coefficients for the relations between the endogenous construct, national culture and the three exogenous constructs (facebook, whatsapp and email) Nat_culture←Facebook indicated a statiscally significant relationship with the following path statistics: (β= .342; p < .05); Nat_culture←Whatsapp (β= .176; C.R. = 2.665; p < .05), and Nat_culture←Email (β= .567; C.R. = 6.400; p < .05). The three exogenous constructs collectively explained about 56 variation in national culture.

Table 7: Standardized regression weight of the path relationship

Path relationship	Estimate	S.E.	C.R.	P-value	R^2
Performance←National culture	.130	.055	1.458	.145	.81
Performance←Facebook	.315	.157	3.585	***	
Performance←Whatsapp	.654	.073	6.158	***	
Performance←Email	.385	.060	3.935	***	
Nat_culture←Facebook	.342	-	-	***	.56
Nat_culture←Whatsapp	.176	.074	2.665	.008	
Nat_culture←Email	.567	.089	6.400	***	

****indicates significance at p<.05*

Evaluation of Indirect Relationship

The research theoretical framework depicts an indirect relation between the exogenous constructs (facebook, whatsapp, and email) and the endogenous construct (SME Performance) with national culture acting as a mediator construct. This suggests the need for testing the indirect effect of the exogenous constructs on the endogenous construct via the national culture.

To test the mediation effect, the bootstrapping method was used. Hayes (2014) described the bootstrapping method as the most effective method for testing mediation in SEM analysis. The procedure involved re-sampling of the working data set between 500 and 1000 times to create a sampling distribution from which the total effect, the direct effect and indirect effect estimates and their corresponding 95 percent confidence interval values are produced. The algorithm also estimates the lower and upper limits as well as the two-tailed significant values for the effects.

Table 8 shows the bootstrapping result for testing the mediation effect of national culture in the research model. As shown in the table the standardized indirect (mediated) effect of Facebook on Performance is significantly different from zero at the 0.001 level (p=.200 two-tailed). Similarly, the standardized indirect (mediated) effect of Whatsapp on Performance is significantly different from zero at the 0.001 level (p=.309 two-tailed). Likewise, the standardized indirect (mediated) effect of Email on Performance is significantly different from zero at the 0.001 level (p=.200 two-tailed).

Table 8: Two-tailed significance of bootstrap confidence interval for indirect effect

Path relationship	**Estimate**	**Lower Bounds**	**Upper Bounds**	**P-value**
Performance←Nat. Culture←facebook	.044	-.045	.155	.200
Performance←Nat. Culture←whatsapp	.023	-.020	.102	.309
Performance←Nat. Culture←email	.074	-.070	.215	.200

Limitations of the Study

As a norm with all studies, this study faced several limitations. If these limitations are addressed in a proper manner in future work, it could result in an improvement of results with better overall quality

and findings.

This limitation was observed based on insufficient literature on the relations between the components of the variables. The researcher was limited in having a detailed discussion on social media marketing tolls based on various perspectives with the scarcity of past research materials. Time and budget were also obstacles to conduct the study with larger sample size and on more than one industry.

However, the limitations of the study provide avenues for future researches. A significant limitation was felt in the process of collecting data. Firstly, since the target population in this study is SMEs in UAE, gaining access to the right department and employee of the SMEs in UAE turned out to be an arduous task. In addition, given the nature of the questionnaire which touches on areas of social media marketing, privacy of the respondent was of utmost importance. In future, it is suggested that the model is utilized in various sections of the SMEs to prevent the difficulty of collecting data and to assist in expanding the findings.

Recommendations for Future Research

The researcher recommends the following steps for future work in this area. The limitations in this study are expected to be addressed in future studies. Therefore, the researcher recommends that a wider scope with more detailed questions are developed and utilized. Future studies can narrow the study's scope to certain criteria to prevent biased responses. In future, the questionnaires should also be distributed to more people in order to improve the findings of the survey. The researcher recommends the following for future work in this area.

The sample area and size should be widened by including companies out of SMEs in UAE. This would help to lower the case of bias and help in improving the accuracy of the findings.

The variables should be increased. The variables used in future studies could be increased to include variables that are not include so that the scope could be widen. It is suggested that, future research work should be as a comparative study between different countries, this could undoubtedly increase the cope and provide more understanding of social media marketing by many organizations in different countries.

Summary

This research is on the impact of social media marketing and e-commerce on the performance of SMEs in UAE: A structural equation modelling. The research papers investigate the social media marketing impact on SMEs performance. Data were collected from the SMEs in UAE. The research employed quantitative approach and used questionnaire to collect relevant data from the respondents. The model was developed using SPSS and AMOS software as the research is quantitative in nature.

References

- Abu Bakar, A. R., Ahmad, S. Z., & Ahmad, N. (2019). SME social media use: A study of predictive factors in the United Arab Emirates. *Global Business and Organizational Excellence*, *38*(5), 53-68.
- Ahmad, S. Z., Bakar, A. R. A., & Ahmad, N. (2019). Social media adoption and its impact on firm performance: the case of the UAE. *International Journal of Entrepreneurial Behavior & Research*.
- Al Tawara, A., & Gide, E. (2017). A Comprehensive Literature Review on the Adoption of Social Media Marketing in SME Retailors in Jordan. *International Journal of Business and Management Studies, ISSN*, 2158-1479.
- AlSharji, A., Ahmad, S. Z., & Bakar, A. R. A. (2018). Understanding social media adoption in SMEs. *Journal of Entrepreneurship in Emerging Economies*.
- Basri, W. (2016). Social media impact on small and medium enterprise: Case review of businesses in the arab world. *Arts and Social Science Journal*, *7*(6), 236.

- Basri, W. S. M., & Siam, M. R. (2019). Social media and corporate communication antecedents of SME sustainability performance. *Journal of Economic and Administrative Sciences*.
- Hair, J. F., Hult, G. T., Ringle, C., & Sarstedt, M. (2014). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)
- Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. European Business Review, 26(2), 106-121.
- Hair, J., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate data analysis: A global perspective. Basım, *Pearson Education Inc.*
- Makki, E., & Chang, L. C. (2015). Understanding the effects of social media and mobile usage on e-commerce: an exploratory study in Saudi Arabia. *International management review*, *11*(2), 98.
- Nuseir, M. T. (2018). Digital media impact on SMEs performance in the UAE. *Academy of Entrepreneurship Journal*.
- Odoom, R., & Mensah, P. (2018). Brand orientation and brand performance in SMEs: The moderating effects of social media and innovation capabilities.
- Olanrewaju, A. S. T., Hossain, M. A., Whiteside, N., & Mercieca, P. (2020). Social media and entrepreneurship research: A literature review. *International Journal of Information Management*, *50*, 90-110.
- Zaidan, E. (2017). Analysis of ICT usage patterns, benefits and barriers in tourism SMEs in the Middle Eastern countries: The case of Dubai in UAE. *Journal of Vacation Marketing*, *23*(3), 248-263.

Comparative Analysis of Motivation Systems, That Create Innovation of Enterprises X and Y – Case Study

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Abstract

This publication identifies motivation as one of the most important management functions and selected theories that significantly influence the motivation process. The analysis of company X and Y in 2017 and 2019 was made in order to determine the possibility of creating motivation. The factors motivating to work were indicated and the changes that occurred were verified. The research was carried out on the basis of the literature review and the applied questionnaire in the surveyed entities.

Keywords: Human Resources, Management, Motivation, Motivation System;

Introduction

Employees are driving force of enterprise. That is why they are often put in the first place. The element of effective management of human resources in enterprise is proper motivation. Motivating of employees is perceived as one of the main managerial functions of undeniable meaning. Proper motivation to action is the main factor resulting in significant achievements at work (Wojtaszek, 2016, p. 4-9).

Motivation is the concept of many various definitions and wide scope of interpretation. It induces, directs and sustains the complex human behaviors, also encourages subordinates to constant improvement, development of knowledge and skills - Lawler III (1973). Financial motivation means additional benefits for employees. They are diversified according to the value and attractiveness (Miciuła, 2018).

Non-financial motivation means awarding the employees through ensuring them the feeling of confidence, employment stability and good atmosphere at work. Motivating tools are a set of methods, procedures, rules and ways as well as organizational solutions that should adequately address motivational problems. There can be distinguished tools (material and non-material) and motivators that create a system of rewards and punishments. Motivating tools can be divided into coercive and incentive to ols and persuasion (Locke 1991).

Innovation (in Latin innovatio means renewal) is the sequence of actions leading to creation of new, better products, technological processes or organizational systems (Wojtaszek & Miciuła, 2019). The definition has been introduced into the economical sciences by J.A. Schumpeter, pointing out the five cases of innovation occurrence: creation of new product, using of new technology, method of production, creation of new market, acquisition of so far unknown raw materials and reorganization of branch of economy (Stępień & Miciuła, 2017).

The main objective of the study is to characterize the issues related to the motivation of employees and a comparative analysis of the incentive system creating innovation used in manufacturing enterprises X and Y. For this purpose, have been used publications in the field of human resources management, discussing the issues of motivation and surveys, documents of the studied organizational units, employees' knowledge and authors' own observations.

An Incentive System In The Organization

The concept of motivation

The concept of motivation is derived from the Latin word "motus" and English "move", meaning to move from one place to another, to set in motion, encourage, influence someone, and stimulate action (Eccles, Wigfield, Schiefele 1998). Motivation is an internal state of man that has an attribute dimension that is appropriate to every human being, whereas/which motivating has activity and functional dimension, which consists/bases in conscious and deliberate impact on the motives of people's behavior by creating means and possibilities to implement/relize their systems of values, expectations (goals of action) to achieve purposes of motivating person (Heckhausen, Heckhausen, 1991, p. 109-132).

Motivating affects human attitudes and behaviors through specific stimuli that are transformed into motifs. Motivating to work is the use of a range of diverse and individual tools and instruments for influencing people. It is a conscious creation of stimulus systems having their source in the human environment. Motivation is an individual problem for a specific employee (Kopertyńska, 2008, p. 13).

Three levels of motivation can be distinguished: (Cox, Hoover, 2005, s.61)

- subordination, meaning to do what the supervisor orders, just as if the employee himself could not think or reason and did not have any talents or was involved in the work,
- goal identification is a type of investment, it creates a desire to achieve it and therefore increases motivation,
- commitment, motivation is never greater than when the employee considers the goal as his own, the employee feels that good work is in his own interest and will bring everything that he can.

In management theory, the term motivation is used for a factor that determines the level, direction and sustainability of efforts at work. A person with high motivation works hard at his or her workplace, while not-motivated person does not. The manager, who uses motivation tools to guide the staff, creates conditions in which the subordinates will feel constant inspiration for hard work and achieve results corresponding to their maximum capabilities (Schermerhom, 2008, p. 259-260).
Themes/Motives/Reasons of human motivation, like needs, can be divided into three basic groups (Sikorski, 2004, p. 12):

- primary (basic) - have a physiological basis, are innate – they are not the effect of learning,
- general - they do not have a physiological basis, they are motives: curiosity, influence on others and emotional attachment, encourage people to increase stimulation,
- secondary (higher order) - they are a product of learning, one can include the motives of power, achievements, belonging, security of status.

Motivating System

It is difficult to find a uniform definition of the motivating system. According to S. Borkowska, the motivating system is a coherent and purposefully chosen set of motivating tools from the point of view of achieving the goals of the organization and employees (Weiner 2012). L. Kozioł assumes that the motivating system is a collection of important instruments and tools for behavior (Kozioł, 2002, p.8).

The motivational system is therefore not detached from the organization. The goal of its creation is the success of the organization and its employees. The effectiveness of the motivating system can be considered from the point of view of the enterprise, then the measure of effectiveness will be the degree of achieving the objectives. From the employee's point of view, this measure will be the level of satisfaction or lack of satisfaction (Borkowska, p. 16). Therefore, it serves specific purposes and applies to most processes in the organization. According to M. Armstrong, it is created in order to: (Armstrong , 1997, p.255):

- optimal use of employees' potential in order to implement the company's strategic objectives,
- increasing the efficiency of employees by making the amount of remuneration dependent on the results of work,
- employee identification with company actions and goals,
- increase of group motivation,
- increase of individual motivation of employees (Wojtaszek & Miciuła, 2018).

Effectiveness of motivating systems

An effective motivational system is called the one that pursues the goal set for it, that is, mobilizes employees to work more efficiently and at the same time satisfies their needs and expectations (Matejun, Socha, 2010, p.90).

When implementing such a system, it is necessary to take into account various conditions concerning the environment in which motivation takes place (Jasiński, 2005, s. 264). When constructing motivational systems of contemporary enterprises operating in a dynamic environment, it is necessary to observe two principles: individualization and the complexity of the motivating process. Individualization requires learning the needs and expectations of individual employees. As a result of this action, the manager will have information on the personal characteristics of employees. However, comprehensiveness requires a systematic approach to motivating. This means the need to create in the company a system of logically coherent and mutually supporting means of motivation, as well as their teams acting on the principle of strengthening. It is then possible to influence on one employee at the same time several motivators tailored to his individual needs, goals and aspirations. Therefore, for the proper motivation, it is necessary to apply the entire set, the system of forces, factors and instruments affecting the employee (Sajkiewicz, 2000, p.18).

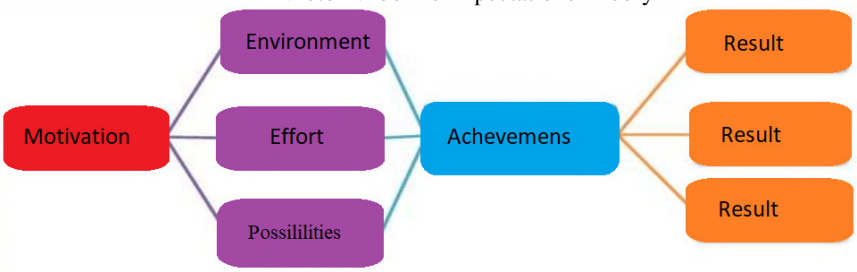
Model of the expected value by Vroom

The Vroom model clearly shows the dynamics of motivation processes in the context of the organization. Vroom models human behavior as a decision-making. Man is always forced to decide on one of many possible ways of behaving. He tries to present a decision process that precedes individual activities as the cause of action. The readiness to take any action by man is always the resultant of: (Michoń, 1981, p. 157-1490).

- expectations of the value of the result that a man wants to achieve - a man depends on causing some effect,
- expectations of the reachability of the result, it is about assessing the (objective) possibility of achieving a result that is valuable in a positive sense.

Hence, the value generally refers to how highly an individual values a particular action option or related ef fort (Steinmann, 1998, S. 330-331). The strength of motivation to perform any sequence of actions is the product of the value of the expected result and the expectation (likelyhood) that such action will lead to exected result in forseen sequence of activities (Banaszyk 2002, p. 25).

Basic theories of motivation
Victor Vroom's Expectations Theory



Motivation relies on the strength of expectation and making the individual assessment of likelyhood that this expectation may actually happen.

Involvement = effort = Achievements

The above expectation theory indicates that it is achieved through probability compared to certain results. Commitment requires effort to achieve it.

Hierarchy of needs according to Maslow

The idea of the hierarchy of needs is the way of theoretical explanation of the two-way decline and the rise of tension.

According to the Maslow hierarchy, people are motivated by a system of five basic needs: (Steinmann, Schreyögg, p.. 340-341).

- physiological needs include elementary desires related to eating, drinking, clothing and living. Their priority over other types of needs arises from the nature of man,
- security needs are expressed in the desire to protect against random events (unfortunate accident, assault, illness, disability, etc.) that could frustrate the satisfaction of physiological needs,
- social needs include the pursuit of community, belonging and satisfactorily satisfying social relations,
- the need for recognition reflects the desire for recognition and respect. This desire refers to the recognition of other people and to self-recognition and self-confidence. It is a desire to be useful and necessary,
- the need for self-realization means the striving for independence and the realization as a person.

Fig. 2: Maslow's pyramid of Leeds (Steinmann, G. Schreyögg, s. 340).

Source: https://www.vectorstock.com/royalty-free-vector/maslow-pyramid-of-needs-vector-7402228 (dostęp: 12-12-2019)

As shown in Figure 2, satisfying the needs located lower in the hierarchy is a condition for the activation of higher needs: the first, when they are not satisfied, dominate and win in conflict with the other. Physiological and security needs dominate, and later the need for self-fulfillment. Human activities are only triggered by unmet Leeds (Koźmiński, Piotrowski, 2002, p.3).

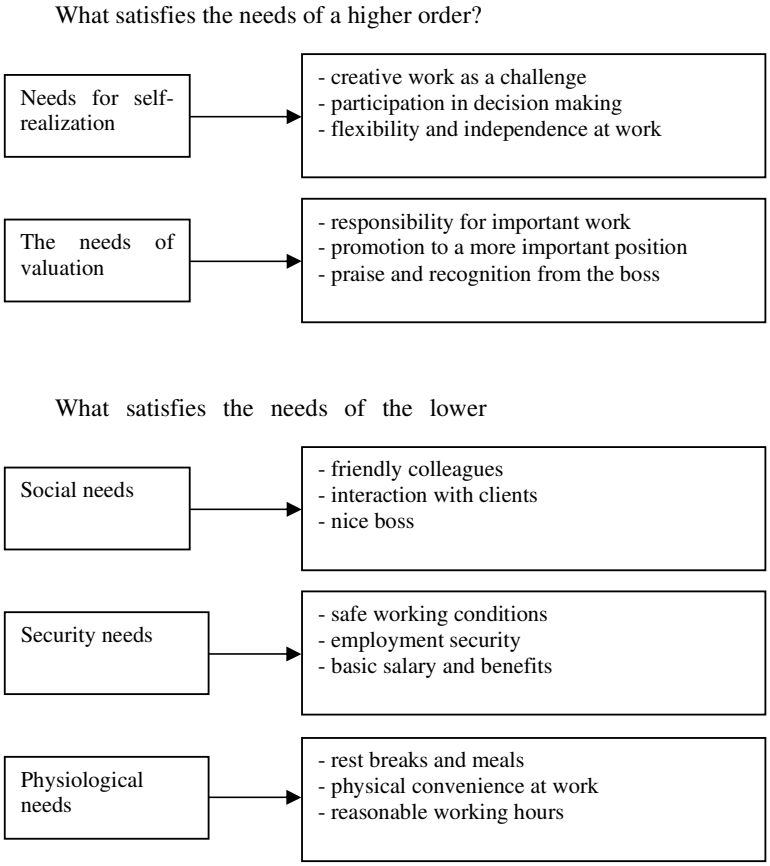


Fig. 3:Options motivation to work in A. Maslow's hierarchy of Leeds (Schermerhorn, p. 261).

Source: own elaboration based on (Nejman, 2009).

The process of motivating employees (Figure 3) continues until the level of self-fulfillment is reached, and this need can never be met. Thus, these last needs present a special type of system called development needs, in contrast to the needs arising from the deficit. The process of motif development is inhibited when one of the levels does not satisfy the Reed (Steinmann, Schreyögg, p. 341).

Richards and Greenlaw model of motivation

Richardson and Greenlaw in their model try to describe more precisely the relationship between the needs and the process of behavioral targeting. Constructive behavior is focused on finding solutions that meet the needs: the need for group acceptance at work forces the adoption of group norms; the need for promotion in the company leads to efforts in the direction of further education. Defensive

behavior is formed when the satisfaction of needs seems unattainable. Through feedback, a new, unmet need is detected, which in turn leads to a new cycle. This basic model of motivation creates frame concepts that illuminate the interrelationships between needs, motivation and behavior.

Further differentiations can be achieved by incorporating the personality structure into the model. The extended model of motivation determines the mutual relation of needs, the absolute level of aspirations, the intensity and nature of the states of tension and frustration, and strategies for satisfying needs. The most common forms of behavior are:

- rationalization is the searching for causes of failure, which are to a lesser extent threatening the ego (or are more willingly accepted) than the real reasons,
- suppression, or repression, negative experiences or feelings are forced to the subconscious,
- aggression, which can be defined as an attack on an object that is considered a source of frustration.

Herzberg's two-factor theory

The basis for the development of the two-factor Herzberg's theory were interviews with workers and officials of American companies. The respondents presented occupational events that were perceived as very pleasant or very unpleasant. The content analysis of interviews has shown that a certain class of factors related to work gives satisfaction, while other factors are the cause of dissatisfaction. Hence, according to Herzberg's satisfaction or dissatisfaction, it can not be considered as extreme points on one scale, but as two independent dimensions (Steinmann, p. 343-345). Some aspects of work, such as the physical working environment, pay, relationships with the boss and colleagues, cause dissatisfaction when absent or prevent dissatisfaction when they are present. These factors have been termed as hygienic. These factors have been termed hygienic. There are also aspects of work that cause satisfaction when they occur. These factors are motivators. They include interesting tasks, recognition for the performance of a job, a sense of responsibility (Koźmiński, Piotrowski, p.327). Dissatisfaction is caused by external factors in the work environment. The most important "factors of psychological discomfort" can be: personnel policy, complaints handling, supervisory competence, safety at work, remuneration. Paying attention to these factors leads to the dissatisfaction of the truth, but it is not a source of satisfaction. Satisfaction can only be achieved through factors that are related to the content of the work. The main "factors of psychological comfort" were: experiencing achievements, recognition for the work done, the work itself, responsibility, promotion, the possibility of personality development (Steinmann, Schreyögg, s. 347).

McGregor's X and Y theory

McGregor distinguished two sets of assumptions about human nature, which were named as "X theory" and "Y theory." According to "theory X", man is lazy, he does not like to show initiative or take responsibility and he or she is mainly interested in economic terms. Work is a necessary evil. The "theory of Y" presents the man as willing by nature to work, intelligent, liking responsibility and eagerly looking for new tasks (Frey, Jegen, 2001).

The theory of equity arose from the criticism of Vroom's theory of expectations. In this theory, fair rewards are important, especially remuneration in relation to the work done. Equity is the belief that an employee is treated identically in comparison to other people. The effects of unfair remuneration can be conflicts, rivalry, lower productivity, increased productivity of some employees, greater fluctuation of employment, and change of the workplace. If an employee believes that there is an inequality between the contribution and the remuneration, it gives a feeling of undervaluation. According to the theory of equity, the incentive system should take into account the rules of division by quantity and quality, which are too general. Two forms of equity are distinguished: distributive and procedural:

- distributive equity concerns comparison of prizes and effort,
- procedural equity refers to the motivational tools used by the organization, such as the assessment of effects.

For the comparative assessment and carrying out a case study of incentive systems, the following motivators were considered in the bank and the office: business car, allowances, improving professional qualifications, stability of employment, business outfit, remuneration, work system, responsibility and prestige. The tests carried out have the authors' own character and based on closed questions. Only those motivational factors were taken into account that were real and achievable.

Research Methodology

The survey was carried out in the selected office X in the Silesian Province and in the banking company Y also in the Silesian Province. The research was conducted in October 2017 and October 2019. Due to the protection of personal data and lack of consent to provide accurate data of the surveyed entities the names were not disclosed. Thanks to the anonymity of the entities, it was possible to collect reliable data that would give a comparative advantage.

Companies X and Y were analysed, as indicated in table 1 below.

Companies X and Y in 2017 and 2019 were analysed	
Subject under investigation X	Subject under investigation Y
The survey was conducted in October 2017 and in October 2019 in enterprise X among 102 randomly selected (from 148) employees (at different ages, with different seniority, education and gender), occupying clerical positions, answered nine questions. Questionnaire was the research tool. The sampling was done using an Excel pseudo random number generator. To determine the character of a random sample, a randomness test of sample 1 was used, where the zero hypothesis was verified in the form of: H0: - the sample is random, against the alternative hypothesis: H1: - the sample is not random. As a result of testing at the significance level of $\alpha = 0.05$, there were no grounds for rejecting the null hypothesis that the sample is random ($p > 0.05$), so it is assumed that the sample is random (Białek, Depta 2010, p.169-171).	The survey was conducted in October 2017 and in October 2019 in a production enterprise Y among 84 randomly selected from among 123 employees (at different ages, with different seniority, education and gender), who took bank positions and answered nine questions. The research tool used is a questionnaire. The sample was drawn based on the pseudorandom number generator Excel. The character of randomness was checked with the series (Depta, Białek, 2010, p. 169-171) test, that is why the zero hypothesis was stated: H_0: - the sample is random, against the alternative hypothesis: H_1: - the sample is not random. As a result of testing at the significance level of $\alpha = 0.05$, there were no grounds for rejecting the null hypothesis that the sample is random ($p > 0.05$), so it is assumed that the sample is random (Białek, Depta 2010, p.169-171).

Source: Own study

The research problem is Poland's low ranking of innovation. There is a lack of innovation on the Polish market. Innovations are created by people. To create anything (innovations) there must be motivation. Without motivation there is no innovation.

The motivation to work is linked to the motivation to create innovation. It seems logical to formulate that employees who have no desire to work (lack of motivation) will not be motivated to create innovations either.

The purpose of analyzing each case was to inform:

- What factors influence motivation at work? Creating innovations?
- Does motivation, including job satisfaction, affect the creation of innovations?
- Have there been any significant changes at the turn of 2017 and 2019?
- Has the situation not changed? And the comparative element/ aspects are the same?

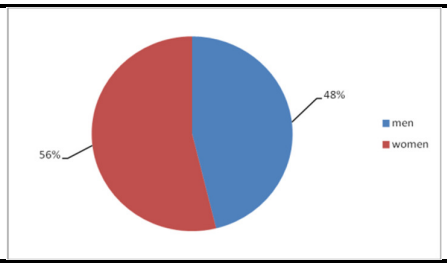
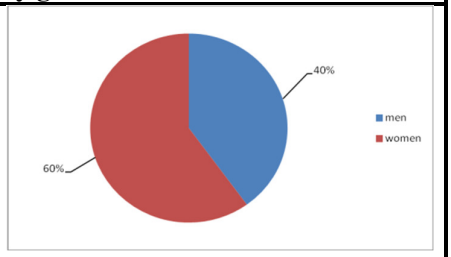
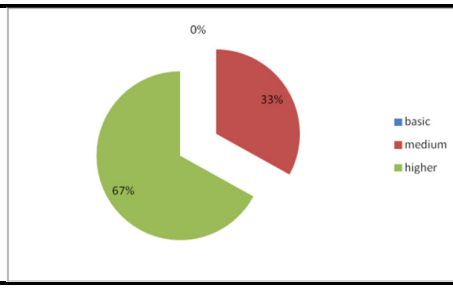
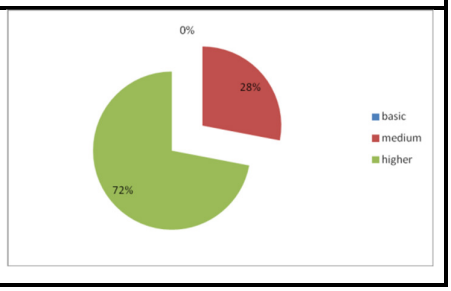
Research hypothesis:

Employment stability and wages are still one of the most important motivational elements.
The way of motivating is different.
Employees in a state-owned company are less motivated than in a private company.
There is a lack of innovation because there is no motivation to work.

Analysis of the motivation system

Table 2 below shows the classification of respondents by gender and education.

Table 2: Classification of respondents by gender and education.

Personal composition of the surveyed companies	
Company X	**Company Y**
Classification by gender	
	
Breakdown by education	
	

Source: Own work

In the study, the majority of people surveyed are women as much as 56% and 48% are men. A small difference between the number of women and men (company X) was noted. The persons participating in the study are those with higher education 67%, secondary education 33% . There were no reports of persons with primary education (company X) among the respondents.

The chart below shows that the vast majority of those with higher education are women (as much as 67 %) and the minority are men (33 %) (company X).

In the conducted survey, the majority of people surveyed are women as much as 60 % and 40 % are men. A slight difference between the number of women and men was noted (company Y).

The persons participating in the survey are those with higher education 72%, secondary education 28% . There were no persons with primary education (company X) among the surveyed persons.

The chart below shows that the vast majority of those with higher education are women (as much as 72%) and the minority are men (28%) (company X).

There are more women in company Y than in company X.

In the course of further analyses, no correlation between gender and education of both employees from company X and Y was detected.

Company x

The survey was conducted in October 2017 and in October 2019 in enterprise X among 102 randomly selected (from 148) employees (at different ages, with different seniority, education and gender), occupying clerical positions, answered nine questions. Questionnaire was the research tool.
The sampling was done using an Excel pseudo random number generator.
To determine the character of a random sample, a randomness test of sample 1 was used, where the zero hypothesis was verified in the form of:

H0: - the sample is random, against the alternative hypothesis:
H1: - the sample is not random.

As a result of testing at the significance level of $\alpha = 0.05$, there were no grounds for rejecting the null hypothesis that the sample is random ($p > 0.05$), so it is assumed that the sample is random (Białek, Depta 2010, p.169-171).

The research was carried out in order to obtain information about the motivators most desired by employees in enterprise X. Analyzing individual motivators, it was noted that the most important element for employees is stability of employment (9 on a scale of 10 points), then prestige and business outfit, where in the assessment they had the same number of points , 5 out of 10 points. The results of the survey are presented in the following chart number 1.

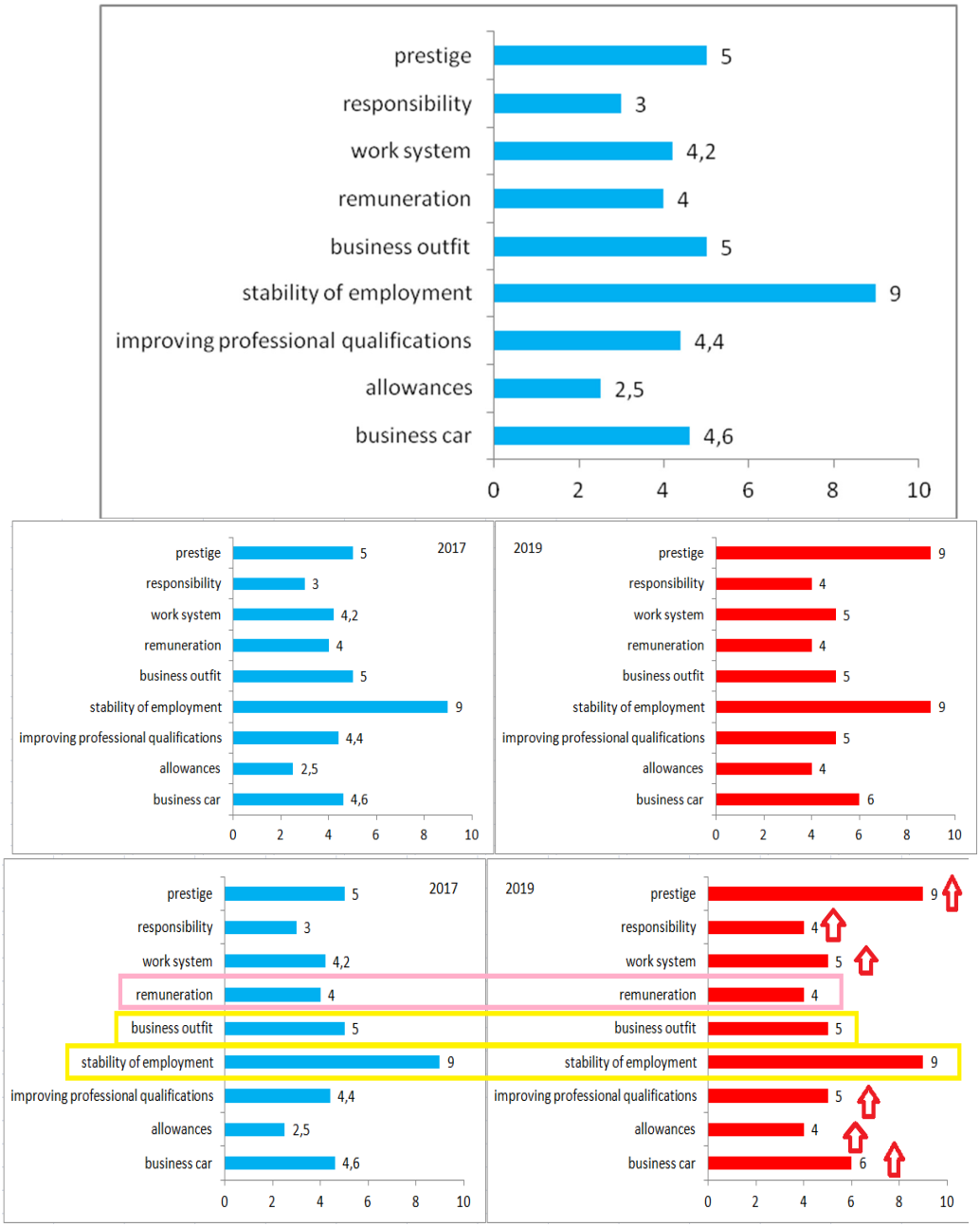


Figure 1: Motivation in the City Hall X in 2017 and 2019

The last least desirable motivator are allowances[1], this is due to the fact that employees do not show high necessity in performing their work outside their place of residence.

Comparing 2017 with 2019, we note that stability of employment (9) is still the most important factor and business out fit is at a uniform level of 5, and remuneration 4. The most important in 2019 was the prestige of the increase from 5 to 9 compared to 2017, and not much, because only one point of responsibility and only slightly from 4.2 to 5 work system and from

[1] Diet - is considered as an allowance for doing your job outside your home.

4.4 to 5 improving professional qualifications, allowances increase from 2.5 to 4, business car increase from 4.6 to 6.

Company Y

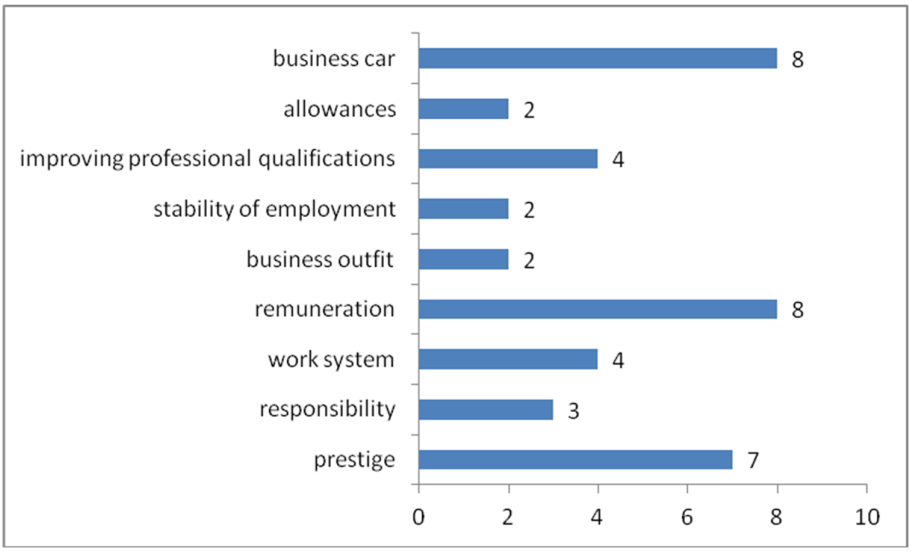
The survey was conducted in October 2017 and in October 2019 in a production enterprise Y among 84 randomly selected from among 123 employees (at different ages, with different seniority, education and gender), who took bank positions and answered nine questions. The research tool used is a questionnaire. The sample was drawn based on the pseudorandom number generator Excel. The character of randomness was checked with the series (Depta, Białek, 2010, p. 169-171) test, that is why the zero hypothesis was stated:

H_0: - the sample is random, against the alternative hypothesis:
H_1: - the sample is not random.

As a result of testing at the significance level of $\alpha = 0.05$, there were no grounds for rejecting the null hypothesis that the sample is random ($p > 0.05$), so it is assumed that the sample is random (Białek, Depta 2010, p.169-171).

The research was carried out in order to obtain information about motivators most desired by employees in the bank. Analyzing individual motivators, it was noticed that the most important motivating elements for employees are remuneration, company car and prestige. They are least motivated by allowances, stability of employment and business outfit[2].

The results of the survey are presented in the following chart number 2.



[2] The authors, using the phrase "work dress", understand the equipment of the employee with the necessary work clothes (for a man's bank employee it is a suit, a tie, and for women: a skirt and a jacket and a scarf).

Figure 2: Motivation in the City Hall Y

When comparing company Y from 2017 to 2019, we note that there were no changes in business car, stability from employment, business oufit. On the other hand, there was an increase in allowances from 2 to 3 points, improving Professional wualifications from 4 to 6 points and an increase of one percentage point in the work system, responsibility. There was a decrease of one percentage point, from 8 points to 7 points, and prestige from 7 points to 6 points.

The Results of Analyzes

The graph below (number 3) presents a summary comparison of the results of the analyzes carried out. The motivators of manufacturing enterprises X and Y were analyzed.

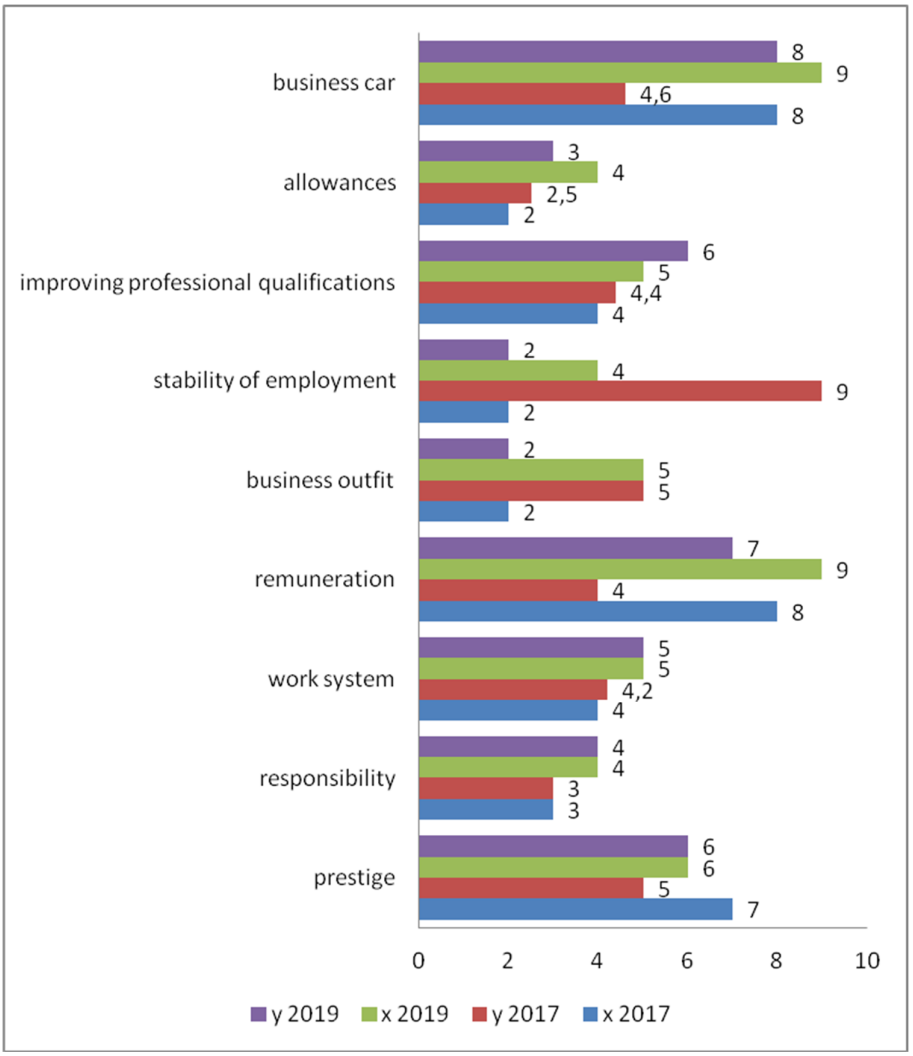


Figure 2: Motivation in the City Hall X and Y (2017 and 2019)

Analysis of chart number 3 indicates that there were large differences in motivation by bank employees and the City Hall. Differential factors are: prestige, work system, remuneration, business outfit, stability of employment, improving qualifications, allowances and a company car. The prestige of occupying a banking position is greater than occupying an official position. Responsibility is comparable in both X and Y.

The work system is better perceived in enterprise X than Y. In enterprise X, salaries are more motivating than in enterprise Y. This is due to the higher wages in banking. Having a formal outfit is more motivating in enterprise Y than in enterprise X. This probably results from the fact that in most enterprises business outfit is issued to an employee as part of his work in accordance with the policy of that enterprise, as was the case (in this situation) bank. Employment stability is definitely much higher in enterprise X than in enterprise Y. Raising qualifications motivates employees of enterprise X more than Y. Allowances are more motivating for town hall officials than for bank employees.

A company car motivates Y employees more than X.

For the analysis of the level of remuneration, the analysis of HR and payroll documents were used. Those documents are included in the regulations for the remuneration of employees in each of analyzed enterprise. The chart 4 below shows the level of earnings of enterprises X and Y.

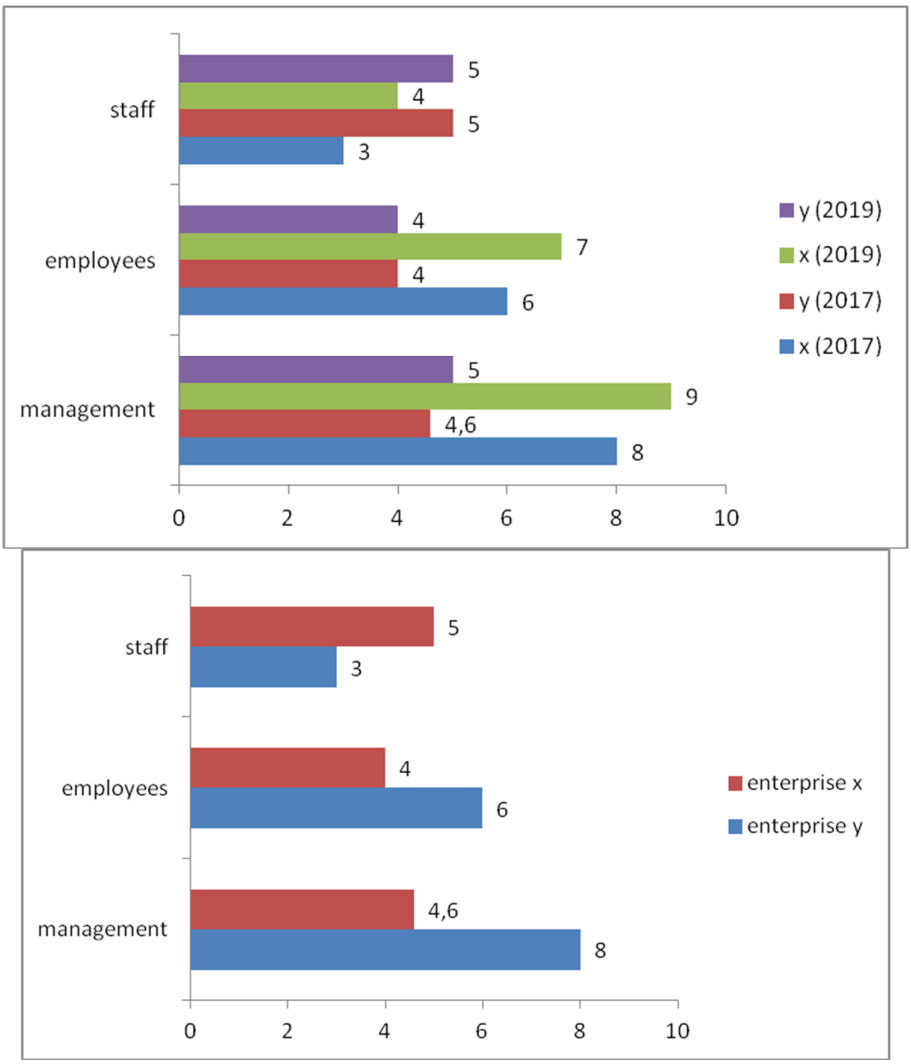


Chart 4: Level of earnings in enterprises

The highest remuneration is obtained by managers and employees in enterprise X. Customer service in enterprise Y earns more than in enterprise Y. The following chart number 5 shows the amount of the remuneration base in the surveyed enterprises.

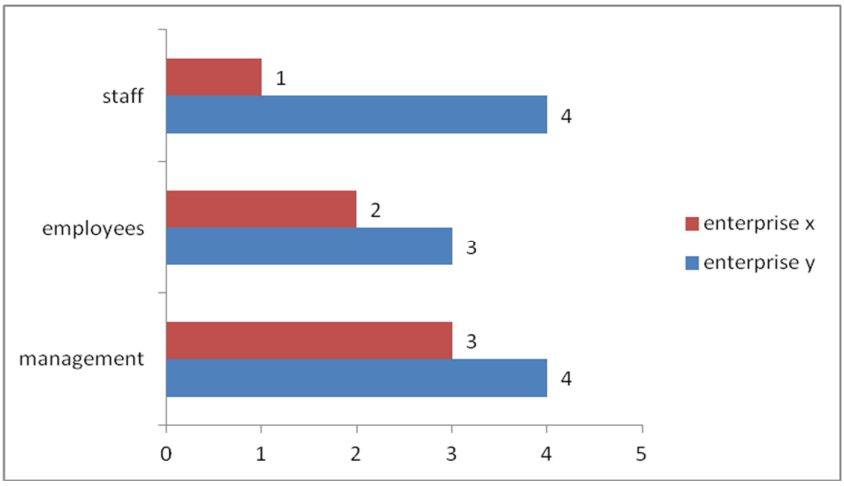


Chart 5: Basis of remuneration in enterprises X and Y

The bases of remuneration in enterprise Y are higher than the bases in enterprise X at all levels of the employees: managerial (white-collar), employee (blue-collar) and staff (customer service) positions. Service employees charge a much higher remuneration than at banks. They are wage workers, can be concluded form participant observation.

The need to work is a natural progression of every person whose stimulus is to support the family, buy a house and other goods, and even luxury goods. From the literature studies we can indicate that a positive attitude to work is important, which will certainly indicate a satisfactory financial result, satisfaction with work. It should be noted here that through the forester effect, success is achieved by maintaining a balance of expectations, which in total results in a multiplication of: promotion, rising salaries, positive relationships, a pleasant atmosphere and many other positive dimensions resulting from a positive attitude and a balance of expectations, which, as it turns out, has no impact on which or where we find ourselves. Innovation is the introduction of elements: balance of expectations and positive attitude.

Conclusions

The theoretical and cognitive implications allow us to conclude that over the years there have been no significant changes in perception or motivation, and more specifically to indicate why there is motivation.

The main hypothesis that stability of employment and remuneration are still one of the most important motivational elements was confirmed.

Two more hypotheses were confirmed: the way of motivating is different and Employees in a state-owned company are less motivated than in a private company.

It was also confirmed that there is a lack of innovation creation because there is no motivation to work.

The conducted surveys clearly emphasize the stability of employment in the production enterprise Y, as a main factor. Employees for whom a higher remuneration is more important will definitely choose work in the enterprise X. Employees for whom stability of employment is more important will probably choose a job in enterprise Y.

Nowadays, we must remember that the basis of remuneration and the level of remuneration is very important for the employee. The way of motivating and motivational

measures significantly affect the choice of the workplace. People with low qualifications will be more satisfied with work in enterprise Y, because of the level of wages. People with high financial expectations and willingness to make frequent business trips will benefit from employment in enterprise X. Persons showing tendencies to stability will be focused on work in enterprise Y.

The above analysis indicates the lack of substantial cohesion of enterprises X and Y. an enterprise X and Y with the same profile and similar structure and have completely different indicators (or needs) in the aspect of motivational systems.

It still seems quite natural that in private companies there is a need for, or even a greater motivation to do the work, as can be seen from the involvement of this whole process.
There is a noticeable increase in prestige in the state sector, which may result from the lack of high salaries in the private sector. We can clearly state that salaries are comparable.

References

Journal Articles

- Armstrong, M. (1997), How to be a better manager, ABC Publishing House, Warsaw.
- Banaszyk, P. (2002), Fundamentals of organization and management, University of Commerce and Recruitment, Poznań.
- Bartkowiak G. (1995), Psychology of management, AE Publishing House, Poznań.
- Białek J., Depta A. (2010), Statistics for students with the STAT_STUD 1.0 program, C.H.Beck Publishing House, Warsaw.
- Borkowska S. (1985), Motivation system in the enterprise, PWN, Warsaw.
- Borkowska S. (2006), Motivation and Motivating, PWN, Warsaw.
- Cox D., Hoover J. (2005), Team management in a modern company, Studio Emka, Warsaw.
- Eccles, J. S., Wigfield, A., & Schiefele, U. (1998). Motivation to succeed.
- Frey, B. S., & Jegen, R. (2001). Motivation crowding theory. Journal of economic surveys, 15 (5), 589-611.
- Heckhausen, J., & Heckhausen, H. (Eds.). (1991). Motivation and action.
- Jasiński Z. (2005), (ed.), Fundamentals of operational management, Oficyna Ekonomiczna, Kraków.
- Kopertyńska M.W. (2008), Motivating employees. Theory and practice, PLACET, Warsaw.
- Kozioł, L. (2002), Motivation at work. Economic and organizational determinants, PWN Scientific Publisher, Warsaw-Krakow.
- Koźmiński, A., Piotrowski, W. (2002), Management. Theory and practice, PWN Scientific Publishing House, Warsaw.
- Lawler III, E. E. (1973). Motivation in work organizations.
- Locke, E. A. (1991). The motivation sequence, the motivation hub, and the motivation core. Organizational behavior and human decision processes.
- Matejun M., Socha J. (2010), Motivational role of the remuneration system on the example of the company "Pol-Hun" M. Bielska sp.j., [in:] Stankiewicz J. (ed.), Social dimensions of managing modern enterprises. People. Organization culture. Social responsibility, University of Zielona Góra, Zielona Góra. Nejman Ż., Kawecka-Endler A. (2014), Motivation - case study in a selected enterprise, The concept of managing contemporary organizations, WWZPCZ, Częstochowa.
- Miciuła, I. (2018), Methods of creating innovation indices versus determinants of their values. In: M., Bilgin, H., Danis, E. Demir U., Can, eds. 2018. *Eurasian Economic Perspectives*. *Eurasian Studies in Business and Economics*, vol. 8/2. Springer, Cham. https://doi.org/10.1007/978-3-319-67916-7_23.
- Nejman, Ż. (2009), Analysis of motivation tools in a selected enterprise, Engineering work, Poznan University of Technology, Faculty of Management Engineering.
- Sajkiewicz A. (2010), (ed.), Human resources in the company, Poltext, Warsaw.
- Schermerhom J. (2008), Management, key concepts, Polish Economic Publisher, Warsaw.

• Sekuła Z. (2008), Motivating for work. Theories and instruments, Polish Economic Publishing House, Warsaw.
• Sikorski C. (2004), Motivation as an exchange - employee relationship models
• and the organization, Difin, Warsaw.
• Steinmann H. (1998), Schreyögg G., Management. Basics of enterprise management. Concepts, functions, examples, Wrocław University of Technology Publishing House, Wrocław.
• Stępień, P., Miciuła, I., (2017), Evaluation of Polish innovation through the prism of the economic situation and institutions supporting innovation. *Journal of Studies and Work of the University of Szczecin*, 48(3), pp. 217-228.
• Weiner, B. (2012). Human motivation. Springer Science & Business Media.
• Wojtaszek, H. (2016). Selected aspects of innovative motivation. World Scientific News, (44), 1-12.
• Wojtaszek, H., Miciuła, I., (2018), Identification of contemporary trends in human capital management by the prism of HR (human resources) works. *Journal of Studies and Work of the University of Szczecin*, 51(2), pp. 55-65.
• Wojtaszek, H., Miciuła, I., (2019), Analysis of Factors Giving the Opportunity for Implementation of Innovations on the Example of Manufacturing Enterprises in the Silesian Province, *Sustainability,* 11(20), 5850, pp. 1-28, doi:10.3390/su11205850.

Online Journals and websites

https://www.vectorstock.com/royalty-free-vector/maslow-pyramid-of-needs-vector-7402228 (dostęp: 12-12-2019)

Towards Building an Open-Domain Corpus for Arabic Reading Comprehension

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Abstract

Reading comprehension is one of the fields of natural language understanding in which machine understanding can be evaluated through answering questions about paragraphs. The work in Arabic reading comprehension is little due to the lack of reading comprehension datasets for Arabic language. The goal of this paper is to present detailed phases aimed to create an Arabic dataset semi-automatically for the purpose of computerized reading comprehension. The paper starts by presenting an introductory survey of available datasets for the English language, then presents the phases of creating a dataset semi-automatically. The presented phases are mainly four each having sub-steps. The first phase is the manual check of the question and answer pairs, the second phase is the google search, the third phase is the document retrieval, and the fourth phase is the paragraph retrieval. The paper then presents some statistics for each phase.

Keywords: Arabic Reading Comprehension, Arabic Question Answering, Resource Building, Vector Space Model.

Introduction

The freely available datasets of Question Answering (QA) have been created with varying objectives in mind. Some of these datasets are fit for the open domain QA task; while, others are fit for the closed domain QA task. QA systems generally comprise of three main components; question processing/analysis, document processing/retrieval, and answer processing/extraction (Mishra & Jain, 2016). The first component aims to analyze the question in order to enhance both document processing/retrieval and answer processing/extraction components. The second component, document processing/retrieval, aims to retrieve related documents, extract and rank the related paragraphs. The last component, answer processing/extraction, aims to extract and rank answers from the top related paragraphs, and display the best answer. In open-domain QA datasets, the answer to the question can be found in several documents retrieved either from the web or from a dataset of documents, and the goal is to extract the correct answer rather than the relevant paragraphs or sentences being listed. It is worth noting that QA datasets consist of pairs of questions with their answers. Questions for QA applications were categorized by the Text Retrieval Conference (TREC)[i] into the following categories: factoid, list, hypothetical, definition, causal, relationship, confirmation, procedural, description, and opinion.

Reading Comprehension (RC) is the task of answering questions from a given paragraph. The answers to those questions are either a span of text, a missing word/entity, a choice from several choices, or any free-form text denoting the answer. Several differences exist between QA and RC. The key distinction is that RC can be considered a sub-task of QA applications (Chen, 2018). This subtask is last component of QA applications, the answer processing/extraction component. Another difference lies in the categorization of questions, see table 1. RC datasets can be categorized according to the type of questions they contain and which can be either span-extraction, cloze-style, multiple-choice, or free-form. In addition, RC datasets consists of triples of the form <question, answer, paragraph>; while, QA datasets consist of pairs of the form <question, answer>.

Table 1: QA versus RC in terms of question categories and dataset content

Comparison	Question Answering	Reading Comprehension
Question categories	Factoid List Hypothetical Definition Causal Relationship Confirmation Procedural Description Opinion	Span-extraction Cloze-style Multiple-choice Free-form
Dataset content	Pairs of <question, answer>	Triples of <question, answer, paragraph>

Arabic language is a Semitic language spoken by more than 330 million native speakers. It comprises of three main forms, the classical Arabic, the modern standard Arabic, and the colloquial Arabic. Although Arabic is widely spread, research targeting Arabic is considered limited when compared to other languages. One of the under researched fields that target the Arabic language is RC. Till 2019, there was only one work that touched upon the main idea of Arabic RC (Mozannar, et al., 2019). This is due to the fact that no datasets have been created for that purpose. The goal of this paper is to propose a technique whose purpose is to create an Arabic RC dataset through exploiting a QA dataset. This paper is structured as follows; section 2 presents the related work, section 3 proposed approach, section 4 presents the discussion, and finally the conclusion.

Related work

Before RC become the source of attention, QA applications were mainly the dominant field, starting by building QA systems such as Watson (Ferrucci, 2012). Here we will presents some of QA datasets, and table 2 shows a short comparison among the presented ones. Smith et al. (Smith, et al., 2008) created a dataset within an undergraduate NLP course, were students were asked to write and evaluate questions with their answers about Wikipedia articles, through four phases, the resulted dataset mainly presented yes/no questions with their answers, having the yes answered questions the most dominant. Berant et al. (Berant, et al., 2013) created webQuestions, which consists of popular questions, asked on the web, they are mainly factoid questions centered about name entities. However, simpleQuestion dataset was created to overcome the problem of small sized datasets, it was proposed by Bordes et al. (Bordes, et al., 2015) and consisted of over 100,000 QA pairs. Mille et al. proposed (Miller, et al., 2016) WikiMovies, which is a dataset constructed through exploiting Wikipedia and MovieLens dataset; one of the goals of creating such a dataset was to provide training examples for machine learning algorithms. There are two main conferences that used to publish datasets and competitions each year, the Cross-Language Evaluation Forum (CLEF) and the Text Retrieval Conference (TREC). CLEF and TREC published a number of competitions for the QA field, where they provide a dataset used as a benchmark. Some researchers translated CLEF and TREC datasets into Arabic language and used them in their research such as Abouenour et al. (Abouenour, et al., 2010), others extended the available datasets and used them in their research such as Baudiš and ŠedivÝ (Baudiš & Šedivý, 2015) which proposed an extended version of TREC dataset, namely curatedTREC consisted of over 1000 QA pairs.

Table 2: QA datasets

Ref.	Year	Dataset	Domain	Size	Answer Types	Dataset Source	Created
(Smith, et al., 2008)	2008	NLP-Project QA-dataset	Open	3997 question-answer pair	Most of the questions are Yes/No	Wikipedia	Manually by undergraduate NLP students over 3 semesters
(Berant, et al., 2013)	2013	webQuestions	Open	5,810 questions-answer	WH-questions	Freebase	Manually by crowed-workers which were asked to answer collected questions
(Bordes, et al., 2015)	2015	simpleQuestions	Open	108,442 question and fact as an answer from FB2M	Factoid	Freebase	Questions generated by crowd-workers based on facts from freebase
(Baudiš & Šedivý, 2015)	2015	CuratedTREC	Open	1,180 questions	Factoid	TREC 1999 TREC 2000 TREC 2001 TREC 2002 Extended with questions from the net	Prepared with regular expression answer patterns
(Miller, et al., 2016)	2016	WikiMovies	Movies	100,000 question-answer pair	13 classes of questions	Wikipedia MovieLens dataset	Substituting entities with other entities in the question written by human annotators

There are several English datasets created for the RC purposes. Such datasets can be categorized into span-extraction, cloze-style, multiple-choice, and free-form. In span-extraction based datasets, the answer for a given question is a single span of text extracted from the related paragraph, such datasets are the Stanford Question Answering Dataset (SQuAD) (Rajpurkar, et al., 2016), and NewsQA (Trischler, et al., 2016). The cloze-style datasets consist of questions with a missing word. Such datasets are inspired from exams that aim to evaluate students. The cloze-style datasets may or may not provide candidate answers. Example on such datasets are; Children Book Test (CBT) (Hill, et al., 2015), CNN and Daily Mail (Hermann, et al., 2015), Who Did What (WDW) (Onishi, et al., 2016), and Clinical Case Reports (CliCR) (Šuster & Daelemans, 2018). Multiple-choice datasets consist of the question, multiple-choices (two or more), the correct answer(s), and the related paragraph. Such datasets include Science Question (SciQ) (Welbl, et al., 2017), ReAding Comprehension dataset from Examinations (RACE) (Lai, et al., 2017), Multi-sentence Reading Comprehension (MultiRC) (Khashabi, et al., 2018), and the Machine Comprehension of Text (MCTest) (Richardson, et al., 2013). Free-form dataset, and which is the most difficult dataset to create, consists of different forms of questions. In the free-form dataset, the answer can be either an exact span of the paragraph, multiple pans of the paragraph, span of the question and the paragraph, or not found in the paragraph. Examples of such datasets are; bAbi

(Weston, et al., 2015), MAchine Reading COmprehension dataset (MS MARCO) (Bajaj, et al., 2016), and NarrativeQA (Kočiský, et al., 2018).

One of the first datasets for multiple-choice RC was created in 2013 namely MCTest (Richardson, et al., 2013). MCTest is a dataset of multiple-choice questions, restricted to fictional stories. It consists of 2000 questions with their multiple choices and their answers constructed from 500 stories. The stories along with with their questions, their multiple choice options, and their answers were all created by crowd workers. In 2017, two multiple-choice datasets were created, the first one is by Welbl and Liu (Welbl, et al., 2017) namely SciQ dataset. SciQ was built with the help of crowd-workers and comprised of 13.7K science exam questions having four multiple-choices, and a corresponding passage. The second one is RACE proposed by Lai et al. (Lai, et al., 2017). RACE was constructed from English exam questions that were created to assess Chinese students of age group 12 to 18. The authors provided a thorough discussion about their dataset with detailed statistics. In 2018, MultiRC was proposed by Khashabi et al. (Khashabi, et al., 2018). MultiRC is a multiple-choice dataset, but it differs from the previous ones in that its questions may have more than one correct answer. It was also created manually by crowd workers.

The first dataset created for cloze-style RC was in 2015 by Hermann et al. (Hermann, et al., 2015). The dataset was created using CNN and Daily Mail news articles automatically. The datasets consist of 92k and 219k documents each for CNN and Daily Mail respectively. Each document has four questions on average. The questions are sentences with one missing word or phrase that can be found from the relevant document. Two cloze-style datasets were created in 2016, the first one is CBT proposed by Hill et al. (Hill, et al., 2015), CBT was created by collecting questions and answers with their contexts from 108 online freely available children's books. CBT is similar to multiple-choice datasets in which each cloze-style question accompanied with four multiple choices. The second dataset is WDW dataset proposed by Onishi et al. (Onishi, et al., 2016), it is different from other RC datasets that the question is formed from two different documents. WDW was created automatically using Natural Language Processing (NLP) tools and exploiting LDC English Gigaword newswire corpus. The cloze question of this dataset is mainly about the person name entities. In 2018, another cloze-style dataset was proposed namely CliCR by Šuster and Daelemans (Šuster & Daelemans, 2018). CliCR is the first medical-based RC dataset, created from medical reports.

The first span-extraction RC dataset was proposed in 2016 namely SQuAD by Rajpurkar et al. (Rajpurkar, et al., 2016), it differs from cloze-style datasets in that its answers include non-entities and may have much longer phrases. It was created in three stages; passage preparation where the passaged were prepared and collected from Wikipedia articles. The creation of the question and answer pairs were also conducted by crowd-workers, and finally the addition of another answer for each question was also done by the crowd-workers. SQuAD consists of 107,785 pairs, obtained from 536 Wikipedia articles, where the answer of each question is a segment of text or span from the corresponding passage. Later in 2018, SQuAD2.0 was proposed (Rajpurkar, et al., 2018), which is a combination of SQuAD dataset along with 50,000 unanswerable questions and their answers, these questions were also devised by crowd-workers. Another span-extraction dataset is NewsQA which was proposed in 2017 by Trischler et al. (Trischler, et al., 2016). NewsQA was also created by crowd workers from 12,744 CNN news articles. On the other hand, Dhingra et al. (Dhingra, et al., 2017) proposed two types of RC datasets, the cloze-style and span-extraction, each having different sizes and sources.

The first free-form RC dataset was created in 2015 namely bAbi (Weston, et al., 2015). It consists of 20 tasks, each having 1000 pairs for training and 1000 pairs for testing. Two datasets of free-form proposed in 2017, namely TriviaQA (Joshi, et al., 2017) and SearchQA (Dunn, et al., 2017). Both TriviaQA and SearchQA were created by first collecting QA pairs and then retrieving the relevant documents or paragraphs for the QA pairs. Three RC datasets of free-form created in 2018, the first one is NarrativeQA (Kočiský, et al., 2018) which is created from stories collected from books and movie scripts. The second one is HotpotQA (Yang, et al., 2018), and the third one is MS MARCO (Bajaj, et al., 2016). Table 3 illustrates a comparative detail between the datasets, in terms of; dataset creation year, type, domain, size, source, question-types included, and how it is created either automatically or manually. Nine datasets out of twenty where generated automatically. As shown in

the table, the size of the datasets have increased with time, the first dataset that was created contains only 2000 pairs on 500 stories, while the largest dataset created consists of 1,010,916 pairs on 8,841,823 paragraphs.

Table 3: RC datasets

Ref.	Year	Dataset	Dataset Type	Domain	Size	Question Type	Dataset Source	Creation
(Richardson, et al., 2013)	2013	MCTest	Multiple-choice	Closed	2,000 questions and answers on 500 stories	N/A	Fictional stories written by crowd-workers	Manually by crowd-workers based on stories
(Herman, et al., 2015)	2015	CNN	Cloze-style	News articles	387,420 questions and answers on 92,579 documents	Entities	CNN news articles	Automatically
(Herman, et al., 2015)	2015	Daily Mail	Cloze-style	News articles	997,467 questions and answers on 219,506 documents	Entities	Daily mail news articles	Automatically
(Weston, et al., 2015)	2015	BAbi	Free-form	N/A	20 tasks each have: 1000 training questions and answers 1000 testing questions and answers	Depend on the tasks	N/A	Automatically
(Hill, et al., 2015)	2016	CBT	Cloze-style	N/A	687,343 questions and answers collected from 108 books	Contains multiple choices to choose one correct answer	Children books	Manually directly from children books freely available online
(Onishi, et al., 2016)	2016	WDW	Cloze-style	N/A	200,000 questions and answers	Person entities	LDC English Gigaword newswire corpus	Automatically
(Rajpurkar, et al., 2016)	2016	SQuAD	Span-extraction	Open	107,785 question-answer pair on 536 articles	Date Other Numeric Person Location Other Entity	Wikipedia	Manually by crowd-workers

						Common Noun Phrase Adjective Phrase Verb Phrase Clause other		
(Trischler, et al., 2016)	2017	NewsQA	Span-extraction	News articles	119,633 questions and answers on 12,744 news articles	Date/Time Numeric Person Location Other Entity Common Noun Phrase Adjective Phrase Verb Phrase Clause Phrase Prepositional Phrase other	CNN news	Manually by crowd-workers
(Joshi, et al., 2017)	2017	TriviaQA	Free-form	Open	95K questions and answers with independently gathered evidence documents	Numerical Free text Wikipedia title Person Location Organization Misc	QA pairs are from 14 trivia and quiz-league websites Documents from web search results and Wikipedia	Automatically
(Dunn, et al., 2017)	2017	SearchQA	Free-form	Open	140,461 question-answer-snippet	N/A	QA pairs of Jeopardy and used google search to retrieve relevant snippets	Automatically
(Welbl, et al., 2017)	2017	SciQ	Multiple-choice	Biology Chemistry Earth science Physics Elementary level to college introductory material	13,7K	Science exam questions	28 science textbooks from online resources	Manually by crowd-workers

(Dhingra, et al., 2017)	2017	QUASAR-S	Cloze-style	Definitions of software entities	37,362 cloze question, answer, context	Factoid-based	Stack overflow website	Automatically
(Dhingra, et al., 2017)	2017	QUASAR-T	Span-extraction	Open	43,013 trivia question, answer, document	Factoid-based	Multiple internet sources	Automatically
(Lai, et al., 2017)	2017	RACE	Multiple-choice	N/A	97,687 questions 27,933 passages	English exam questions	English exams for middle and high school Chinese students	Manually created by collecting and cleaning questions generated by English instructors
(Šuster & Daelemans, 2018)	2018	CliCR	Cloze-style	Medical reports	100,000 questions and answers	N/A	BMJ Case Reports	Automatically
(Kočiský, et al., 2018)	2018	Narrative QA	Free-form	Books and Movie scripts	46,765 questions and answers from 1,567 stories	Most answer types are based on WH-questions	Books from Project Gutenberg Movie scripts from the web	Manually by crowd-workers
(Khashabi, et al., 2018)	2018	MultiRC	Multiple-choice	News Society Law Justice, History and Anthropology Science Stories Movie plots	6,000 questions on 871 paragraphs	Multiple-choice questions having more than one correct answer	CNN news WSJ news NYT news Wikipedia Society, Law, Justice, History and Anthropology articles Elementary school science textbooks 9/11 reports Stories from the Gutenberg project and MCTest CMU Movie Summary corpus	Manually by Crowd-workers

(Rajpurkar, et al., 2018)	2018	SQuAD	Span-extraction	Open	107,785 question-answer pair + 50,000 unanswerable question-answer pair on 536 articles	N/A	Wikipedia	Manually by crowd-workers
(Yang, et al., 2018)	2018	HOTPOTQA	Free-form	Open	112,779 questions, answer and supporting facts	Person Group/Org Location Number Date Artwork Adjective Event Yes/No Common noun Other proper noun	Wikipedia	Manually by crowd-workers
(Bajaj, et al., 2016)	2018	MS MARCO	Free-form	Open	1,010,916 question-answer on 8,841,823 passages	Description Numeric Entity Location Person	Bing query logs	The answers for the query logs were generated by crowd-workers

Proposed Approach

Since there exists no RC dataset created for the Arabic language, we opt to create one semi-automatically through exploiting an existing dataset originally created for QA applications and comprising of pairs of the form <question, answer>. This paper provides details of one experiment whose aim is to create a RC dataset exploiting the CLEF QA dataset. The RC dataset was created in four phases as detailed in figure 1. In phase 1, native Arabic speaker manually checked each pair of the CLEF dataset for correctness. In phase 2, a google search for relevant documents was performed. This is followed by phase 3 and then phase 4 in which document retrieval and paragraph retrieval were performed. Details of the phases are as follows:

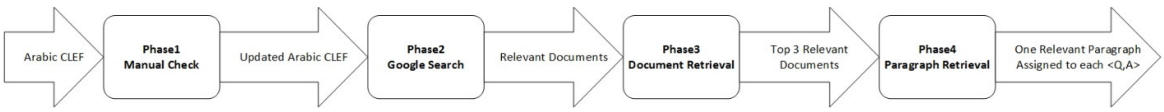

Fig. 1: Dataset Creation Phases

Phase1: Manual Check of Existing Pairs

The Arabic CLEF dataset was given to an Arabic native speaker for a manual standard review of correctness. The dataset was reviewed for two main reasons; (1) Arabic CLEF is a translated version of an English one; therefore, a syntactical correctness check is needed. (2) The development of the Arabic CLEF can be tracked back to the early 90s; thus, some of the included factual information which might have been valid at the time of the dataset creation may no longer apply and thus require updating; otherwise, the outdated information will have a negative impact on the results of phase 2. The result of a pair that needs to be updated was either an omitted pair, or a modified pair. Four types of pairs were omitted: (a) syntactically incorrect pairs with no answers as it was difficult to know what the questions were really about, (b) replicated questions (only a single copy of the pair was left in the dataset), (c) pairs with ambiguous questions, and (d) pairs with questions including English abbreviations. Modification of questions and their answers were performed for three reasons; (a) Pairs that have one or two syntactic incorrectness were corrected. (b) Pairs that included factual questions with old answers, their answers were updated according to the current time. (c) In some cases whole pairs were update, since the question and the answer were technically related back to 90s and had no records online. The original Arabic CLEF consisted of 800 pairs, however, after performing the above modifications, 189 pairs were modified, and 200 pairs were omitted resulting in a modified Arabic CLEF of 600 pairs. Questions were also given labels, which can be found with more statistics and examples in our previous work (Biltawi, et al., 2019).

Phase2: Google Search

After creating the updated version of Arabic CLEF, the pairs were converted into queries to perform google search. The goal is to retrieve 20 to 30 relevant document from the web or maybe less, see figure 3. Following are the detailed steps:

1. Perform preprocessing on both the question and its answer. The preprocessing step includes three sub-steps; the first one is tokenization, the second one is noise removal, and the third sub-step is normalization. Noise removal refers to removing punctuations, diacritical marks and stop words. The main punctuation mark in the case of questions and answers is the "?" that comes after the question itself. However, normalization refers to normalizing the Arabic letters. For example, all forms of the letter Alif (آ ، إ ، أ) is transformed to the bare Alif (ا). Hamza (ء) is removed from the Arabic letter Waw (ؤ) to be the bare (و), and from the Alif al-Maqsoora (ئ) to be (ى). Ta' al-Marbootah (ة) is transformed to Ha' (ه) by removing the two dots. Finally, elongation (ـ) which called Tatweel in Arabic is also removed, for example the word university in Arabic with the elongation is written as (جـــــامـعـــة) and without elongation is written as (جامعة).

2. Combine the preprocessed question and answer to formulate a single query.

3. Perform google search using google API in Python. This step consists of the following two sub-steps; first, after retrieving the relevant document, only the textual material is fetched from it, paragraph by paragraph. Then the size of the document is checked, if the size is less than 2KB then the document is discarded, otherwise the document is saved in a text file. This is concluded after a number of experimentation. Generally, having documents of sizes less than 2KB contains rubbish data.

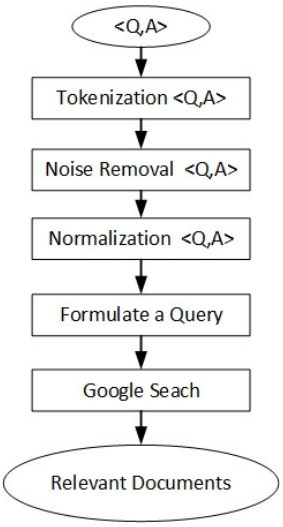

Fig. 2: Phase 2 - Google Search

Phase3: Document Retrieval

Document retrieval was performed using Vector Space Model (VSM) to retrieve the top three related documents resulted from google search. Figure 4 illustrated detailed steps of this phase. Following are the detailed steps:

1. Prepare three forms of each query and three forms of its equivalent related documents retrieved in the previous phase. The query is a combination of the question and its answer, while the documents are the related documents for that question and answer pair. The main preprocessing steps that were shared by the three forms were; tokenization, noise removal, and normalization, which are already discussed in the previous phase, having the noise removal, an additional sub-step which is the removal of non-Arabic letters/words performed on the relevant documents and one exception which is avoid removing stop-words. The three forms are;

    a. The first form is the original question and its answer preprocessed and combine to be used as a query with the original preprocessed related documents.

    b. The second form is similar to the first form but with additional step, which is stop-words removal.

    c. The third form is also similar to the second form but with additional step, which is stemming.

2. The query and its relevant documents of each form were represented as vectors using Term Frequency-Inverse Document Frequency (TF-IDF). TF alone refers to the number of times the term occurs in the document, while IDF refers to the number of documents that a term appears in. However, TF-IDF refers to the relevancy of the term. Following are the equations for IDF, and TF-IDF, where DF is document frequency of the term i, N is the number of documents in total, and j represents a document.

$$IDF_i = \log \frac{N}{DF_i} \quad (1)$$

$$TF - IDF = TF_{i,j}\ x\ IDF_i \quad (2)$$

3. Create a postings file or an inverted file from the vectors of each form of the relevant documents, then perform cosine similarity between each form of the query Q with its equivalent related document inverted file D. Next is the equation of the cosine similarity.

$$cosine\ similarity = \cos\theta = \frac{\sum_{i=1}^{n} Q_i D_i}{\sqrt{\sum_{i=1}^{n} Q_i^2}\sqrt{\sum_{i=1}^{n} D_i^2}} \qquad (3)$$

4. Take the average for the similarity measure of the three forms, and retrieve the top three relevant documents.

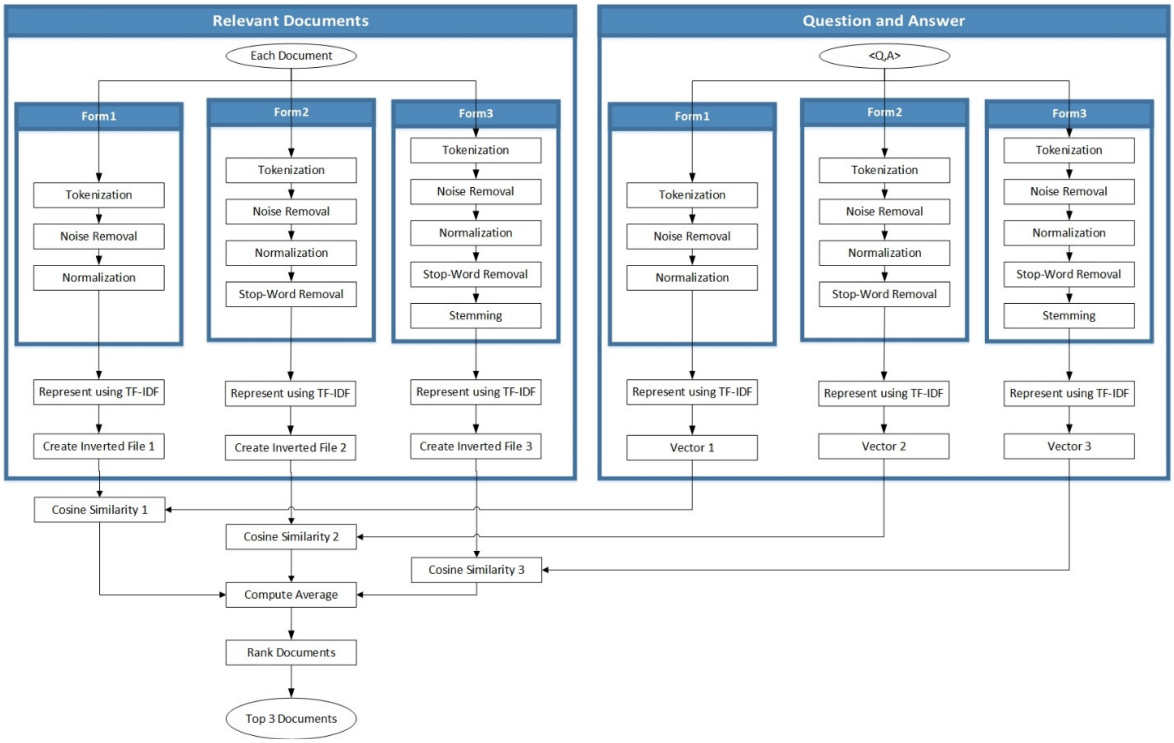

Fig. 3: Phase 3 - Document Retrieval

Phase4: Paragraph Retrieval

Paragraph retrieval was performed using VSM as well, to choose the most relevant paragraph among the paragraphs of the top three relevant documents retrieved in the previous phase, then these paragraphs were assigned to its equivalent question answer pair, figure 5 illustrated the main steps of phase 4. Following are the steps:

1. For each query, combine all three top relevant documents, and then separate the paragraphs according to “new line” character.

2. Preprocess each paragraph using the same preprocessing techniques used in the previous phase, to create three forms from each paragraph.

3. The query and its relevant paragraphs of each form were represented as vectors using Term Frequency-Inverse Document Frequency (TF-IDF).

4. Create a postings file or an inverted file from the vectors of each form of the relevant paragraphs, then perform cosine similarity between each form of the query Q with its equivalent related paragraph inverted file P. Next is the equation of the cosine similarity.

$$cosine\ similarity = \cos\theta = \frac{\sum_{i=1}^{n} Q_i P_i}{\sqrt{\sum_{i=1}^{n} Q_i^2}\sqrt{\sum_{i=1}^{n} P_i^2}} \quad (4)$$

5. Take the average of the three similarity results, then choose the top similar paragraph and assign it to its equivalent question-answer pair.

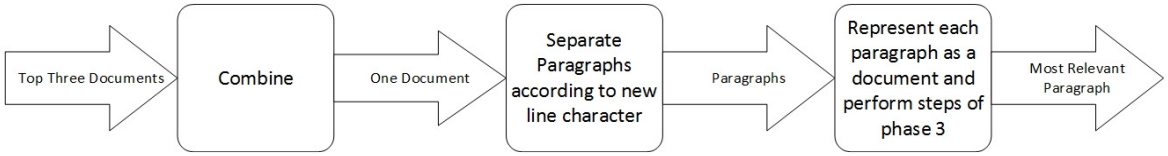

Fig. 4: Phase 4 - Paragraph Retrieval

Discussion

Since each phase has a different output, this section tracks the results of each phase, starting from phase one and ending with phase four. The output of phase one is the modified CLEF, the output of phase two is a set of documents from the web, the output of phase three is a list of the top three relevant documents, and finally phase four outputs a paragraph for each QA pair.

1. Phase 1: the modified version of Arabic CLEF consisted of 600 question and answer pairs. A detailed discussion can be found in our previous work (Biltawi, et al., 2019).

2. Phase 2: The expected number of retrieved documents was in the range of [20-30] documents for each query, but the actual range after implementation was [2-26]. Only three queries returned no documents. Therefore, the acceptance size was decreased from 2KB to 1.6KB for the retrieved documents during this phase, and the implementation of this phase was repeated only for the three queries. Table 4 demonstrates the average number of files retrieved from the web, the average number of tokens, the maximum and minimum number of tokens, the average number of maximum and minimum tokens during phase 2.

Table 4: statistics of phase 2

Average No. of files retrieved	Average No. of tokens	Max No. of tokens	Min No. of Tokens	Average No. of max tokens	Average No. of min tokens
13	13569	19607634	44	92121	329

3. Phase 3: the goal of this phase was to retrieve the top three relevant documents, but the range of the retrieved documents in phase 2 was [2-26]. Therefore, in phase 3, if the number of relevant documents is three or less then the documents are passed to the next phase; otherwise, the top three relevant documents were retrieved using VSM as discussed in the previous section. At the end of this phase, the total number of queries with only two files were 6 while the remaining 594 queries had three files. Table 5 demonstrates the average number of tokens, the maximum and minimum number of tokens, the average number of maximum and minimum number of tokens.

Table 5: statistics of phase 3

Average No. of tokens	Max No. of tokens	Min No. of Tokens	Average No. of max tokens	Average No. of min tokens
10356	5594261	116	26841	724

4. Phase 4: the goal of this phase was to assign a paragraph for each QA pair, and after implementing the experiment, the average number of tokens for the relevant paragraphs is 6603 having the maximum equal to 32767 and the minimum equal to 118, see table 6.

Table 6: statistics of phase 4

Average No. of tokens	Max No. of tokens	Min No. of Tokens
6603	32767	118

Conclusion

This paper provides a survey for the existing datasets for both question answering and reading comprehension. Then the paper discussed in details the phases with their outcomes for creating an Arabic reading comprehension dataset semi-automatically exploiting an existing dataset of question answering. The main four phases discussed were; the manual check, google search, document retrieval, and paragraph retrieval. As a future work, the presented experiment will be implemented on more QA datasets, and a detailed statistic will be provided.

References

Abouenour, L., Bouzouba, K. & Rosso, P., 2010. An evaluated semantic query expansion and structure-based approach for enhancing Arabic question/answering. International Journal on Information and Communication Technologies, 3(3).

Bajaj, P. et al., 2016. MS MARCO: A Human Generated MAchine Reading COmprehension Dataset. arXiv preprint arXiv:1611.09268.

Baudiš, P. & Šedivý, J., 2015. Modeling of the Question Answering Task in the YodaQA System. s.l., s.n.

Berant, J., Chou, A., Frostig, R. & Liang, P., 2013. Semantic Parsing on Freebase from Question-Answer Pairs. s.l., s.n.

Biltawi, M., Awajan, A. & Tedmori, S., 2019. Evaluation of Question Classification. s.l., s.n.

Bordes, A., Usunier, N., Chopra, S. & Weston, J., 2015. Large-scale Simple Question Answering with Memory Networks. arXiv preprint arXiv:1506.02075.

Chen, D., 2018. Neural reading comprehension and beyond. Doctoral dissertation, Stanford University.

Dhingra, B., Mazaitis, K. & Cohen, W. W., 2017. QUASAR: DATASETS FOR QUESTION ANSWERING BY SEARCH AND READING. arXiv preprint arXiv:1707.03904.

Dunn, M. et al., 2017. SearchQA: A New Q&A Dataset Augmented with Context from a Search Engine. arXiv preprint arXiv:1704.05179.

Ferrucci, D. A., 2012. Introduction to “this is watson. Journal of Research and Development , 56(3.4), pp. 1-1.

Hermann, K. M. et al., 2015. Teaching Machines to Read and Comprehend. s.l., s.n.

Hill, F., Bordes, A., Chopra, S. & Weston, J., 2015. The goldilocks principle: Reading children's books with explicit memory representations. arXiv preprint arXiv:1511.02301.

Joshi, M., Choi, E., Weld, D. S. & Zettlemoyer, L., 2017. TriviaQA: A Large Scale Distantly Supervised Challenge Dataset for Reading Comprehension. arXiv preprint arXiv:1705.03551.

Khashabi, D. et al., 2018. Looking Beyond the Surface:A Challenge Set for Reading Comprehension over Multiple Sentences. s.l., s.n.

Kočiský, T. et al., 2018. The NarrativeQA Reading Comprehension Challenge. Transactions of the Association for Computational Linguistics, Volume 6, pp. 317-328.

Lai, G. et al., 2017. RACE: Large-scale ReAding Comprehension Dataset From Examinations. arXiv preprint arXiv:1704.04683.

Miller, A. et al., 2016. Key-Value Memory Networks for Directly Reading Documents. arXiv preprint arXiv:1606.03126.

Mishra, A. & Jain, S. K., 2016. A survey on question answering systems with classification. Journal of King Saud University-Computer and Information Sciences, 28(3), pp. 345-361.

Mozannar, H., Hajal, K. E., Maamary, E. & Hajj, H., 2019. Neural Arabic Question Answering. arXiv:1906.05394v1 .

Onishi, T. et al., 2016. Who did What: A Large-Scale Person-Centered Cloze Dataset. arXiv preprint arXiv:1608.05457.

Rajpurkar, P., Jia, R. & Liang, P., 2018. Know What You Don't Know: Unanswerable Questions for SQuAD. arXiv preprint arXiv:1806.03822.

Rajpurkar, P., Zhang, J., Lopyrev, K. & Liang, P., 2016. SQuAD: 100,000+ Questions for Machine Comprehension of Text. arXiv preprint arXiv:1606.05250.

Richardson, M., Burges, C. J. & Renshaw, E., 2013. MCTest: A Challenge Dataset for the Open-Domain Machine Comprehension of Text. s.l., s.n.

Smith, N. A., Heilman, M. & Hwa, R., 2008. Question Generation as a Competitive Undergraduate Course Project. s.l., s.n.

Šuster, S. & Daelemans, W., 2018. CliCR: A Dataset of Clinical Case Reports for Machine Reading Comprehension. arXiv preprint arXiv:1803.09720.

Trischler, A. et al., 2016. NewsQA: A Machine Comprehension Dataset. arXiv preprint arXiv:1611.09830.

Welbl, J., Liu, N. F. & Gardner, M., 2017. Crowdsourcing Multiple Choice Science Questions. arXiv preprint arXiv:1707.06209.

Weston, J. et al., 2015. TOWARDS AI-COMPLETE QUESTION ANSWERING: A SET OF PREREQUISITE TOY TASKS. arXiv preprint arXiv:1502.05698.

Yang, Z. et al., 2018. HOTPOTQA: A Dataset for Diverse, Explainable Multi-hop Question Answering. arXiv preprint arXiv:1809.09600.

[i] **https://trec.nist.gov/**

Tax Compliance Control as A Protection Method Against Tax Risks in Business

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Abstract

Many modern studies in the field of taxpayer behavior are focused not on studying the problem of tax evasion, but on the issue of voluntary compliance with tax laws. The key issue is to increase the share of taxpayers who voluntarily comply with the tax laws of their country, and thereby reduce government spending related to tax administration. The tax behavior of people and their willingness to pay taxes can be considered as a universal phenomenon, which is formed under the influence of a number of factors. Often, tax compliance by taxpayers is called tax compliance. The main tool for the implementation of the convergence mechanism in the tax system is tax compliance, which acts as a unified methodological base and attribute point in the harmonization of various groups of economic interests in the field of taxation. Tax compliance at the macro level involves building a clear, vertical relationship of the chain “tax legislator - tax executor - taxpayer" acting as the basis for building a stable tax convergence system.

Keywords: Compliance Control, Tax, Tax Accounting, Business.

Introduction

Each enterprise in the process of its financial and economic activities is prone to various financial risks associated with its current work. Tax risks present one type of such financial risks, when the enterprise has a possibility of financial losses arising in the process of calculating, paying and optimizing tax payments (Akamah, 2018). Nowadays, most organizations have a number of issues that do not allow it to quickly and effectively eliminate or minimize tax risks. Today, one of the key problems is the lack of a responsible person in the company who collects and analyzes information on tax risks, which is necessary for evaluation and information support of the tax risk management. Which limits the tax risk management activities to merely disputing decisions of tax authorities in court. This problem stems from the absence of a single mechanism for monitoring, accounting, analysis and assessment of tax risks, set by internal documents (Lennox, 2013).

Competent management of tax risks will ensure saving of money, as these risks present not only potential tax assessments and penalties, but also an instrument with which one can avoid overpaying taxes, correctly use tax incentives and reserves, and ensure the absence of budget lending (Filzen, 2015). The use of such mechanisms in tax policy management of an economic entity directly affects the state of its tax security, which is an integral part of economic security as a whole (Sandmo, 2005). The introduction of a tax compliance system will reduce the company's tax risks. As of today this buzzword refers, per se, to that group of internal control measures that in one way or another deals with tax issues, including contractual relations. Introduction of compliance control into activities of taxpayers in terms of taxation will allow to quickly identify, control and minimize arising tax risks.

Literature Review

At present, a study of foreign experience in application of tax compliance control and its adaptation to Russian realities is becoming increasingly relevant. Russian scientists agree on the definition and essence of the "tax compliance" concept. One of the leading researchers in this field, I. A. Mayburov, by "tax compliance" understands "one of the controlling authorities' functions, which ensures taxpayer's compliance with tax laws and other regulatory legal acts, standards of organizations (regulations of tax authorities) and prevents taxpayer from involvement into unlawful activities, as well as timely recommendations concerning the application of types and methods for conducting effective financial and economic activities by a taxpayer in a given legal framework" (Goncharenko, 2015). Korostelkin (2014) also understands "tax compliance" as following tax legislation by participants of tax legal relations, and reduction of financial, economic, legal and tax costs arising due to tax legislation violation (Akhmadeev, 2019).

Thus, the tax compliance control system is designed to promptly identify tax risks and mitigate the occurrence of those situations that provoke them. According to M. R. Pinskaya (2012) "the tax compliance process has two components: an advisory one aimed at reducing the invalidity risks through setting standards for taxpayer's behavior, and a controlling one aimed at overseeing the proper implementation of tax legislation by the tax authorities".

Tax compliance control is based on the preliminary control and identification of potential factors that entail violation of the law and other obligations of an economic entity to its counterparties. Savseris (2012) has a similar opinion on this matter. He believes that "tax compliance system is designed to identify tax risks in advance, to prevent situations with which they are associated. And if it is impossible to exclude such situations, assess tax risk and reduce its level".

Methodology

Development of an effective tax compliance control system in a company depends largely on the available budget sum for its creation and implementation, as well as staff qualifications. However, common elements in the development of such a system are: methodology, automation, internal control system and company's personnel. The efficiency of the developed and implemented tax compliance control system directly depends on the quality characteristics of these elements. The methodology implies the level of detalization of the accounting policy adopted in the organization in terms of taxation. The complexity of applying RAS (Russian Accounting Standards) 18/02, tax balance compilation, and effective tax risk management depend on the automation of individual processes. The internal control system monitors and verifies the correctness of filling out tax returns, and the need to hire a tax consultant and conduct advanced training depends on the qualifications of the staff. Based on the elements highlighted above and their quality characteristics, you can choose one of the tax compliance control organization models (fig.1).

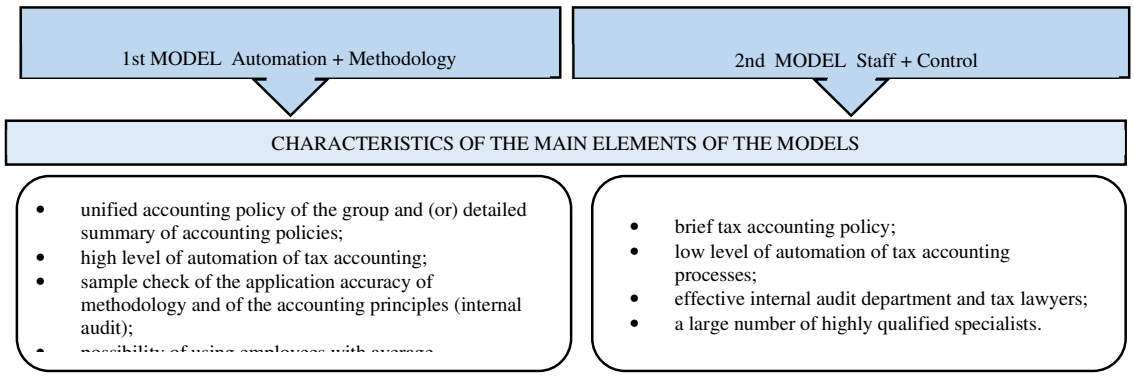

Figure 1: Models of tax compliance control at the enterprise

Source: Based on the materials of the Ernst & Young

The principal tasks of tax compliance control are:

a) confirmation of tax accounting accuracy (Armstrong, 2015);
b) determination of tax risks and identification of tax assets (Cerqueti, 2011);
c) monitoring over tax legislation compliance and data source for conducting financial analysis (Sparta, 2018);
d) an instrument for implementing tax control measures, including external ones.

The main positive aspects of the tax compliance control for an organization are the prevention or minimization of financial losses and sanctions from both Russian and foreign tax regulators, and the presence of a well-organized system for detecting and preventing tax risks. Based on the fact that one of the principal tasks of the tax compliance control is tax risk management, it can be concluded that it also manages the entire tax policy of the organization. The tax compliance control mechanism of an economic entity cannot effectively function without a system for prevention, minimization, or complete elimination of possible tax risks.

To establish and implement a system for prevention, minimization, or complete elimination of possible tax risks, it is necessary to solve a number of tasks:

1. Organize the collection and storage of information related to changes in the internal and external environment that may affect the operation of an economic entity (especially changes in tax legislation and the economic situation in the country). Economic factors usually include the possibility of an audit, the sum of penalties, tax rates, economic benefits, income sum, and the taxpayer's tax burden.
2. After analyzing the specifics of the business entity's activity, to determine the tax risk factors and its consequences specific to it.
3. Identify areas and develop methods to eliminate or minimize established tax risks.
4. To set the developed methods for reducing the tax risk level in the internal acts of the economic entity.
5. Organize management accounting and financial reporting for decisions that may cause tax risks.

Implementation of tax compliance control functions to the company's internal acts and regulations allows to solve these problems, which is indicated in a number of successive stages presented in Figure 2.

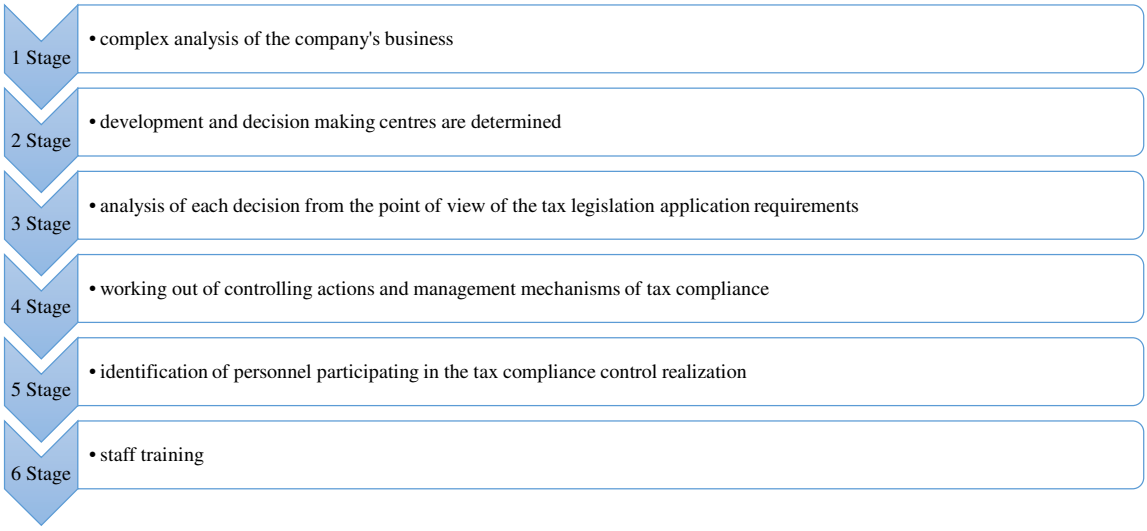

Figure 2: Stages of development and implementation of tax compliance control functions in internal regulations of an economic entity

Source: compiled by the author

At the first stage it is necessary to analyze the company's activities, its legal form and its business specifics, as well as to determine a specialist among the staff that can trusted with responsibilities of

the tax compliance Manager. Then, development and decision-making centers are determined based on the results of the first stage of development and implementation of tax compliance control functions. The third stage is to determine the impact of a decision made during the second stage on the taxation of an economic entity, as well as the possibility of tax risks. Based on the results obtained during the third stage, at the fourth stage tax compliance control measures are developed and implemented in the current internal regulations of the business entity.

In the final two stages, employees who are directly involved into establishment and operation of the tax compliance control mechanism are identified and trained, and their job descriptions are amended. Summing up, it can be concluded that the essence of tax compliance control lies not only in the preliminary detection and effective influence on financial, economic, legal and tax costs that arise as a result of tax legislation violation due to insufficient understanding of the tax mechanism by participants of tax relations, but also in the adequate assessment and minimization of their negative consequences, which in its turn is the basis of the company's tax security.

Discussion

Tax compliance as a key tool for forming an effective tax policy. Compliance control in an organization is a system of measures aimed at combating violations of legal norms, ignoring of internal regulations and ethical provisions in business by both managers and linear staff units. Mandatory compliance control is carried out only in the constituent entities of the banking sector (Bank of Russia Regulation no. 242-P, no. 06-29/PZ). Other companies and organizations are not required to do this. It will be useful for business entities to introduce separate controlling elements:

a) with strict administrative regulations (operating in the areas of energy, pharmaceutical, and telecommunications);
b) subsidiaries of international corporate groups that may be subject to requirements of the anti-corruption legislation of the United States and the United Kingdom;
c) whose managers, contractors, and products are blacklisted or subject to sanctions.

One of the most effective ways to manage the taxation of an economic entity is tax planning, one of the directions of which includes the development of accounting policy. In Russia, the issue of implementation of tax compliance control in the economic entities has been little studied. According to Korostelkin (2014) "tax compliance" should be considered as a system that allows to confirm the reliability of tax liabilities calculation. Kirilova (2012) believes that tax compliance is one of the functions performed by the management bodies of an economic entity in order to:

a) comply with tax laws and regulations (Bertrand, 2003);
b) prevent illegal activities (Petrov, 2019);
c) develop recommendations for effective financial and economic activities, with consideration of tax legislation norms (Lehoux, 2019).

The need to develop and implement tax compliance control can be dictated by both regulatory authorities, as well as by self-regulatory organizations (auditors, tax consultants) and the business entity itself. In general, the goals of tax compliance control can be attributed to:

- development of measures for optimization of the company's tax liabilities and reduction of tax risks (Kosov, 2018);
- improvement of tax reporting methods (Korableva, 2019);
- compliance with external tax regulations and organization's internal acts when forming the tax base.

The basis of the compliance control system are the principles presented in figure 3.

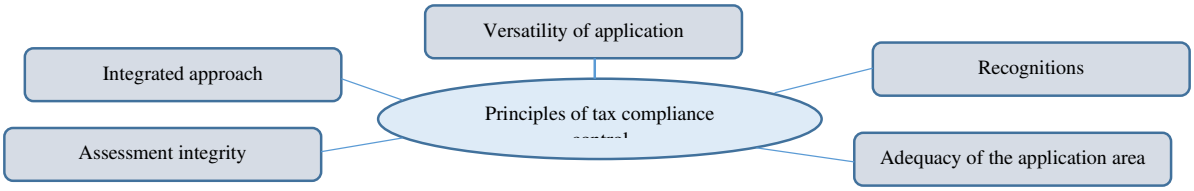

Figure 3: principles of tax compliance control

Source: compiled by the author

The principle of an integrated approach is affirmed by the fact that compliance control covers all of the company's tax risks, starting from unintentional or erroneous tax base erosion, and ending with deliberate tax evasion. The principle of the assessment integrity takes into account that the system is aimed at improving the performance of the accounting staff, financial departments, and managers of the organization (Fischer and Zachmann, 2020). The principle of versatility of application means that the tax compliance control system is applicable to all organizations due to its universality. The principle of recognition states that despite the possible reluctance of the company's employees to use this system, it is an effective tool for minimizing tax risks and should be implemented at a high administrative level (Bykanova, 2017). The principle of adequacy of the application area lies in the fact that compliance control affects only those areas of the company's activity that are regulated by the tax legislation (Xiao, 2020).

The need to implement compliance control for the formation of the tax base for corporate income tax is confirmed by data of the Federal Tax Service of the Russian Federation according to which 98% of field inspections in 2017 in Russia resulted in detection of violations. The minimum additional charges per one on-site tax inspection in Russia have increased by 73% over the past 3 years. For example, as of 2017 the total sum of such additional charges comprised 16.4 million roubles. Budget revenues have increased by 32% as a result of enforced collection across Russia (fig. 4.)

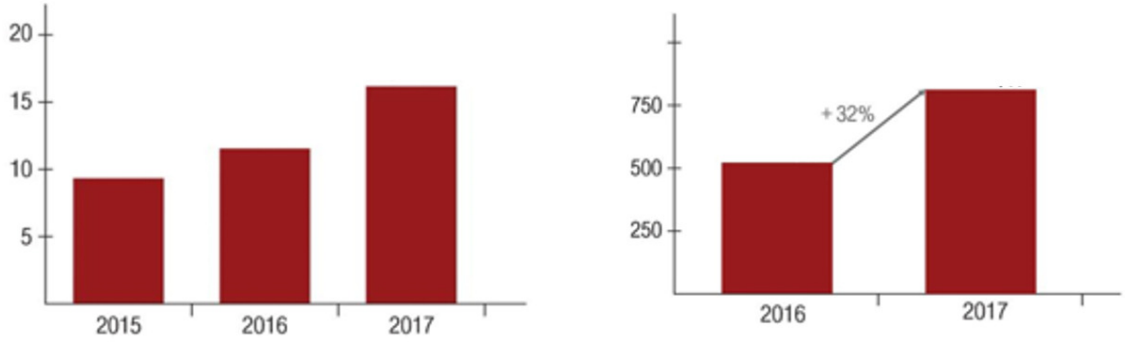

Figure 4 : Additional charges and budget revenues graphs according to data of the Federal Tax Service

Source: website pravovest-audit.ru/nashi-statii-nalogi-i-buhuchet/nalogovyy-kontrol-v-cifrah-i-perspektivah-2018-goda/ (access date: December 12, 2019)

The average sum of additional charges in major cities comprised over 55 million roubles per one on-site tax inspection. These sums could have been saved by the company thanks to the implementation of the compliance control system. Obvious, that additional charges in the result of tax inspections have a tendency for growth, which indicates at the low efficiency of the existing internal control in organizations in the area of taxation. This fact is confirmed by the number of lawsuits won by tax authorities, which in 2017 comprised 82.8%.

The development and implementation of tax compliance control in organizations can become an effective instrument for reducing the number of tax audits, and as result the sum of additional taxes, penalties and fines. General criteria for organizations that above all need a tax compliance system can be formulated as following:

a) having close interaction with contractors (suppliers of goods, works or services);
b) carrying out expenses whose feasibility and economic justification are difficult to confirm;
c) the company's revenue is above 200 million roubles per year (according to data from monitoring of carried out tax audits);
d) the cost of contracts exceeds a certain level (as determined by the organization and depends on the number of contracts with one counterparty);
e) the duration of cooperation with one and the same counterparty (the counterparty's integrity should be regularly analyzed to avoid the tax inspector's classification of transactions with this counterparty as unfavorable)

The purpose of implementing tax compliance control in an enterprise is to reduce the possibility of tax violations and, as a result, the risk of tax sanctions. In order to minimize or eliminate the risks of incorrect interpretation of tax legislation, it is advisable for an economic entity to develop and implement a detailed accounting policy for tax purposes. It should contain a uniform approach related to controversial points of taxation, for example, in the calculation of income tax, special attention should be paid to the certain types of income and expenses. With the correct choice of a particular tax option provided by the law, the accounting policy can be considered and used as a tool to plan the tax burden.

Conclusion

Based on the above, the main areas to pay attention to when implementing tax compliance control during the development of the accounting policy of an economic entity are:

a) Stability of the accounting mechanism. Which will significantly increase the reliability of results, especially when using the tax policy developed in accordance with the law. And in the case of consistent application of the accounting policy provisions in terms of accounting and taxation of business activities related to calculation and payment of taxes.
b) Completeness of the accounting mechanism. Each fact of economic activity that occurred in the reporting (tax) period can be correlated with the tax return. And on the other hand, each indicator of the tax return can be detailed in accordance with forming and documented facts of the economic activity.
c) Sufficiency and thoroughness of the accounting mechanism. The controlling tax authority must be able to access all necessary information provided for by Russian law.
d) Internal account of questionable facts of the economic activity. Facts of the economic activity that have dual interpretation for the purposes of tax accounting are subject to specialized accounting.

Delegate to the finance department the responsibilities for development of a unified tax accounting methodology, a clear and detailed accounting policy, tax analysis of transactions, as well as interaction with tax authorities during audits as per the experience of foreign companies.

References

- Akamah, H., Hope, O.K., Thomas, W. B. (2018), 'Tax havens and disclosure aggregation', *Journal of International Business Studies*, 49(1), 49–69.
- Akhmadeev, R.G., Bykanova, O.A., Salomadina, P.S. (2019), 'The effect of the VAT change on the final consumer', Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, pp. 765-770.

- Armstrong, C. S., Blouin, J. L., Jagolinzer, A. D., Larcker, D. F. (2015), 'Corporate governance, incentives, and tax avoidance', *Journal of Accounting and Economics*, 60(1), 1–17.
- Bertrand, M., Mullainathan, S. (2003), 'Enjoying the quiet life? Corporate governance and managerial preferences', *Journal of Political Economy*, 111(5), 1043–1075.
- Bykanova, O.A., Akhmadeev, R.G., Kosov, M.E., Ponkratov, V.V., Osipov, V.S., Ragulina, Y.V. (2017). 'Assessment of the economic potential of sovereign wealth funds', *Journal of Applied Economic Sciences*, 12 (1), 70-84.
- Cerqueti, R., Coppier, R. (2011), 'Economic growth, corruption and tax evasion', *Economic Modelling*, 28, 489–500.
- Filzen, J. (2015), 'The information content of risk factor disclosures in quarterly reports', *Accounting Horizons*, 29(4), 887–916.
- Fischer, A.M., Zachmann, L. (2020), 'Do the rich pay their taxes early?'. *International Tax and Public Finance*, 27, 194–214.
- Goncharenko L. I., Vishnevskaya N. G. (2015). 'Tax control of transfer prices application by major taxpayers: how relevant is the change of rules? ', *Economy. Taxes. Law*, 2 (4), 112-119.
- Kirillova O. S. (2012), 'Tax systems. Development methodology', The Monograph. Moscow. UNITY-DANA, 263.
- Korableva, O., Durand, T., Kalimullina, O., Stepanova, I. (2019), 'Studying user satisfaction with the MOOC platform interfaces using the example of coursera and open education platforms', Paper presented at the ACM International Conference Proceeding Series, 26-30.
- Korostelkin M. M. (2014), 'Tax compliance as a system for confirmation of the accuracy of tax liabilities calculation', *Management accounting*, 11, 60 - 72.
- Kosov, M.E., Akhmadeev, R.G., Smirnov, D.A., Solyannikova, S.P., Rycova, I.N. (2018), 'Energy industry: Effectiveness from innovations', *International Journal of Energy Economics and Policy*, 8 (4), 83-89
- Lehoux, L., Duck, H., Akhmadeev, R., Morozova, T., Bykanova, O. (2019), 'Sustainable development facets: Taxation solutions for the energy industry', *Journal of Security and Sustainability Issues*, 9(2), 457-472.
- Lennox, C., Lisowsky, P., Pittman, J. (2013), 'Tax aggressiveness and accounting fraud', *Journal of Accounting Research*, 51(4), 739–778.
- Petrov, A.M., Putihin, Y.E., Poluleh, M.V., Yurasova, I.O., Erohina, V.N. (2019), 'Accountant Modeling Technology and Statistics in the Context of the New Educational Concept', *International Journal of Innovative Technology and Exploring Engineering*, 8 (12), October 2019
- Pinskaya, M. R. (2012), 'Managing tax risk as a factor in countering tax evasion', *Taxes and financial law*. 9, 209 -214.
- Sandmo, A. (2005), 'The theory of tax evasion: A retrospective view', *National Tax Journal*, 58(4), 643–663.
- Savseris, S. (2012), 'Company's tax security: how to ensure it', *Accounting: simple, clear, practical 2*, 42-48
- Sparta, G.T., Stabile, G. (2018), 'Tax compliance with uncertain income: a stochastic control model', *Annals of Operations Research*, 261, 289–301.
- Xiao, C. (2020), 'Intergovernmental revenue relations, tax enforcement and tax shifting: evidence from China', *International Tax and Public Finance,* 27, 128–152.

Specifics of Social Financing to Build A Modern Academic Staff Incentive Programme

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Abstract

The article considers the place of active personnel policy in the system of modern management-marketing and specific of insurance social package financing in a University. The possibility of increasing the level of motivational component of personnel potential of the company through strengthening of the administration's attention to the working conditions and social protection of people of creative professions related to one of the most sensitive to changes in the corporate culture and social policy, organizing groups of highly qualified personnel. General trends in the provision of social packages to employees of organizations are revealed. Modern approaches to the structure of the social package's formation are described. A questionnaire was formed for conducting a pilot survey of Moscow university's professors as well as the regional universities. As a result of the survey was identified some positive attitude of university teachers to the opportunity to participate in the programs of voluntary health insurance and non-state pension provision. The preferences of teaching staff's on the constituent elements of each of these programs are specified and their readiness to participate in these programs on the terms of co-financing was assessed. There was also formulated some features of social guarantees' financing in higher education institution.

Keywords: Teaching Staff of The University; Motivation of The University Teacher; Social Guarantees; Social Insurance.

JEL Classification: M14, M12, G22, G23, J39

Introduction and literature Review

In business, to build a company's development strategy, a popular management and marketing tool is used, which is a balanced scorecard. One of the key items in this system is *Personnel*. At the same time, the balanced scorecard is effective not only to develop a general shared understanding of the strategy and to link high-level goals and tasks set for certain departments and staff members, but also to serve as a staff incentive system.

As covered in the article by Isaeva (2015), to exploit the management and marketing concept in higher education at the present stage of development of Russian universities, we need to take into account the multifaceted nature of development of the educational services market. It also shows that such factors as "a balance between horizontal self-organization and vertical managing of a university", "blending" of rigid hierarchy structures into horizontal relationship networks" significantly impact on how a particular university in the sector will be developing. These factors identify the need to create special environment to support the system's primary resource which is the academic staff.
Within a university's marketing and management framework, a special monitoring system to assess and develop the academic staff potential needs to be built.

In our previous publications, we have singled out "staff loyalty" as an indicator to develop academic staff potential. When measuring the level of staff loyalty, factors that contribute to the development of the university's staff, its corporate culture, motivational potential and the teaching staff's passion, shall be evaluated.

According to Babynina (2013) Motivation potential is usually studied in two dimensions – how much is the teaching staff satisfied with various aspects of their work at the university, and aspects of the development of the corporate culture such as the motivational environment and the incentive system by assessing teacher satisfaction with various aspects of the university's employment policy.

Benefits package to the staff is one of the components of a positive human resources policy (Babynina 2014).

In her work, E. H. Vergara mentions the structure of the benefits package that is offered to an employee on a voluntary (compulsory) basis apart from his or her wage, and the one as a supplement to his or her wage or as a reimbursement of personal expenses: a mandatory benefits package, a competitive package and a compensation package (Vergara, 2013).

Compulsory benefits package includes obligatory employer payouts prescribed by the Russian law: annual paid leave, payments under certificates of sickness, contributions to the pension fund, compulsory health insurance.

Competitive benefits package includes employer company's voluntary fringe benefits: subsidized or free meals, voluntary medical insurance, sports expenses, subsidized sanatoria and holiday-home vouchers, etc.

In the research on Ageeva (2017) states, that compensation package includes measures aimed to compensate or refund employee's personal funds spent while at work .

In for-profit enterprises, in addition to the actual wages, employers also use indirect methods (cash and non-cash benefits) to motivate their staff, which form a so called "benefit package".

The work by I. Dolgopolova (2015) identifies general trends of benefit packages offered by for-profit enterprises to their employees:

- The list of benefits is getting more diverse and unconventional. For example, employees get extra pay for engaging in creative activities, rewards for personal self-fulfillment in cyberspace in order to respond to social needs.
- Welfare payments motivate staff to stick with the company for a longer time, and therefore are usually provided to employees who stayed in the company for more than a year.

Welfare payments are not provided or are limited to employees who had professional failings or abused the discipline during a year.

The work by Gutsu, et (2018) specifically studies the downfall of motivation and professional identity in the higher education sector due to over-complication of work for today's high school teachers. The authors say that in such conditions "developing and implementing a totally new, effective management policy aimed at attracting, retaining and motivating talented academia become the priority".

The work further states that in their work teachers are mainly motivated by their desire for self-improvement, personal fulfillment, professional commitment, interest in and enthusiasm for their discipline. Teachers' professional commitment is independent of both employment terms and of how much their material needs are satisfied.

A bureaucratic incentive system that ignores individual and typological characteristics of a particular occupational category stimulates teachers' motivation very slightly believes Isaeva (2007).

Findings obtained by the researchers suggest that both interdisciplinary research on high school teacher motivation and niche research aimed at creating favorable working environment in a particular university that allows to make maximum possible use of employees' innovative creative potential, are required.

Presently, the Russian welfare benefits practice involves compulsory guaranteed payments formed based on transfers of insurance contributions made by employers to social off-budget funds and paid out additionally within social partnership with the employees. Ageeva (2017) believes, that in the real economy, enterprises widely use corporate social benefits.

An important salary component is a company's benefits package that may be formed based on the job grade, on the offered program options ("cafeteria", "menu"), etc.

Hypotheses

Since the work of an University teacher is a creative process that is largely related to his personality and interaction with students, in order to increase the motivation, it is necessary to provide such working conditions that will allow him to quickly monitor the state of health, as well as participate in a voluntary funded pension system.

The purpose of the study is to prove the relationship between the value of the motivational potential of the universities' teaching staff and the level of teachers' satisfaction with their working conditions and social protection, as well as substantiate the importance of improving the system of financing social guarantees for University teachers.

The objectives of the study are to conduct a pilot sociological survey of teachers of Russian universities located in different regions of the country, and to identify the relationship between the possible package's content, which is offered to Moscow and regional universities' teaching staff, including insurance part of the package, and those services in which are mostly demanded.

Methodology and Data

Sixty teachers were surveyed whose sets of answers helped to shape certain patterns using correlation and regression analysis. For that, answers from table 3 were selected and correlated with the answers from tables 9 and 10.

During the research, general scientific methods were used, such as analysis, synthesis, a systematic approach, formalization method, scientific abstraction technique, as well as special methods of scientific understanding: statistical (correlation and regression analysis), experimental approach (opinion poll), modeling.

With increasingly growing competition for students in the higher education market, as well as due to the growing need to improve educational process, educators and their qualifications become the key wheel gear that takes a university higher in the domestic ranking. Crucial components for a university to be included in global university rankings include the teaching level, profound educational content, the use of modern educational technology, as well as publication activity in international peer-reviewed journals.

Employee motivation is a tool for a company's long-term strategy, and universities are no exception here.

When we talk about motivating teaching staff in institutions of higher education, benefits package, and its insurance component in particular, becomes of huge importance since psychological pressure that a teacher regularly faces when communicating with a large audience, as well as the tremendous amount of methodological work and department's activities that need to be done in brief time frame in addition to research activity, tend to worsen their health.

As a result, they more often contact healthcare facilities, there is a bigger need for a proper rest which, unfortunately, they don't have that much during the summer since intense teaching and teachers' pursuit of excellence in both educational and research activities takes a good deal of summer time to do research, write monographs, workbooks and opinion pieces.

This study aimed to establish relation between the possible composition of the benefits package, including its insurance component, offered to teachers of Moscow and regional universities, and the services that are actually needed.

The study followed teachers of the Moscow Automobile and Road Construction State Technical University (Moscow), Bauman Moscow State Technical University (Moscow), Moscow State Tchaikovsky Conservatory (Moscow), the National Research Tomsk Polytechnic University (Tomsk), Russian State University named after A. N. Kosygin (Technology. Design. Art) (Moscow), Plekhanov Russian University of Economics (Moscow), Saratov Socio-Economic Institute of Plekhanov Russian University of Economics (Saratov), Ural State Economic University (Yekaterinburg).

There are sixty teachers aged 25 to 75 were interviewed. Interviewed teacher ranks show that the pilot survey matched current university teacher ranking structure: 1 dean, 3 heads of departments, 7 professors, 37 associate professors, 10 senior teachers, 2 assistants / teachers.

More than 70% of respondents (42 persons) have a Ph.D. degree, 15% (9 persons) have a higher doctorate degree and equal number of respondents are non-degree.

More than half of our respondents are middle-aged persons: 25 persons (41.7%) are aged 40-49 years, 19 persons (31.7%) are aged 30-39 years. There are 7 persons (11.7%) aged 50-59 years, 2 persons (3.3%) are age 60-65 years, 3 persons (5%) are above 65 years, and 4 persons (6.7%) are less than 30 years of age. 75% of respondents are women.

One third of the respondents – 21 persons (35%) have been working in the field of higher education for over 20 years, 27 persons have been working 11 to 20 years (45%) in this field and 12 people (20%) – less than 10 years. At that, the majority of respondents are employed as full-time teachers – 44 people (73.3%).

The study produced the following indictors.

The first stage determined the teachers' general attitude to their professional activities.

Table 1: What attracts you most to work in a university?

	Answer options			
	Teaching	**Research**	**Teaching and research equally**	**Hard to say**
persons	20	6	34	-
%	33.3	10.0	56.7	-

The data show that the majority of teachers interviewed (56.7%) are equally attracted by both teaching and research. One third of respondents (33.3%) are professionally interested in teaching.

Table 2: What do you think is the most important thing for you in your scientific and teaching career? (respondents were asked to select three most significant items)

Answer options	Persons	%
Serving society	15	25
Constant scientific pursuit	22	36.7
Opportunity to disseminate knowledge	38	63.3
Work with young people	42	70.0
Creative environment	44	73.3
Other	3	5.0

The majority (44 persons out of 60) of teachers interviewed (73.3%) associate their professional activity with creative environment; 70% (42 persons) singled out their wish to work with young people, 63.3% (38 persons) opted for an opportunity to transfer their knowledge to younger generations; 36.7% of respondents (22 persons) selected constant scientific pursuit as one of the key points in their teacher career choice, and for 15 persons (25%) high school teaching is a form of serving society.

Since this was a free-answer question, three teachers also added "Opportunity to evolve", "Flexible hours", "Opportunity to select a potential employee".

Table 3: What social aids do you think may be attractive for a university teacher? (respondents were asked to select three most significant items)

Answer options	Persons	%
Subsidized voluntary health insurance (health services in various out-patient clinics)	31	51.7
Subsidized travel vouchers for university staff and faculty and their families	25	41.7
Paying for recreational activities (visiting health care centres; swimming pool, gym membership, etc.)	24	40.0
Paying for skills-enhancement	23	38.3
Paying for costly healthcare services	19	31.7
Education fee discounts for children of university staff and faculty	16	26.7
Financial aid	16	26.7
Non-state pension scheme	15	25.0
Covered travel-to-work expenses (public transport pass)	9	15.0
Life and health insurance	5	8.3
Free meals	-	-
Other (please, specify)	3	5.0

Items such as "Subsidized voluntary health insurance (health services in various out-patient clinics)" (51.7% of respondents); "Subsidized travel vouchers for university staff and faculty and their families" (41.7% of respondents); "Payment for recreational activities (visiting health care centers; swimming pool, gym membership, etc.)" (40.0% of respondents) became of the greatest interest among teachers.

The least popular are "Covered travel-to-work expenses (public transport pass)" (15.0%); "Life and health insurance" (8.3%). Free meals option won nobody's interest.

Three interviewed teachers also mentioned "Materially lowered mortgage rates to 1.5-2% plus compensation for guaranteed long-term employment at the university (at least 10 years). Like the one the armed forces have"; "Favorable terms to rent and purchase housing"; "Covered costs for international internship" as well-wished forms of aid.

After correlation and regression analysis of the answers, the authors concluded that subsidized voluntary health insurance (health services in various out-patient clinics) was most preferred by teachers – candidates of science, aged 30-39, with 11 to 20 years of university experience and holding the office of assistant professor or senior teacher. This is a group of teachers who don't have sufficient income to fully pay for for-profit healthcare, but have a need for better healthcare services compared to the publicly funded health care.

Non-state pension scheme was of interest for teachers aged 50-59 years who have 11 to 20 years of high school experience, hold the office of assistant professor and have a degree of candidate of sciences. And this is quite explicable since as a person nears the retirement age, there is a growing concern of whether a person will have enough savings to maintain a desired quality of life considering low public pensions.

Table 4: What social aids have you been enjoying over the past three years?

Answer options	Persons	%
Paying for skills-enhancement	20	40.8
Financial aid	7	14.3
Subsidized travel vouchers for university staff and faculty and their families	4	8.2
Education fee discounts for children of university staff and faculty	4	8.2
Paying for recreational activities (visiting health care centres; swimming pool, gym membership, etc.)	3	6.1
Subsidized voluntary health insurance (health services in various out-patient clinics)	2	4.1
Paying for costly healthcare services	1	2.0
Other (please, specify)	14	23.3

The most opted answer amongst available social aids was "Paying for skills-enhancement" with one third of respondents (40.8%) who enjoyed it.

A rather high number of respondents (13 out of 60 interviewees or 21.7% of respondents) stated they did not use any form of social aid and one teacher (1.7% of the total number of respondents) had a study tour abroad financed by the university.

The data in table 4 show that the issue of availability of voluntary health insurance schemes for university teachers and the reasons why they do not use these schemes, where they are offered by the university, despite their statistically high demand, needs further study.

Table 5: How would you respond if your employer offered you a social insurance package (participation in a voluntary health insurance scheme and/or non-state pension scheme)?

Answer options	Persons	%
You would start appreciating your workplace more only in case of fully covered insurance scheme	30	50.0
You would start appreciating your workplace more even in case of partially covered insurance scheme	11	18.3
It would not affect your work ethic	19	31.7

The answers show the majority of respondents would appreciate their workplace more if they had additional insurance schemes covered by the employer (41 persons or 68.3% of respondents).

Table 6: If your employer offered you to cover one scheme of your choice at his expense, what scheme would you choose?

Answer options	Persons	%
Voluntary health insurance scheme	39	65.0
Non-state pension scheme	17	28.3
None is of interest	4	6.7

Out of the two proposed schemes, voluntary health insurance scheme was of greater interest to the respondents, with more than two-thirds of the interviewed teachers who opted for it (65.0%).

Non-state pension scheme covered by the employer was much less interesting for respondents, with only one third of respondents (28.3%) who chose it.

Four respondents (6.7% of the total number of respondents) were not interested in any of the offered schemes.

Table 7: What voluntary health insurance schemes are of the most interest to you?

Answer options	**Persons**	**%**
Out-patient and in-patient medical services incl. dental care	42	70.0
Out-patient medical services incl. dental care, only	12	20.0
In-patient medical services only	4	6.7
Other	2	3.3

Respondents' most preferred voluntary health insurance scheme was "Out-patient and in-patient medical services incl. dental care", with 42 out of 60 interviewed teachers (70%) who chose it.

One teacher noted that he (she) was not interested in health insurance schemes, and another was interested in having out-patient medical services without dental care.

Table 8: What non-state pension schemes are of most interest to you?

Answer options	Persons	%
Life pension subject to the amount of savings	29	48.3
Fixed-term pension, for the agreed timeframe, subject to the amount of savings	8	13.3
Fixed-term or life pension in amount agreed in advance	18	30.0
Other	5	8.3

The assessment is broken down as follows: almost half of the teachers would be interested in having "Life pension subject to the amount of savings" (48.3%), one third of teachers (30.0%) opted for "Fixed-term or life pension in amount agreed in advance" and only 13.3% chose "Fixed-term pension, for the agreed timeframe, subject to the amount of savings".

Since this was a free-answer question, five interviewees responded as follows: "None"; "None is of interest"; "I do not trust non-state pension schemes, their integrity and longevity"; "I am not interested in non-state pension schemes"; "I have never participated in non-state pension schemes".

Table 9: Are you willing to participate in voluntary health insurance schemes as co-financing? If so, what size of voluntary health insurance premiums are you willing to contribute?

Answer options						
	up to 60%	40 to 50%	30 to 40%	20 to 30%	up to 20%	I am not willing to co-finance using own funds

persons	0	1	3	4	25	27
%	0	1.7	5.0	6.7	41.7	45.0

According to the survey results, 45% of respondents are not willing to co-finance voluntary health insurance schemes using their own funds.

Just under half of respondents (41.7%) are willing to co-finance a voluntary health insurance scheme, however, in the amount of up to one fifth of the required premium.

Certainly, the size of premiums under co-financed voluntary health insurance schemes may significantly vary depending on the scheme content and health care institution ranking. Therefore, this study featured deemed amount of financing that is required. So, the data obtained rather reveal how much people are willing to contribute independently, from psychological perspective.

After correlation and regression analysis, the data showed that teachers who are candidates of science aged under 30, with less than 10 years of high school experience, and those with 11 to 20 years of high school experience, holding associate professor offices, were not willing to co-finance using their own funds. This trend can be accounted for the fact that up to the age of 30, health status does not yet require frequent health center visits. And with limited free funds, they are usually unfavorably disposed towards health insurance.

Table 10: Are you willing to participate in non-state pension schemes as co-financing? If so, what size of non-state pension contributions are you willing to make?

	Answer options					
	up to 60%	40 to 50%	30 to 40%	20 to 30%	up to 20%	I am not willing to co-finance using own funds
persons	0	0	4	5	15	36
%	0	0	6.7	8.3	25.0	60%

Even more peremptory answers were provided to this question: 60% of respondents are not willing to co-finance a private pension scheme using their own funds. One quarter of respondents (25%) are willing to co-finance, however, in the amount of up to 20% of the required amount.

At the same time, after correlation and regression analysis, we found that non-degree teachers aged under 30 with less than 10 years of experience holding senior teacher offices were not willing to co-finance using their own funds.

The reason for this is that many teachers, at the outset of their academic career, which starts at a young age, do not yet realize that they should start to save money as early as possible.

Conclusion and Discussion

The performed survey revealed that:

- modern teachers are attracted by both scientific and teaching elements of the profession: an opportunity to transfer their knowledge to younger generation, as well as an opportunity to be creative;

- voluntary health insurance became the undisputed leader among the social benefits, leaving behind such needs as subsidized travel vouchers and recreational activities;
- our survey reaffirmed the acute need for voluntary health and pension insurance schemes, making them a new motivation for teachers to improve their performance;
- most teachers are not willing to co-finance health and pension insurance.

The results of this study may help Russian universities to make useful and relevant decisions when developing incentive programs and forming demand-driven benefits packages for teachers.

References

1. Adnan S.M, Hey D.,van Staden C.J. (2018) 'The influence of culture and corporate governance on corporate social responsibility disclosure: A cross country analysis'. *Journal of Cleaner Production*. Vol.198, 820-832
2. Ageeva E. V. (2017) 'Social risk Management: studies'. manual / E. V. Ageeva, E. A. Bezhentseva; Irkutsk: Publishing house of BSU
3. Babynina L. S. (2012) 'Compensation model remuneration: theory, methodology and corporate experience'. Thesis for the degree of doctor of economic Sciences. GOU HPE "Russian economic University. G. V. Plekhanov". Moscow
4. Babynina L. S. (2013) 'Implementation of the compensation model of remuneration at the corporate level'. *Bulletin of the REU*. No. 12, 97-100
5. Dolgopolova I. V. (2015) 'Effectiveness of corporate social package: opinion of employees'. *Scientific journal of ITMO.* Series: Economics and environmental management. No. 1. 48-54.
6. Fordhama A.E., Robinson G.M, Leeuwenca J.V. (2018) 'Developing community based models of Corporate Social Responsibility'. *The Extractive Industries and Society*. Vol 5 (1) 131-143
7. Gutu E. G., Nyagolova M. D., Runova T. A. (2018) "Research of motivation of labor activity of the teacher of higher education institution". *Vestnik Mininskogo universiteta*. Issue 6 (3)
8. Isaeva K. V. (2015) 'Building a system of motivation of personnel on the basis of a system of balanced indicators (experience of domestic companies)'. *Rationing and remuneration in industry*. Issue. 5-6. 37-43.
9. Isaeva K. V. (2007) 'Integration of vectors of development of the educational market of Russia'. *Vestnik of the Plekhanov Russian university of economics*. No. 5. 3-16.
10. Koval L. V., Marar O. I. (2016) 'Social package as a tool to stimulate the work of teachers of higher education: regional aspect'. *Region: systems, economy, management*. Issue 3 (34). 78-86.
11. Selyanskaya G. N. (2003) Marketing management of personnel potential of the University: Dis. Cand. Econ. sciences'. Moscow
12. Vergara E. H. (2013) 'The Role of the social package as a tool to stimulate the work of personnel of a modern company'. *Young scientist*. Issue 10. 296-297.

Public-Private Partnership as a Tool for Implementing the State Infrastructure Policy of The State

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Abstract

In conditions of deficiency of budgetary funds important task facing government is to find tools that allow you to replace public investment in the creation and upgrading of infrastructure to private capital and at the same time to optimize financial expenses for this purpose. To define the positions in this direction is the search for new approaches in the use of public-private partnership with active participation of private capital. Based on the results of a study of the distribution of global investments in priority sectors of the economy identified the factors and conditions necessary for effective interaction between government and business. Highlighted a number of problems that hinder the effective implementation of public-private partnerships in priority sectors of the economy. It is established that the existing potential in the implementation of public-private partnership projects is not being realized enough. Based on the experience of advanced economies and identifies some priority areas of its improvement, taking into account current world trends.

Keywords: Public-Private Partnership, Economy, Business, Infrastructure Policy, Innovation, Investment.

Introduction

Infrastructure policy of the state is influenced by many objectively defined for the country factors, including its size, geographical location, availability of natural resources, features of historical development of States and forms of business activities. There is no doubt that for any country is important to have a clear understanding of internal and external challenges that have emerged on the way to effective development, and identifying opportunities and prospects of formation of effective innovation system. The implementation of government infrastructure policy based on the use of public-private partnership (PPP) has the objective preconditions in the modern world. The mechanism of interaction between the state and business in realization of priority national projects actively studied in Russia and in foreign countries is determined by different approaches to the definition of public-private partnership and its role in the development of the economy (Vertakova Yu., Plotnikov V., (2014), Salinger, L. (2004), etc.). Great attention to the understanding of the role of public-private partnerships in the modern economy innovation is paid in developed countries, where implementation of projects on PPP basis, is considered as an important instrument of state innovation strategy (Delmon, J. (2014), Petersen, O. H. (2011)). As practice shows the outcome of such interaction should be to attract additional private investment in the formation of innovation infrastructure of the economy and increasing the quality of public goods (Lebedenko O., Agamagomedova E., Charochkina E. and Vertakova A. (2017)).

Results and Discussion

Search and implementation of the most effective mechanisms and relevant directions for the development of infrastructure does not lose its relevance today. According to experts, in order to ensure the rapid development of the country's national economy in the development of infrastructure, it is necessary to invest more than 5% of GDP annually. In world practice, infrastructure investment is considered one of the most effective tools to stimulate economic development. Globally, data on Russian investments in key infrastructure sectors almost coincide with the global trend and remain at an average level of 3.2%. If we consider investments by sectors of the economy, then in 2018 the transport sector of the economy traditionally occupies the largest share in the distribution of global infrastructure costs. About 1.3 dollars trillion is spent on roads, bridges, airports and other transport facilities in the world per year. Investments in energy take the second place, as for the sector of information and communication technologies, it occupies a small share in government spending (Fig. 1).

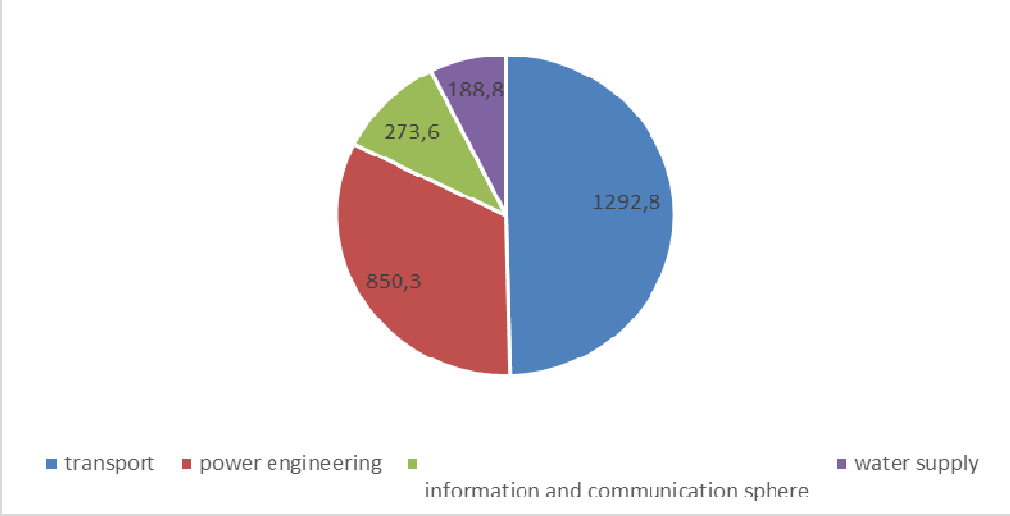

Fig. 1: Global investment in major sectors of the economy in 2018, billion US dollars

The source: Rating of regions by the level of PPP development. Analytical review, 2019. [http: //pppcenter.ru/assets/docs/reit240419.pdf]

With regard to the distribution of investment by country, China today occupies a leading position in all areas of infrastructure, the three leaders include India, the USA and Japan. Russia does not occupy a leading position in more than one sector (Table 1).

Table 1: Ranking of countries by investment in the economy in 2018

Transpotr	Energy	Information and communication environment	Water supply
1) China	1) China	1) China	1) China
2) USA	2) USA	2) Japan	2) Japan
3) Japan	3) Japan	3)USA	3) India
…	…	…	…
11) Russia	**15) Russia**	**12) Russia**	**25) Russia**

The source: Rating of regions by the level of PPP development. Analytical review, 2019. [http: //pppcenter.ru/assets/docs/reit240419.pdf]

Today it is obvious that government spending on infrastructure needs to be increased. In many developing countries, including Russia, the potential of public-private partnerships being realized is not always fully consistent with the necessary trends of the modern innovative global community. A

large share of investments in infrastructure is carried out at the expense of the state, for example, education, transport and healthcare, but as the experience of developed countries shows, the mechanism of public-private partnerships can work well in these areas. In general, 3 422 PPP projects are currently being implemented in Russia with a total volume of private investments of 2 182 billion rubles, and in China at the end of 2018, 4691 PPP projects were under implementation, where the volume of private investments amounted to 1 trillion dollars.

The main challenge for developing countries is to maximize the potential of the business for the implementation of the tasks, the responsibility for which rests with the state. It is important to develop directions for the use of PPPs in new sectors of the economy, in particular in the field of IT infrastructure. To activate the PPP in the social sphere. On the world market has been formed certain trends that have an impact on the entire system of economic relations, including the trends in the field of PPP, in particular, PPP projects have become larger, but also riskier, higher priority commitments of the public side, there is a growing demand for "green" investments and quality projects, these processes are increasingly being transferred to digital form, countries are more active in sharing their practices and develop universal approaches to investing. In the world there is a trend for high-quality infrastructure investment (Infrastructure Investment, Quality). Russia, as a member of the Working group on infrastructure of the "Big twenty" (G20) has been working on the formation of criteria for assessment of projects in relation to Quality Infrastructure Investment. United center for the development of infrastructure and PPP will combine the capabilities of the Corporation, and the Center's experience in this field, will increase the quantity and quality of infrastructure projects, implement global best practices in the field of application of PPP mechanisms, as well as accelerate the launch of new projects. An effective tool to overcome the lack of data about infrastructure and attracting private investment in its development is the creation, development and integration of digital platforms. In Russia have already created such aggregator platform support infrastructure projects "ROSINTER". A wide range of tools and services allows you to simplify the process of preparation of projects to attract the necessary partners to enhance the competence in the issues of attracting investments (Fig.2).

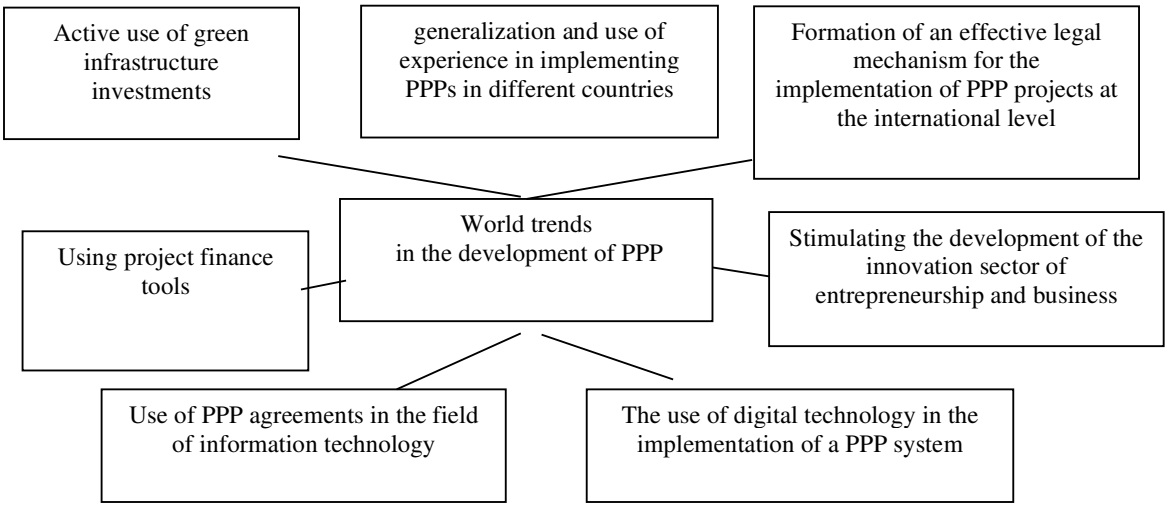

Fig. 2: World trends in the development of public-private partnerships at the present stage

Undoubtedly, the instrument of public-private partnership is in demand. This is evidenced by the changes in legislation that have appeared recently. Recently, we have the opportunity to implement PPP agreements in the field of information technology. Active interaction between business and government allows balancing risks. Now, concessionaires have resorted to the tools of the Project Financing Factory to attract syndicated loans to their projects. This allows you to implement much larger undertakings than before, and reduce the cost of projects. Obviously, those countries that strive to achieve success in implementing an effective infrastructure policy, based on the

implementation of PPP projects that are in line with global trends, will eventually gain significant competitive advantages.

Conclusions

Over the past several decades, the phenomenon of PPP has significantly changed and has undergone a number of changes. The number of projects is gradually increasing, the legal framework is being strengthened, and the industry is expanding. The study of foreign experience indicates that there is a centralization of public administration in this area: public institutions play an increasingly important role in the establishment of the PPP institution and its transformation into an instrument for implementing the country's infrastructure policy.

The mechanism for implementing public-private partnerships should primarily be determined by the strategic goals of the country's innovative development. Modern conditions require the development of high-tech industries and the expansion of scientific potential, which is impossible without investment and interest from both the state and private business. The PPP implementation mechanism should include socio-economic and institutional mechanisms to stimulate all participants at each stage of implementation. They could include forms and methods of monitoring the global PPP markets, integration of production with science and education, economic incentives for private business for progress in implementing projects, some privileges on innovative patents, subsidization of innovation, business activity, as well as insurance of economic risks, institutional consolidation of new economic and social relations and their results. As a result, we should receive a growth in innovative activity of the economy, increase in competitiveness and resistance to the global challenges of our time.

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References

- Bondar, N. N. (2012), ‘Place of public-private partnership in investment support for the development of industries,’ *Bulletin of the GSTU named after BY. Dry*, 4 (51), 080-086.
- Concessions and infrastructure investments: results and new trends (2019) [Online] NAKDI [23.01.20] Available: URL. https://investinfra.ru/frontend/images/PDF/osk2019/OSK-2019-Bik.pdf
- Delmon, J. (2019), 'Public-Private Partnership in Infrastructure,' *A practical guide for public authorities* [Online], [22.01.20]. Available: URL.http://www.ppiaf.org/sites/ppiaf.org/files/publication/Jeff%20Delmon_PPP_russian.pdf
- Lebedenko O., Agamagomedova E., Charochkina E. and Vertakova A. (2017), The use of public private partnership for the development of transport and housing infrastructure. Proceedings of the 30th International Business Information Management Association (IBIMA), ISBN:978-0-9860419-9-0-8-9, November 2017, Madrid, Spain, 1892-1896.
- Lene Tolstrup Christensen and Karsten Greve (2018) Choosing state-owned enterprises instead of public-private partnerships for infrastructure management: an explanation of institutional changes in the Danish transport sector, 18 (1/2), 137-161.
- Mataev, T.M. (2015), ‘Forms of public-private partnership in the implementation of infrastructure projects,’ *Public-private partnership*, 1 (1), 9-18.
- Petersen, O. H. Public-Private (2011), Partnerships as converging or diverging trends in public management? A comparative analysis of PPP policy and regulation in Denmark and Ireland, *International Public Management Review*, 12 (2), 98-99.
- Plotnikov, V. and Vertakova, Yu. (2012), Public-Private Partnership on Professional Education Organization in the Interests of Russian Industry. *Economy and Management*, 11(85), 37 - 39.

- Rating of regions by the level of PPP development. Analytical review (2019) [Online] Moscow [23.01.20] Available: URL. http: //pppcenter.ru/assets/docs/reit240419.pdf
- Salinger, L. (2004), a New model of investment partnership between the state and the private sector. *A world of difference*, 2, 13-14.
- Varnavsky, V.G. (2010), Public-Private Partnership: Theory and Practice. M.: Publishing. HSE House.
- Vertakova Yu. and Plotnikov V. (2014), Public-private Partnerships and the Specifics of their Implementation in Vocational Education. *Procedia Economics and Finance*, 16, 24-33.

The Impact of Digital Business on Competitive Advantages of Social and Economic System

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Abstract

Competitiveness of modern national social and economic systems depend on the digital technologies and they are the key economic drivers. Depending on the degree of information progress influence the market dictates new trends for all the industries. This means that digitalization opens promising prospects of effectiveness of warehouse stocks management and logistics processes. At that, automated management systems of supply chains ensure significant optimization of stocks of end products, raw materials, spare parts at a warehouse of an enterprise. At the same time digital instruments also reduce logistic costs, help the owners plan routes more effectively, control transport loading, establish correct logistic priorities in the company's operations. Thus, large companies will be able to interact with technological businessmen and IT specialists by creating venture funds and business incubators specializing on Industry 4.0 technologies and also as part of technological contests aimed at solving of business problems.

Keywords: Economy, Companies, Digitalization, Costs, Competitive Advantages, Society

Introduction

The computer and information technologies changed business processes in many industries a long time ago and became a routine thing. Digitalization has already attained good results in corporate and state management, in the education, healthcare, public services systems. Russia leads the world by the spread of digital technologies in state management, in some types of urban transportation service (Petrov, 2019).

At present, digitalization is already introduced into industrial technologies and Russia's aviation, car, shipbuilding, food industry companies, nuclear power and the rocket and space industry. Digital twins are created; production processes are doubled in virtual reality. A transfer to a distributed production model has started (Akhmadeev, 2016). A company can use a machine tool located at another plant in another city remotely.

Literature Review

The digital economy phenomenon is very multidimensional and includes penetration of information technologies into all spheres of society's life. The term was coined by the founder of MIT Media Lab Nicholas Negroponte in 1995 (The Massachusetts University). Modern researchers Brennen J. S (2016) mean the same by the word, but they focus exclusively on industry changes. Slepov V.A. (2019) in his works point to the rising role of digital technologies in the producing industries and, as a consequence, the impact on the labour market. Researches by Parviainen (2017) say that digitalization influences not only the processes of industrial production, but also the whole value chain and all external and internal

agents. In his turn, Sabbagh (2013) and Kayikci (2018) focuses in his research on digitalization's influence on logistics as an industry and on transaction cost cuts on the whole. The authors of research Zubarev (2019) state that new technologies help companies speed up processes at all stages of the production chain. According to Kosov (2018), this is a great competitive advantage of the business.

Theoretical Background

Competitive advantages of the key subjects of economic relations are ensured by a significant profit growth, more effective work of employees and material assets optimization. Thus, revenue of the digital business in the West grew by 9%, while its market value by 12% compared to its peers. Basing on the higher economic and financial indicators of the business, 78% of company managers, who participated in a poll held by Capgemini Consulting and MIT Sloan Management, said that digitalization will become critically important for their companies, which is why for 67% of general director's digitalization will become pivotal in their corporate strategies. The researches demonstrate that the companies, which use digital technologies successfully, are more competitive than those, which lag behind in digital maturity. These features allow us to single out several competitive advantages inherent only to the digital business.

First, the competitive advantages include altered and adapted business models. As more devices are switched to the networks, the company's possibilities of collecting data from the most faraway links of the value chain ensure conditions for reforming the business models and creation of new ones thanks to the Internet. E-commerce development became one of the key growth drivers of the digital economy in the USA and China and gave them a powerful incentive for the development of related logistics. "Those who solve other people's problems get the profit. The current global profit now is to sell the stuff produced by somebody else. Everything that helps it – from logistics to Facebook – is profitable and promising." That is why logistics is gaining momentum now and "an even relatively overpriced delivery service is of incredible popularity."

At that, Amazon has recently achieved delivery speed of one day after the order – the client can receive 70% of Amazon's own goods (i.e. not provided by other online retailers) within 6-14 hours after ordering. Despite higher express delivery tariffs, this segment expands by 25–60% annually. Consequently, when supply exceeds demand, such a psychological feature as fast satisfaction of customer's desires becomes one of the demand supporting factors (Glubokova, 2019). However, the new economy of fast delivery requires special infrastructure – ports, warehouses, high-speed railways, a plane fleet, the absence of traffic jams on the roads, etc, including special culture of treating the consumer.

Thus, in 2017, the US e-commerce turnover amounted to U.S.$445–455 bln, or 550% more than in Russia. For comparison: Russian Post's revenue from the delivery business amounts to 116.6 bln rbls (or $1.94 bln rbl) compared with a revenue of FedEx alone, which amounts to $60 bln, or nearly 200% as much. Experts forecast that the gap will be bridged in the next few years, because "a real boom of superfast delivery only starts, while it can be stopped short by prohibitively high prices and a low quality of servicing." (Neubert, 2018). However, global e-commerce development and switching to the networks can face some obstacles. Although some social and economic systems are successful in spreading internet technologies, it is evident that the emerging markets will be limited in signing contracts and entering the market because of poor Internet penetration.

Another competitive advantage ensured by the digital technologies in the social and economic systems is reduction of the time needed to produce new goods and services, higher efficiency of operations and a stronger ability to react to market changes. Automated digital management of supply chains helps the company boost its productivity, efficiency and transparency of operations, produce good demand forecasts and manage its material assets in a real time regime creating a reliable system of order delivery (Prodanova, 2018; Kosolapova, 2019). A research done by International Data Corporation FutureScape, confirms that 75% of value chains will be built on the processes, products and services

united with the help of digital technologies as early as by 2019, which will help increase labor productivity and increase the time of reaction to market changes.

Discussion and Result

This leads us to outlining the following competitive advantages.

a) Creation of new ways of client service. It was only recently that competitive advantages were gained by the price leadership and uniqueness of the product, while today competition is won with the help of innovations and outsourcing (Aksenova, 2010). Digital companies attain loyalty by offering each client uniformity and a high quality of service regardless of the interaction channel. At the same time, it helps companies receive valuable analytics for constant improvement of their products and services and precise forecasting of future purchases;
b) A higher service quality. Two out of three clients change their service supplier because of the quality of service. The companies which pay as much attention as they can to the quality of client service outstrip the market and are ahead of their competitors (Ekimova, 2016). Watermark Consulting analyzed the stock prices of such companies for six years and concluded that the yield on these securities is almost three times as high as of the companies comprising the S&P. The companies which do not pay much attention to the quality of client service lag behind the market by about 34% (Korableva, 2019);
c) The use of innovations to increase labor productivity. People want to work at the companies, which have the means and the wish to encourage and support their productivity, help react to the changes faster. The digital companies offer their employees the instruments necessary for effective connection, a high degree of involvement, joint work and mobility. In its turn, Deloitte said in a research that profit per equity growth will exceed 50%, if employee dissatisfaction falls to 10% (Shtefan, 2017).

Thus, the spread of information technologies and digitalization will ensure the spread of entrepreneurship (e-commerce, information and communication technologies); more creative and innovative solutions will be applied; the service quality will increase; access to new markets and new clients will increase (Lehoux, 2019; Turishcheva, 2019).

Conclusion

Digitalization is gaining momentum both in the middle-size businesses, which are conspicuous for their high mobility and fast reaction to market changes, and in big business. Nowadays, even the sectors usually controlled by the state digitalize. All these create the prerequisites of digital business influence on the whole social and economic system of a whole state. A research by Dorofeyev (2018) demonstrates significant changes in all business areas thanks to digitalization and proves that information and communication technologies grow rapidly. A research done by Kutsuri G. (2019) explains the influence of digital technologies on different areas of economic activities depending on the level of economic development of various social and economic systems. At that, a research by Maiti M. (2017) and Neubert M. (2018) points to direct correlation between information technologies and social and economic development. Consequently, this correlation is about the same in developed and developing states.

Digitalization opens promising business opportunities of higher effectiveness in managing warehouse stocks and logistics processes. Automated systems of supply chain management optimize ready products, raw materials, spare parts stocks at the warehouses of a company significantly. Digital instruments also reduce logistic costs, help create effective routes, control transport loading, form better priorities of logistics operations for the whole company. In its turn, development of Industry 4.0 technologies requires concentration of resources, that's why the companies have to form industry partnerships for joint project financing, reduce risks, interaction with the government agents, technological companies and research centers to create expert and consultative centers, exemplary enterprises, develop industry platforms, solutions and standards. Thus, large companies will be able to

interact with technological businessmen and IT specialists by creating venture funds and business incubators specializing on Industry 4.0 technologies and also as part of technological contests aimed at solving of business problems.

References

- Brennen, J. S. and Kreiss D. (2016), 'Digitalization,' *The international encyclopedia of communication theory and philosophy*, 4 (2), 1-11.
- Parviainen, P. (2017),' Tackling the digitalization challenge: how to benefit from digitalization in practice,' *International journal of information systems and project management*, 5 (1), 63-77.
- Kosov, M.E., Akhmadeev, R.G., Smirnov, D.A., Solyannikova, S.P. and Rycova, I.N. (2018),' Energy industry: Effectiveness from innovations, ' *International Journal of Energy Economics and Policy*, 8 (4), 83-89
- Lehoux, L., Morozova, T.V., Safonova, E.G., Balashova, A.D. and Protasov, M.V. (2019),' Practical aspects in calculating of impairment of financial assets according to IFRS 9 «Financial instruments»,' Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 6624-6632.
- Aksenova, A. A. (2010), 'Personal income tax deductions as an instrument of realization of equality constitutional principle, ' RISK: *Resources, Information, Procurement, Competition*, 3
- Ekimova, K.V., Bolvachev, A.I., Dokhoyan, Z.M., Danko, T.P., Zarova, E.V., Shemetkova, O.L. and Sekerin, V.D. (2016),' Improvement of the methods for assessing the value of diversified companies in view of modification of the herfindahl-hirschman model, ' *Journal of Internet Banking and Commerce*, 21 (4), 14-26
- Prodanova, N.A., Plaskova, N.S., Popova, L.V., Maslova, I.A., Dmitrieva, I.M., Sitnikova, V.A. and Kharakoz, J.K. (2018), 'Corporate reporting of the future: On the path towards new through the analysis of today,' *Eurasian Journal of Analytical Chemistry*, 13 (4), 296-303.
- Kayikci, Y. (2018, 'Sustainability impact of digitization in logistics,' *Procedia Manufacturing*, 2 (12), 782-789.
- Petrov, A.M., Kiseleva, N.P., Kevorkova, Z.A., Melnikova, L.A. and Yshanov I.G. (2019), 'Present development practices for tax, financial and statistical reporting in the Russian Federation, ' *International Journal of Innovative Technology and Exploring Engineering*. 8 (12), 2412-2423.
- Turishcheva, T.B., Ponomareva, D.A. and Luzgina, A.S. (2019),' Review of the key requirements for the financial statements complying with the international and Russian accounting standards, 'Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 3031-3039.
- Dorofeyev, M., Kosov, M., Ponkratov, V., Masterov, A., Karaev, A., Vasyunina, M. (2018), 'Trends and prospects for the development of blockchain and cryptocurrencies in the digital economy,' *European Research Studies Journal*, 21 (3), 429-445.
- Sabbagh, K. (2013), 'Digitization for economic growth and job creation: Regional and industry perspective,' *The global information technology report*, 2 (4), 35-42.
- Glubokova, N.Y., Egorova, L.I. and Sokur, V.S. (2019), 'Tax control of small enterprises: Russian and foreign experience,' Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 3354-3358.
- Kosolapova, M.V., Muravitskaya, N.K., Tolmachev, M.N., Melnikova, L.A. and Petrov, A.M. (2019), 'Technology for solving the problems related to the implementation of the concept of preserving capital in accounting and statistics. *International Journal of Recent Technology and Engineering*. 8 (3), 789-792
- Zubarev N. Y. (2019), 'Digitization of socio-economic development: the problem of choosing age limits in the complex economic evaluation of losses related to the population premature mortality,' 1st International Scientific Conference" Modern Management Trends and the Digital Economy: from Regional Development to Global Economic Growth"(MTDE 2019). Atlantis Press.

- Akhmadeev, R.G., Kosov, M.E., Bykanova, O.A., Ekimova, K.V., Frumina, S.V. and Philippova, N.V. (2016), 'Impact of tax burden on the country's investments,' *Journal of Applied Economic Sciences*, 11 (5), 992-1002.
- Petrov, A.M., Putihin, Y.E., Poluleh, M.V., Yurasova, I.O. and Erohina, V.N. (2019), 'Accountant Modeling Technology and Statistics in the Context of the New Educational Concept, ' *International Journal of Innovative Technology and Exploring Engineering*. 8 (12), October 2019
- Kutsuri, G. N. (2019), 'Impact of digitalization on improvement of economy, IT and Internet of business, ' *Journal of Physics: Conference Series*, 3, 33 - 38.
- Korableva, O., Durand, T., Kalimullina, O. and Stepanova, I. (2019), 'Studying user satisfaction with the MOOC platform interfaces using the example of coursera and open education platforms,' *Paper presented at the ACM International Conference Proceeding Series*, 26-30.
- Neubert M. (2018), 'The impact of digitalization on the speed of internationalization of lean global startups,' *Technology Innovation Management Review*, 8 (5), 42-49
- Slepov, V.A., Kosov, M.E., Chalova, A.Y., Gromova, E.I. and Voronkova, E.K. (2019), 'Integration of the financial market sectors: Factors, risks and management approaches,' *International Journal of Mechanical Engineering and Technology*, 10 (2), 1243-1250.
- Shtefan, Y.G., Zimakova, L.A., Vakhrushina, M.A, Chirkova, M.B. and Malitskaya, V.B. (2017), 'Stages of economic substantiation analysis and modeling for the meat processing companies' price strategy,' *Espacios*, 38(49), 16-25
- Maiti, M. and Kayal, P. (2017), 'Digitization: its impact on economic development & trade,' *Asian Economic and Financial Review*, 7 (6), 541-548.

Students` Research Projects in Science: Involvement Evaluation Methods

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Abstract

The issues of attracting students to scientific work and research projects always cause considerable discussion. This is explained by high competition of scientists and faculty for the right to publish their scientific achievements and also by the possibility to be among the winners in the distribution of grant funds for research and development. This state of affairs leads to a situation where the student community is actually "out of the brackets" of the scientific life of a higher educational institution. In fact, the student scientific community remains an underestimated resource for the research activities of an educational organization. As a result a difficult task appears concerning involvement of students in scientific and educational projects (scientific articles, monographs, conferences, scientific grants, etc.). Based on empirical data, the authors propose a methodology that takes into account the criteria for assessing the degree of student participation in research projects.

Keywords: Students` Science, Scienceprojects, Sciencepapers, Experts, Sciencejournals.

Introduction

Student science in the academic environment is included in the list of key areas of work. The task of the university is to prepare not only specialists in the fields of study, but also scientific and pedagogical workers. Higher educational institutions seek to find students who are predisposed to scientific activity in order to make them future teachers. The streamlined process of introducing students to the teaching staff ensures a well-balanced change of generations, new vision, approaches and methods in education.

The state, business and non-profit organizations encourage students who have distinguished themselves in research activities. The grant and scholarship support that students receive, increases the prestige of the educational institution, affects its domestic and international ratings, and popularizes it among applicants. There are interesting and successful international projects for integrating the scientific potentials of the student and business communities, for example, Demola Network [6, p. 224]. This interaction format unites more than 750,000 students, 50 universities and leading world companies [9].

Student science is an important contribution to the quality of education. Many researchers rightfully note that students involved in scientific work have better academic performance and more developed critical thinking [8, p. 264]. There is a consensus that teachers play a special moderator role in attracting students to big science [4, p. 106]. It is close cooperation with curators, teachers that allows to acquire the much-needed primary positive experience of scientific research.

For the development of student science in higher educational institutions, separate structural units are distinguished, such as the Council of Young Scientists and the Student Scientific Society [1,

p. 297]. Individual faculty members are appointed as scientific curators in faculties, training areas, and study groups. As part of the scientific work, a plan of scientific events is compiled, scientific journals are published, where young researchers publish their works. Effective teacher contracts contain KPIs for academic leadership – the staff is motivated to work personally with students. The authors describe only a small part of the amount of work aimed at involving students in the research process.

The process of involving students in scientific work creates a certain burden on the budget of a higher educational institution. In this regard, the question arises from assessing the effectiveness of the expenditure of funds or evaluating the effectiveness of involvement, which determines the relevance of this research.

The purpose of the research is to identify criteria for evaluating the effectiveness of involving students in scientific work within the framework of a higher educational institution and, based on the criteria, develop a formula for calculating the engagement rate.

Objective: to test the developed formula on the example of the North-West Institute of Management, RANEPA.

The object of the research is the academic environment, the subject is the process of students involvement in research activity at the university.

Research Methodology

The main method of this scientific research is the content analysis of the essay. In the article, the authors asked leaders of student scientific communities from leading universities and experts from the North-West Institute of Management, RANEPA to answer in a free form the question: “By what criteria would you rate the level of student involvement in scientific work?” Students and experts received anonymous google forms via the Internet. The research involved 15 students from 7 leading universities of St. Petersburg and Moscow and the Brussels Free University, as well as 5 experts from the North-West Institute of Management, RANEPA.

Based on the analysis of essays written by leaders of student scientific associations and experts of NWIM RANEPA, the authors formed a list of criteria, highlighted comments regarding the proposed question. The list consists of ten quantitative criteria, three qualitative criteria and one remark. The results of the analysis of the essays are shown in table 1.

Table 1: Essay criteria analysis

	Criterion name	**Comment by authors**
Quantitative criteria	1. Number of publications per year	As the experts rightly noted in the remark, the criterion for the number of publications cannot be an integral part of a comprehensive assessment of involvement. It is necessary to determine the list of journals that can guarantee the quality of published works.
	2.Number of presentations at conferences	The list of recorded conferences should be formed by a special commission.
	3. Belonging to a scientific team led by a specific scientist	Belonging to the scientific team, according to the authors, can be an objective criterion. For example, the number of participants in a student scientific society, a council of young scientists, or another scientific association

	4. The number of participants, winners and winners at recognized scientific competitions	The list of contests, as well as magazines for publications and conferences, must be approved by a special commission.
	5. Frequency of visiting online libraries and information resources	Not every university has an electronic library portal. If an electronic library is available, this criterion is suitable for assessing engagement.
	6. The level of rivalry in competitions for motivational financial incentives	The difficulty lies in the fact that a number of financial incentives are provided only for students of the budget form of education. Under certain conditions, the criterion can be used.
	7. Availability of a developed research project	A scientific project is a rather vague concept. Coursework can also be a scientific project. Criterion can be used only in certain conditions, when the concept of a scientific project is clearly defined.
	8. Publications in journals indexed in Scopus and WoS	The criterion is suitable for certain universities where the practice of student publications in such journals is common.
	9. Presence of a permanent scientific supervisor	The assignment of a scientific adviser to a student does not always indicate active scientific work. This criterion can only be used in certain conditions.
	10. Participation in university research projects	The criterion can be used for universities in where the participation of students involved in such projects is guaranteed.
Qualitycriteria	1. The quality of theses	An objective qualitative assessment requires the involvement of independent third-party experts, which is associated with additional financial costs. Qualitative criteria can be used once every several years (for example, once every 4 years) as a fundamental assessment of changes.
	2. Quality of a research	
	3. Satisfaction of students with the quality of involvement in scientific work	
Remarks	The criterion for the number of publications is not indicative, because very often students make insignificant publications to receive scholarships for scientific work	

The authors also note the importance of internal evaluation. An internal assessment is a set of criteria for involving students in research work within the university based on indicators associated with this university. For example, a criterion may be a student's scientific publication in journals published by a university in which students are studying. The dynamics of the number of student publications in such journals will also make it possible to determine the efficiency of expenditure of funds for these journals, and to select their optimal number and focus. Similarly for conferences, scientific competitions, competitions for material incentives (internal scholarship competitions), the frequency of visits to internal online resources (electronic scientific libraries of the university).

In this way, it is possible to formulate a formula for assessing the involvement of students in research work. A formula may contain individual criteria or combinations thereof.

$$Involvement = \frac{Criterion}{Total\ number\ of\ students} \times 100\%$$

Results

Testing on the example of the North-West Institute of Management, RANEPA

As part of the solution to the problem, the authors analyzed data related to the process of involving students in research work at NWIM RANEPA. The generated data set includes data on the publication activity of students enrolled in the full-time department in the summer of 2015 in scientific journals published by NWIM RANEPA.
The process of collecting and processing data was as automated as possible. Data was downloaded from the official websites of the institute and scientific journals into the MS Office environment. Data processing was carried out using macros and an object-oriented programming language Visual Basic.

Limitations

The quality of the studied data was often quite low. The text was not machine-readable, so the authors had to use recognition tools. Under such conditions, minor errors and data loss are possible.

The studied sample of students enrolled in the summer of 2015 contained 1010 people. Data was exported from documents of orders for admission. Data on the authors of scientific articles were downloaded from the table of contents of scientific journals. Next was the intersection of the sets of the studied sample of students and authors. In order to minimize possible errors and coincidences, the surname, name and patronymic were used in the format "SurnameNP" (Surname, name and patronymic). The dynamics of student involvement in research projects in the context of academic years is clearly shown in table 2.

Table2: Students` involvement dynamics

The name of the scientific journal	The number of scientific publications of NWIM students for the academic year			
	2015-16	2016-17	2017-18	2018-19
Eurasian integration	0	0	0	1
Scientific works of NWIM	0	1	6	1
Student Science Journal	2	5	4	9
Administrative Consulting	1	0	0	1
State and business. Ecosystem of the Digital Economy	1	5	4	6
Amount	4	11	14	18
Number of unique authors	3	10	14	16
Involvement	0,30%	0,99%	1,39%	1,58%

From table 2 it follows that from one academic year to another, the number of authors among students of the sample being analyzed is growing.

The positive dynamics of the involvement of students in scientific activity shows not only the increased interest of this category of actors in the educational environment to science in general, but also the conscious need to publish their research and educational achievements.

Discussion

In recent years, Russian science has been dynamically developing. The President of Russia sets the Government of the country strategic goals to bring Russian science to a new level. The spectrum and amount of scholarship payments to young scientists are growing. The President has set tasks in order to increase the number of graduate students in Russian universities. Also it's necessary to emphasize that salaries of scientific and pedagogical workers are growing. In general, the main accent is put on the development of human capital, on the formation of a wide range of skills, including soft skills, which will allow to obtain qualitative changes in all key strategic priorities [3, p. 92].
However, to achieve certain goals, quite controversial projects and indicators are being developed. So, according to the charter of the national project "Education", Russia should come in fifth place in terms of the total number of articles in areas determined by the priorities of scientific and technological progress, in publications indexed in international databases. There is a well-founded opinion that a quantitative approach in such matters motivates researchers to write more and more articles, which can be detrimental not only to their quality, but to the education system as a whole [4, p. 66].

The conclusion of this scientific research is confirmed by the results of many researches regarding the fact that the share of student research projects remains modest and correspond to modern world trends and challenges [2, p. 49; 9, p. 1492; 7, p. 33].

According to the authors, in order to maintain the quality of educational services and the development of science, higher educational institutions need to build a competent monitoring system for many indicators, including the involvement of students in the scientific process.

References

1. Ermachkov I.A., EkimovA.I.,Vazerova A.G. (2018). Students' humanitarian science club activity in 2006-2012. European Journal of Contemporary Education. 7(2): 286-290.
2. Gribenshikov K.V. The problem of disclosure of the scientific potential of students in modern universities // World science. № 4 (4). 2017. P. 49-52.
3. Ivanov D.Y., SuslovE.Y., Evdokimov K.V., Samorukov V.I. Human Capital Development in a Digital Economy // Bulletin of theBelgorod University of Cooperation, Economy and Law. 2020. № 1 (80). P. 85-93.
4. Le H, Janssen J, Wubbels T. Collaborative learning practices: teacher and student perceived obstacles to effective student collaboration. Cambridge Journal of Education.№ 48(1). 2018. P. 103-122.
5. Pleshchenko, V.I. (2018). The Problem of Plagiarism in Scientific Publications and Graduation Research Papers // Vyssheeobrazovanie v Rossii = Higher Education in Russia. Vol. 27. No. 8-9, pp. 62-70. (In Russ., abstract in Eng.)
6. Rafikova E., Ivanov D., Lexashov A. Development of the management system of scientific projects. In the collection: Science Week SPbSTU materials of the scientific-practical conference. Institute of Economics and Economics SPbSTU. 2015.P. 222-225.
7. Reznik, S.D., Sazykina, O.A. (2019). Organization of Research Activities at University Department: Management Mechanisms for "Uncontrollable" Scientists. Vysshee obrazovanie v Rossii = Higher Education in Russia. Vol. 28. No. 4, pp. 21-36. (In Russ., abstract in Eng.)
8. Shcheglova I., Koreshnikova Y., Parshina O. The Role of Engagement in the Development of Critical Thinking in Undergraduates // Voprosyobrazovaniya / Educational Studies Moscow. 2019. No 1. P. 264–289. URL: https://vo.hse.ru/data/2019/04/09/1176080263/10%20Shcheglova.pdf
9. Tsareva I., Pyadina T.Analysis of the level of development of research activities in the university // Synergy journal. 2018. № 19. P. 1491-1497.
10. Demola official website. URL: https://www.demola.net/about.

Responsible and Sustainable Innovations: In Search of Emerging Topics

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Abstract

The aim of the study is to identify the emerging topics in research on responsible and sustainable innovations. The study employs the bibliometric methodology. The analysis of keywords included in the Scopus-indexed publications and their co-occurrence is used to discover topics, which have been attracting the attention of academia in recent years. VOSviewer software supports analysis and visualization of research findings. First of all, top high-frequency keywords in the research field are retrieved and their time distribution is analyzed. Secondly, the time-based overlay visualization of high-frequency keywords network is presented and discussed. 'Responsibility', 'responsible research and innovation', 'philosophical aspects' and 'government' are recognized as four leading emerging topics in the research field. The study fills the identified gap in the body of knowledge and contributes to the development of the research field through indicating emerging topics of scientific inquiry related to responsible and sustainable innovations. Its originality derives from employing bibliometric methodology based on keywords co-occurrence analysis, which has not been done before.

Keywords: Responsible Innovation, Responsible Research And Innovation, Sustainable Innovation, Bibliometrics.

Introduction

Nowadays innovation is regarded as the engine of change for companies, economies and societies. Given innovation nature, it is aimed at generating value and benefits for several stakeholders. However, it is already known that innovation can also bring about some unexpected effects. This may happen if an innovation is based on deception about benefits and side effects or if some ethical or societal anxiety being implication of an innovation were not taken into consideration (Dreyer et al., 2017; Leone & Belingheri, 2017). The idea of responsible innovation (called also responsible research and innovation, sustainable innovation) emerged as the response to aforesaid phenomena. The idea of responsible innovation has arisen as a new approach which amplifies on formerly proposed concepts related to business responsibility by drawing on technology assessment, ethics in science, ethical, legal and social aspects embedded in innovation processes (von Schomberg, 2012; Martinuzzi et al., 2018). The idea of responsible innovations has grown in recent years, however the ways it is defined and described have become increasingly diverse (Wilford, 2018; Sudolska et al., 2019). Some frameworks describe it as responsible research and innovations – RRI (von Schomberg, 2011; Martinuzzi et al., 2018), while others call the idea as responsible innovations – RI (Owen et al., 2013; Burget et al., 2017) or sustainable innovations – SI (Hargadon, 2015; Dyck & Silvestre, 2018). Despite the name used, the core of the analyzed idea is to embed responsibility at very early stages of research and innovation by focusing on research integrity with environmental and institutional dynamics, putting strong pressure on societal impact of business. The concept of RRI, RI or SI points out that currently both science and innovation are directed on socially desirable and socially acceptable ends (Owen et al., 2013). Both research and innovation should be responsible in several aspects: environmentally, ethically, socially and politically. The concept offers an inclusive approach

to research and innovation ensuring the cooperation of several market actors (innovators, researchers and research founders, policy makers, companies, society) during the entire research and innovation process. The main aim of this is to better align both the process and outcomes of research and innovation with the values, needs and expectations of whole societies.

The issues related to responsible and sustainable innovations attract numerous ranks of scholars, which leads to the development of the research field (Timmermans, 2018; Sudolska et al., 2019). This observation is confirmed by scanning the research productivity indexed in Scopus and Web of Science databases. As of 31 December 2019, there are found 1,863 Scopus-indexed publications comprising at least one of the phrases 'responsible innovation', 'responsible research and innovation' or 'sustainable innovation' in their titles, keywords and abstracts (topic search). Respectively, 1,357 of such publications are retrieved from the Web of Science database. The selection of keywords for the search is motivated by the fact that these three concepts overlap (cf. Sudolska et al., 2019, pp. 16–19).

Nevertheless, so far, the amassing research output in the field has not been yet mapped thoroughly with bibliometric methods. The search for the following combination of phrases: Topic Search ('responsible innovation' OR 'responsible research and innovation' OR 'sustainable innovation') AND ('bibliometric' OR 'bibliometrics' OR 'scientometrics' OR 'informetrics') brings only 11 bibliometric items in Scopus and 5 in Web of Science. Excluding duplicates and one item not related to the topic (Bührer et al., 2019), there are found 11 publications employing bibliometric methods to study the aspects related to responsible and sustainable innovations.

The first category of publications presents bibliometric analysis of studies related to the sustainability concept (Martens & Carvalho, 2017; Storopoli et al., 2019). The second category is concentrated on particular technologies such as autonomous vehicles (Cavazza et al., 2017, 2019) or brain-machine and brain-computer interfaces (Compañó, 2009) as potential solutions in sustainable innovation processes. The third group of papers employs bibliometric methods to study some aspects related to responsible innovations, responsible research and innovations or sustainable innovations. Sudolska and her colleagues (2019) map the field of responsible and sustainable innovations with the use of research profiling methodology (cf. Porter et al., 2002). Nazarko conducts bibliometric analysis of the research output focused on responsible research and innovation (Nazarko, 2019) and discusses this construct as a component of a conceptual system paired with future oriented technology assessment (FOTA) (Nazarko, 2017). Franceschini et al. (2016) explore research communities focused around eco-innovations, environmental innovations, green innovations and sustainable innovations. Similarly, De-Miguel-Molina and associates (2018) study the evolution of research on eco-innovations. Vaz, Lezana and Maldonado (2017; cf. Vaz, Shoeninger Rauen, & Rojas Lezana, 2017) conduct bibliometric analysis of sustainable innovations in the context of the automotive industry. Nevertheless, none of the aforementioned publications identifies and explores emerging topics in the research field related to responsible and sustainable innovations, which indicates the gap in the body of knowledge.

Filling the discovered gap is the motivation to conduct the study aimed at identifying the emerging topics in research on responsible and sustainable innovations. Keywords co-occurrence analysis (He, 1999) is used to discover topics, which have been attracting the attention of academia in recent years. This method has been found to be an effective approach to map the research themes in neighboring fields related to e.g. sustainability (Guo et al., 2017) or the sustainable enterprise and the sustainable organization (Lis, 2018). The structure of the paper follows the traditional model consisting of the methodology section, research results presentation, discussion and conclusions.

Method of study

Research Sample

We used the Scopus database for retrieving bibliometric data in the research sampling process. As of 04 January 2020, we searched for the logical disjunction of phrases 'responsible innovation',

'responsible research and innovation' or 'sustainable innovation' in the titles, keywords and abstracts of publications indexed in the Scopus database. Neither a subject area nor a date of publication were limited in order to ensure including all relevant publications related to the topic under the study. In total, we retrieved 1,869 bibliometric records (publications). Research output is distributed over 26 subject areas defined by the Scopus database. The most populated are: Business, Management and Accounting (790 publications), Social Sciences (595), Environmental Science (389), Engineering (386), Energy (253), Decision Sciences (247), and Computer Science (233). Journal articles are the most numerous category of documents in the sample, followed by conference papers and book chapters. In regard to the language of publications, the sample is very much biased towards English (97% of the items). The detailed parameters of the research sample are presented in Table 1./

Table 1: Parameters of the research sample

Category	Items (occurrences)
Date (year) of publication	2020 (18); 2019 (323); 2018 (292); 2017 (257); 2016 (212); 2015 (168); 2014 (143); 2013 (120); 2012 (69); 2011 (62); 2010 (49); 2009 (36); 2008 (36); 2007 (23); 2006 (20); 2005 (9); 2004 (18); 2003 (5); 2001 (2); 2000 (2); 1999 (1); 1995 (1); 1993 (1); 1992 (1); 1978 (1)
Subject areas (overlapping)	Business, Management and Accounting (790); Social Sciences (595); Environmental Science (389); Engineering (386); Energy (253); Decision Sciences (247); Computer Science (233); Arts and Humanities (184); Economics, Econometrics and Finance (168); Medicine (140); Biochemistry, Genetics, and Molecular Biology (89); Agricultural and Biological Sciences (82); Chemistry (52); Psychology (52); Materials Science (51); Nursing (51); Mathematics (50); Chemical Engineering (37); Earth and Planetary Sciences (25); Physics and Astronomy (22); Multidisciplinary (14); Pharmacology, Toxicology and Pharmaceutics (13); Immunobiology and Microbiology (13); Neuroscience (11); Health Professions (9); Veterinary (3)
Document type	Article (1,117); Conference Paper (293); Book Chapter (166); Review (114); Editorial (50); Book (38); Note (31); Conference Review (19); Short Survey (13); Letter (8); Erratum (5); Retracted (1); Undefined (14)
Language	English (1,813); Spanish (18); French (12); Portuguese (12); German (10); Chinese (3); Italian (5); Russian (4); Lithuanian (3); Slovenian (1); Ukrainian (1)

Source: Own study based on data retrieved from the Scopus database (04 January 2020).

The publications included in the sample provide 8,563 keywords, including both author keywords and index keywords. 'Innovation', which occurred 448 times, is the most cited keyword. The threshold of 100 occurrences is achieved by 9 expressions, 50 occurrences – by 16 items, 20 occurrences – by 93 items and 10 occurrences – by 240. There are 6,427 keywords which occurred only once. Following the formula provided by Donohue (1974; as cited in: Guo et al., 2017, p. 7), the number of high-frequency keywords in the sample is 113, which corresponds with the minimum number of occurrences equal to 16. This threshold is achieved by 115 keywords included in the sample, which are selected for co-occurrence analysis.

Research Instruments

Keywords co-occurrence analysis is supported with VOSviewer software (van Eck & Waltman, 2010, 2018) in order to visualize the findings (van Eck & Waltman, 2014). The parameters of VOSviewer software used for analysis are provided in Table 2.

Table 2: VOSviewer parameters used for analysis

Item	Characteristic/ value
Type of analysis	Co-occurrence analysis
Unit of analysis	All keywords
Counting method	Full counting
Method of normalization of strength of the links between items	Association strength method
Layout	
Attraction	2 (default setting)
Repulsion	0 (default setting)
Clustering	
Resolution parameter (detail of clustering)	1 (default setting)
Minimum cluster size [N]	1 (default setting)
Merging small clusters	Switched on
Visualization	
Scale	1.00
Weights	occurrences
Labels size	0.50
Maximum number of lines	1000
High frequency keywords used for analysis [N]	115
Minimum occurrences of a keyword used for analysis [N]	16

Source: Own study based the use of the VOSiewer application (04 January 2020).

The item density and overlay visualization functions of VOSviewer are used to identify the most prominent and the emerging topics in the research field.

Results Presentation

High Frequency-Keywords Identification

The item density visualization function of VOSviewer is employed to present the prominence of high-frequency keywords illustrating the topics attracting the most of attention of the academia (cf. Figure 1).

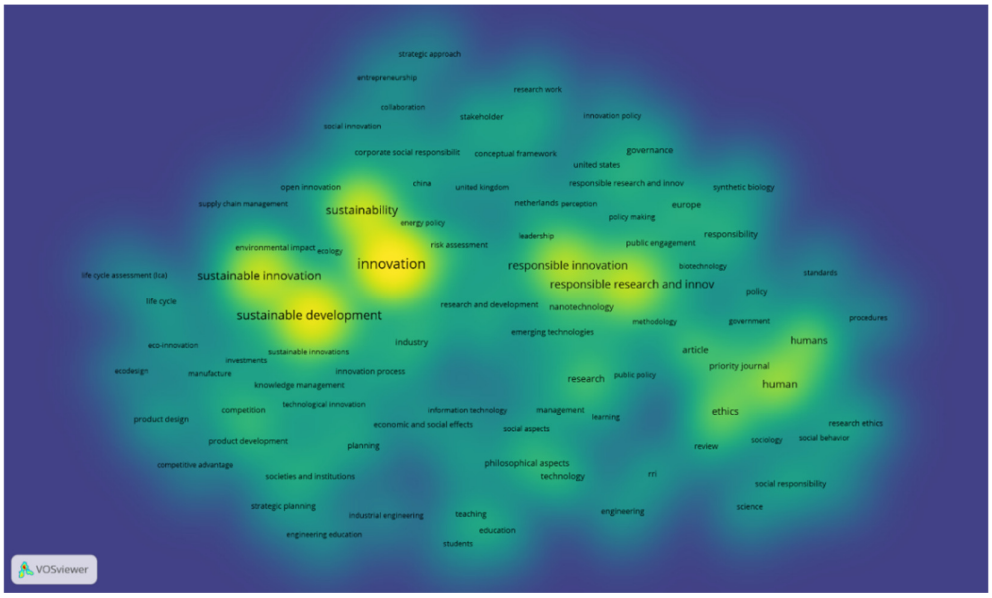

Figure 1: Item density visualization of co-occurrence analysis of high-frequency keywords in research on RI, RRI and SI

Source: Own study based on data retrieved from the Scopus database and analyzed with the use of the VOSviewer application (04 January 2020).

Top 10 high-frequency keywords in the research field and their time distribution between 2015 and 2019/2020 is presented in Table 3. Moreover, information regarding the average publication date for these expressions is provided.

Table 3: Top 10 high frequency keywords (occurrences) in research on RI, RRI and SI

Keywords	Total	2019/20	2018	2017	2016	2015	Average publication year
innovation	1 (448)	1 (90)	1 (58)	2 (50)	1 (43)	1 (32)	2014.66
sustainable development	2 (327)	4 (58)	3 (44)	3 (40)	2 (40)	2 (25)	2014.55
sustainability	3 (241)	2 (62)	4 (39)	4 (31)	4 (26)	5 (19)	2015.72
sustainable innovation	4 (225)	6 (42)	6 (36)	5 (25)	3 (30)	8 (15)	2015.20
responsible research and innovation	5 (217)	3 (59)	2 (45)	1 (52)	5 (25)	3 (23)	2017.24
responsible innovation	6 (195)	5 (43)	5 (38)	7 (22)	6 (22)	3 (23)	2016.29
human	7 (151)	7 (30)	7 (26)	6 (23)	7 (18)	6 (17)	2016.10
ethics	8 (112)	8 (25)	9 (17)	8 (17)	8 (15)	9 (14)	2016.38
humans	9 (104)		8 (18)	9 (16)	9 (14)	7 (16)	2015.66
article	10 (75)	9 (21)	10 (12)			10 (8)	2015.88
research and development		10 (16)					2016.14
technology assessment				10 (13)			2015.94
decision making					10 (9)		2016.02

Source: Own study based on data retrieved from the Scopus database and analyzed with the use of the VOSviewer application (04 January 2020).

Overlay Visualization of Publication Date of High Frequency-Keywords

The overlay visualization function is employed to identify emerging topics in the research field (cf. Figure 2). In this kind of visualization, the scores are assigned to each item taken for analysis. While searching for emerging topics, the date (year) of publication is such a score. In the visualization, the range of colors is from blue (the lowest score, here: the earliest publications) to green (middle score) and yellow (the highest score, here: the most up-to-date publications) (van Eck & Waltman, 2018, p. 9).

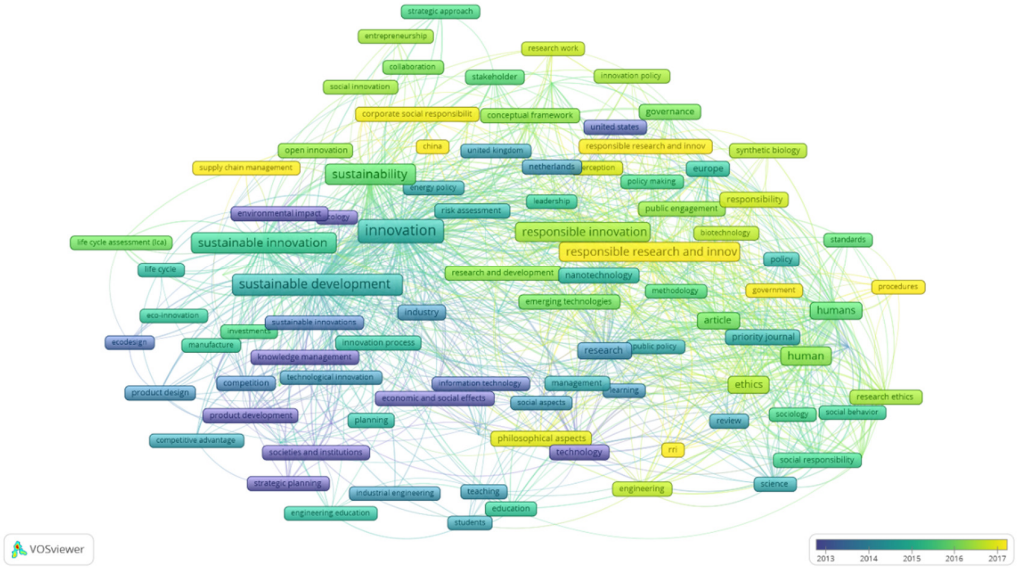

Figure 2: Overlay visualization of high-frequency keywords in research on RI, RRI and SI
Source: Own study based on data retrieved from the Scopus database and analyzed with the use of the VOSviewer application (04 January 2020).

The following keywords in the RI, RRI and SI research field have the most up-to-date average publication year according to the calculations for the overlay visualization: 'literature review', 'RRI', 'government', 'China', 'procedures', 'supply chain management', and 'responsible research and innovation'. In total, in the sample, there are 8 keywords with the average publication year newer than 2017.00 and 8 other keywords with the score between 2016.50 and 2017.00. Detailed bibliometric characteristics of these items are provided in Table 4.

Table 4: Bibliometric characteristics of the newest keywords in research on RI, RRI and SI (sorted by date)

Keyword	Average publication year	Occurrences	Links	Total links strength
literature review	2017.84	19	46	89
RRI	2017.58	33	50	113
government	2017.35	23	48	129
China	2017.29	24	39	88
procedures	2017.26	19	43	11
supply chain management	2017.25	16	32	63
responsible research and innovation	2017.24	217	89	664
responsible research and innovation (RRI)	2017.22	37	48	84

corporate social responsibility	2016.89	28	45	105
philosophical aspects	2016.77	48	62	160
perception	2016.70	20	50	94
responsibility	2016.61	51	61	188
stakeholder engagement	2016.59	22	52	98
artificial intelligence	2016.57	23	40	75
technology adoption	2016.56	25	55	115
research work	2016.55	20	56	131

Source: Own study based on data retrieved from the Scopus database and analyzed with the use of the VOSviewer application (04 January 2020).

Discussion

The data presented in Table 4 indicate four keywords that we consider as worth noticing among emerging research topics, i.e.: (1) 'responsible research and innovation', (2) 'responsibility', and (3) 'philosophical aspects' and (4) 'government'. We have chosen the keywords that have been attracting the attention of academia in recent years based on the analysis of their high-frequency occurrence in the research field combined with their time distribution and total links strength. Given these findings, the identified keywords prove an increasing interest of researchers in the aspects related to responsibility understood in broad meaning. Responsibility is a social aspiration expanding over time as it follows the progress in social values and norms. The way of understanding and interpreting responsibility in regard to innovations is increasingly changing. Nowadays, the researchers highlight that the span of responsibility in relation to innovations comprises not only legal requirements, but also the expectations of the stakeholders as well as the values connected to the society and the natural environment. This may be linked with the increasing interest of scholars in the philosophical aspects related to responsible and sustainable innovations. The findings regarding the newest keywords in the studied research field confirm that issues related to incorporating responsibility into scientific research and business strategies attract academia. Responsible research and innovation has emerged as a new concept which broadens previously proposed approaches considering business responsibility through leaning on technology assessment (cf. 'technology adoption' and 'artificial intelligence' in Table 4), ethics in science and technology, legal, social and ethical issues (cf. 'corporate and social responsibility' in Table 4) involved in innovation processes. Furthermore, the issues related to 'government' appear among interesting emerging topics in the field of research. This is probably caused by the fact that responsible research and innovation is an approach that focuses on applying appropriate governance mechanisms in relation to innovations. It proposes establishing governance mechanisms to include all the stakeholders (cf. 'stakeholders engagement' in Table 4) and the public in the early stages of research and development in order to identify and resolve potential value conflicts. Governing the research and innovation process boosts the probability of anticipating and recognizing how research and innovation on one hand may benefit society and on the other hand prevent any negative consequences from happening. The role of governments in support of responsible and sustainable innovations and discussing related recommendations and implications for government policies may be another explanation for including 'government' among emerging issues in the field.

The aforesaid findings are consistent with the literature review, which appeared to be a very popular type of methodology applied in the up-to-date publications in the field (cf. Table 4). The importance of responsibility issues in regard to research and innovation is discussed by Leone and Belingheri (2017) and Dreyer et al. (2017). Leone and Belingheri (2017) focus on integrity of the principles of ethics and responsibility in the discourse of business innovativeness. Furthermore, Dreyer et al. (2017) point out the differences between research and innovation, however, focusing on the impacts of both on society and the environment. The responsibility aspects are extensively considered also by Owen et al. (2013), Hargadon (2015) or Wilford (2018). Owen et al. (2013) and Hargadon (2015) highlight that while analyzing responsibility related to innovation, the significant issue is to reflect the social changes as well as the modern context in which innovations occur. Wilford (2018) argues that responsibility is a core element of the responsible research and innovation approach. The

necessity of conscious and responsible governing of research and innovation is discussed by Burget et al. (2017) who highlight that responsible research and innovation is an attempt to govern innovation processes in the way that enables including all the stakeholders and public actors in it to increase anticipation of research and innovation outcomes, both positive and negative. Von Schomberg (2011, 2012) underlies the significance of governing innovation processes through early 'upstream' interventions instead of 'downstream' monitoring and 'correction' of interventions ex post. While considering the issues of governing research and innovation, he points out the shift towards ex ante calculations of the risks and benefits associated with uncertain decisions regarding technology and innovations. In a similar vein, Martinuzzi et al. (2018) examine the responsibility of the industry towards society and the environment. They argue that responsible research and innovation is a new concept with the potential to advance the discourse of governing innovation processes taking into account the responsibility challenges that the industry is facing today.

Conclusions

The study has identified emerging topics in research on responsible and sustainable innovations. The analysis of keywords included in the Scopus-indexed publications and their co-occurrence has been used to achieve the aim of the study. Firstly, high-frequency keywords in the research field have been retrieved and their time distribution has been analyzed. Secondly, the time-based overlay visualization of high-frequency keywords network has been presented and discussed.

The analysis of high-frequency keywords in the research field combined with their time distribution and total links strength allowed to identify 'responsibility', 'responsible research and innovation', 'philosophical aspects' and 'government' as four leading emerging topics in the field of research. Responsible research and innovation is a very complex and multidimensional concept. However, the essence of the approach is widely understood responsibility. The conducted study raises awareness of possibility to solve problems related to research and innovation with the focus on delivering particular social and environmental benefits in addition to commercial goals. The identified emerging research topics call all market actors: researchers, research founders, regulations' and policy makers as well as business innovators, for searching the solutions to address negative impacts of innovation processes. The aforementioned emerging topics focus on stakeholders and public engagement while governing innovation processes directed at treating responsible research and innovation as a kind of common researchers' and businesses innovators' capability incorporating conscious and responsible processes, mechanisms as well as organizational routines.

The study fills the identified gap in the body of knowledge and contributes to the development of the research field through indicating emerging topics of scientific inquiry related to responsible and sustainable innovations. Its originality derives from employing bibliometric methodology based on keywords co-occurrence analysis, which has not been done before.

While discussing the findings of the study and their implications and added value for the research field, limitations of the research process should be revealed. First of all, the study employs only one research method, which means the lack of research triangulation. Such a fact may be considered as a weakness. Secondly, the research sample includes publications indexed in only one bibliometric database. Although Scopus is recognized as a highly valuable source of bibliometric data indexing quality source titles, relying on one database may result in some biases. The bias towards publications written in English may be an example. As indicated in the methodology section, 97% of items in the research sample are in English. It may mean underrepresentation of valuable publications written in other languages, indexed in local, national databases. Thirdly, the study is conducted from the perspective of the whole research field, neglecting potential differences between subject areas. In order to mitigate the aforementioned limitations, in further research it is recommended to: (1) employ other research methods in order to ensure triangulation and increase objectivity of the research findings; (2) replicate the study with use of data retrieved from other bibliometric databases to avoid potential biases e.g. towards the language of publication; (3) conduct the separate analysis of emerging topics within each of the most densely populated subject areas in the research field i.e.

Business, Management and Accounting, Social Sciences, Environmental Science, Engineering, Energy, Decision Sciences, and Computer Science.

Among the implications of our study we point out the necessity of integrating up-to-date questions and problems faced by governments, business units, non-governmental organizations as well as individuals while implementing innovation processes. This is important conclusion, particularly taking into account that delivering profitable but at the same time ethically acceptable and socially desirable innovations nowadays becomes a requirement of competitive economies and businesses. Although the paper contributes mainly to the development of the body of knowledge in management sciences, it seems to provide some implications for business practice as well. Pointing out the main emerging research topics may focus the attention of research and business representatives on the complexity of innovation processes and their impacts not only in terms of internal effects but also innovation externalities, both positive and negative.

The conducted study inspires us for further research. The field of research on responsible and sustainable innovation is highly dynamic. Therefore, the emerging topics identified through the conducted study need to be monitored over time. The dynamics of the changes and shifts of newest keyword occurrences and their total strength seem to be highly interesting for further research. Secondly, we plan a depth-in investigation of the directions of future research within emerging topics in order to raise the market actors' awareness of areas significant for business and economy development while conducting the empirical research on responsible and sustainable innovations.

References

- Bührer, S., Schmidt, EK., Reidl, S., Palmen, R., and Groo, D. (2019), 'Evaluation framework for promoting gender equality in research and innovation: How to define suitable indicators to evaluate gender equality effects in R&I systems?' *17th International Conference on Scientometrics and Informetrics, ISSI 2019*, 2-5 September 2019, Rome, Italy, 1770–1775.
- Burget, M., Bardone, E., and Pedaste, M. (2017), 'Definitions and conceptual dimensions of responsible research and innovation: A literature review,' *Science and Engineering Ethics*, *23*(1), 1–19.
- Cavazza, BH., Gandia, RM., Antonialli, F., Nicolaï, I., Zambalde, AL., Sugano, JY., and De Miranda Neto, A. (2017), 'Management and business of autonomous vehicles: A systematic integrative bibliographic review,' *Proceedings of the European Conference on Innovation and Entrepreneurship, ECIE*, 21-22 September 2017, Paris, France, 141–149.
- Cavazza, BH., Gandia, RM., Antonialli, F., Zambalde, AL., Nicolaï, I., Sugano, JY., and De Miranda Neto, A. (2019), 'Management and business of autonomous vehicles: A systematic integrative bibliographic review,' *International Journal of Automotive Technology and Management*, *19*(1–2), 31–54.
- Compañó, R. (2009), 'Future ICTs for active ageing: Brain-machine and brain-computer interfaces,' *Assistive Technology Research Series*, *23*, 235–252.
- De-Miguel-Molina, B., De-Miguel-Molina, M., Segarra-Oña, M. del V., and Peiró-Signes, Á. (2018), Bibliometrics and networks: Case of a multinational perspective on how eco-innovation has evolved in academic literature, *Innovation Discovery: Network Analysis of Research and Invention Activity for Technology Management*, Pilkington, A. and Daim, T. (eds.), World Scientific Publishing Co. Pte. Ltd., London.
- Donohue, JC. (1974), *Understanding Scientific Literature: A Bibliometric Approach*, MIT Press, Cambridge.
- Dreyer, M., Chefneux, L., Goldberg, A., von Heimburg, J., Patrignani, N., Schofield, M., and Shilling, C. (2017), 'Responsible innovation: A complementary view from industry with proposals for bridging different perspectives,' *Sustainability*, *9*(10), art. 1719.
- Dyck, B., and Silvestre, BS. (2018), 'Enhancing socio-ecological value creation through sustainable innovation 2.0: Moving away from maximizing financial value capture,' *Journal of Cleaner Production*, *171*, 1593–1604.
- Franceschini, S., Faria, LGD., and Jurowetzki, R. (2016), 'Unveiling scientific communities about

sustainability and innovation. A bibliometric journey around sustainable terms,' *Journal of Cleaner Production*, *127*, 72–83.

- Guo, D., Chen, H., Long, R., Lu, H., and Long, Q. (2017), 'A co-word analysis of organizational constraints for maintaining sustainability,' *Sustainability*, *9*(11), art. 1928.
- Hargadon, A. (2015), *Sustainable Innovation: Build Your Company's Capacity to Change the World*. Stanford University Press, Stanford.
- He, Q. (1999), 'Knowledge discovery through co-word analysis,' *Library Trends*, *48*(1), 133–159.
- Leone, MI., and Belingheri, P. (2017), 'The relevance of innovation for ethics, responsibility and sustainability,' *Industry and Innovation*, *24*(5), 437–445.
- Lis, A. (2018), 'Keywords co-occurrence analysis of research on sustainable enterprise and sustainable organisation,' *Journal of Corporate Responsibility and Leadership*, *5*(2), 47–66.
- Martens, ML., and Carvalho, MM. (2017), 'Key factors of sustainability in project management context: A survey exploring the project managers' perspective,' *International Journal of Project Management*, *35*(6), 1084–1102.
- Martinuzzi, A., Blok, V., Brem, A., Stahl, B., and Schönherr, N. (2018), 'Responsible research and innovation in industry - challenges, insights and perspectives,' *Sustainability*, *10*(3), art. 702.
- Nazarko, Ł. (2017), 'Future-oriented technology assessment,' *Procedia Engineering*, 182, 504–509.
- Nazarko, Ł. (2019), 'Responsible research and innovation - A conceptual contribution to theory and practice of technology management,' *Business: Theory and Practice*, *20*, 342–351.
- Owen, R., Stilgoe, J., Macnaghten, P., Gorman, M., Fisher, E., and Guston, D. (2013), A framework for responsible innovation, *Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society*, Owen, R., Bessant, J. and Heintz, M. (eds.), Wiley, Chichester.
- Porter, AL., Kongthon, A., and Lu, J-CC. (2002), 'Research profiling: Improving the literature review,' *Scientometrics*, *53*(3), 351–370.
- Storopoli, J., Ramos, H., Quirino, G., and Rufín, C. (2019), 'Themes and methods in sustainability research,' *Revista de Gestão Ambiental e Sustentabilidade*, *8*(3), 410–430.
- Sudolska, A., Lis, A., and Chodorek, M. (2019), 'Research profiling for responsible and sustainable innovations,' *Sustainability*, *11*(23), art. 6553.
- Timmermans, J. (2018), Mapping the RRI landscape: An overview of organisations, projects, persons, areas and topics, *Responsible Innovation 3: A European Agenda?* Asveld, L., van Dam-Mieras, R., Swierstra, T., Lavrijssen, S., Linse, K. and van den Hoven, J. (eds.), Springer International Publishing, Cham.
- van Eck, NJ., and Waltman, L. (2010), 'Software survey: VOSviewer, a computer program for bibliometric mapping,' *Scientometrics*, *84*(2), 523–538.
- van Eck, NJ., and Waltman, L. (2014), Visualizing bibliometric networks, *Measuring Scholarly Impact: Methods and Practice*, Ding, Y., Rousseau, R. and Wolfram D. (eds.), Springer International Publishing, Cham.
- van Eck, NJ., and Waltman, L. (2018), *VOSviewer Manual*, Universiteit Leiden.
- Vaz, CR., Rojas Lezana, AG., and Maldonado, MU. (2017), 'Sustainability in the automotive sector: An analysis of structured content,' *Journal on Innovation and Sustainability*, *8*(2), 79-103.
- Vaz, CR., Shoeninger Rauen, TR., and Rojas Lezana, AG. (2017), 'Sustainability and innovation in the automotive sector: A structured content analysis,' *Sustainability (Switzerland)*, *9*(6), art. 880.
- von Schomberg, R. (2011), Introduction: Towards responsible and innovation in the information and communication technologies and security technologies field, *Towards Responsible Research and Innovation in the Information and Communication Technologies and Security Technologies Field*, von Schomberg, R. (ed.), Publications Office of the European Union, Luxembourg.
- von Schomberg, R. (2012), Prospects for technology assessment in a framework of responsible research and innovation, *Technikfolgen Abschatzen Lehren*, Dusseldorp M. and Beecroft, R. (eds.), VS Verlag fur Socialwissenschaften, Wiesbaden.
- Wilford, SH. (2018), 'First line steps in requirements identification for guidelines development in responsible research and innovation (RRI),' *Systemic Practice and Action Research*, *31*(5), 539–556.

Youth Preferences and Behaviour Related to Food Products from the Sustainability and Marketing Perspective

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Abstract

The main goal of the article is to find whether the following generation, comprised by today's young people, has a tendency to aggravate or to eliminate ecological and social problems resulting from consumption of food products. The achievement of the research was possible thanks to investigate young people's preferences and behaviour concerning this area in the aspect of sustainability. The survey questionnaire was addressed to 440 people aged 15-23. The research has shown that highest nutrition irregularity occurs in case of having suppers by young people (41.2%), breakfasts (20.6%) and dinners (18.4%). The largest group of people (61.2%) prefers typical dishes of the Polish cuisine. A group of respondents comprising 24.8% of the total eat products of the fast food category. Relatively few people (11.7%) consume vegetable and fruit salads, vegetable and fruit cocktails. Eating one's fill and overeating are practiced by 72.2% of respondents. Young people are uninterested in veganism (0.5%) and vegetarianism (4,3%). Only 10.8% of the surveyed do not waste food. Only 12.4% of young people make free donation of food for social purposes. More than 20% of them do not segregate food product packaging (23.4% at home, 27.0% outside the home). The research has shown that most young people in Poland contribute to aggravation of ecological and social problems in the sector of food products. Such situation is also a challenge for marketing.

Keywords: Sustainable Development, Food Products, Young Generation.

Introduction

Sustainable science is a young, still developing area of knowledge, concerned with the problems of excessive exploitation of natural resources and creation of conditions for sustainable development. The paradigm of sustainable development is a foundation of this science. This is a developing trend of research, given the quick growth pace of ecological and social problems. According to Rogall, we are already quite sure today that the limits of nature's capacity have been exceeded, it only remains unclear to what extent. The consumption of resources and emission of harmful substances will double every 28 years. This means that after 280 years, emission of harmful substances and consumption of resources will be thousand times higher than today (Rogall, 2010, pp. 145, 158). This evidences that sustainable development cannot keep pace with the rate and scale of growth of ecological and social problems. "The distance between current practices and truly sustainable practices is enormous" (Martin and Schouten, 2014, p. 11). The greatest threat to the modern world and future generations is production and consumption of goods and services. The scholarly literature puts strong emphasis on production and consumption of goods. However, there are no detailed studies explaining whether the generation to replace us, comprised by today's youth, has a tendency for aggravation or for mitigation of the growing ecological and social problems. This issue is important, since the future of sustainable development is in the hands of the young generation. Curtailing thereof will have catastrophic effect on our planet. Earth, as an isolated system externally powered by nothing more than solar energy,

will not sustain excessive exploitation of its resources and increasing pollution with harmful substances.

The main goal of the article is to explain whether the following generation, comprised by today's young people, has a tendency to aggravate or to eliminate ecological and social problems resulting from consumption of food products. To induce upward trends in sustainable development, the young generation should contribute to elimination rather than aggravation of such problems. The authors examine the issue on the basis of a survey conducted among 440 young people aged 15-23. The results of the research may also be useful in the catering industry and marketing. They facilitate proper development of culinary offers by Central and Eastern European restaurants and cafés frequented by young people.

Consumption of food creates many problems in the area of sustainability. Unsustainability is predominant in the sphere of consumption of food products. Symptoms thereof include: purchase of excessive amounts of food, consumption of unhealthy food, food waste, generation of refuse comprised by enormous amounts of food product packages and waste. Consumption of unhealthy food, eating of excessive amounts thereof, irregular nutrition all lead to many diseases and ailments.

The world must undergo transition from a state of deep unsustainability to a state Pabian calls mass sustainability. Currently, few producers and consumers genuinely respect the principles of sustainable development (Pabian et al. 2013, p. 6). Under conditions of mass sustainability, only few people will fail to respect them (Pabian, 2017, p. 15). Therefore, the subject matter of sustainability is increasingly reflected in scholarly literature, being examined by such authors as Holden, Linnerud, Banister, Schwanitz and Wierling (2018), Brinkmann (2016), Fogel (2016), Haugan (2014), Thiele (2016), Jeanrenaud, Jeanrenaud and Gosling (2017), Avianas and Nassos (2014), Bossink (2012).

Literature Review

Within the globally conducted research activity related to the food consumption one can distinguish several themes, which have been discussed below. The research that has been conducted so far has not explained whether the following generation, comprised by today's young people, has a tendency to aggravate or to eliminate ecological and social problems resulting from consumption of food products taking into consideration their preferences and behaviour in this area in the aspect of sustainability.

One of the most important issues analysed in the world literature is nutritional assessment of particular products intended for consumption. AlJahani and Cheikhousman, (2017), developed a pumpkin-based functional juice and assessed its acceptability by various consumers. Mitiku, Abera, Bussa and Abera (2018), investigated what effect produced a partial substitution of wheat flour with sweet potato flour on the nutrient composition and sensory properties of bread. Tadesse, Ibrahim, Forsido and Duguma, (2018), attempted to improve the nutritional and sensory qualities of enset-based food with pumpkin and amaranth.

Attempts have also been made to investigate the impact of various factors on food consumption. Septianto (2016) explored the effect of musical tempo on consumer choice of tea in different temperatures. Kitsawad, Joseph and Tipvarkarnkoon (2017) examined the changes in sensory qualities of jaew sauce taking heat into consideration and to determine its acceptance among Thai and foreign consumers. Ziv (2018) solved the following scientific problem: whether changing the pleasantness of background music while tasting two identical products in succession may influence the experience of taste and preference. Vignolles and Pichon (2014) analyzed the links between nostalgia and food consumption.

A vital area of research constitutes determining the dietary patterns and behaviours related to food in various countries of the world. Vanhonacker, Lengard, Hersleth and Verbeke (2010) showed a picture of the profile of European traditional food consumers in terms of their socio-demographics, attitudes, life-style orientations and behavioural characteristics. Guine, Ferrao, Ferreira, Correia,

Cardoso, Duarte, Rumbak, Shehata, Vittadini and Papageorgiou (2019) focused their attention on Mediterranean countries. They investigated factors that influence food choices and consumption patterns in five countries: Croatia, Egypt, Italy, Greece and Portugal. According to them the food choices were also determined by concerns related to the environment and sustainability. Serrano-Cruz, Espinoza-Ortega, Sepulveda, Vizcarra-Bordi and Thome-Ortiz (2018) covered in their study central Mexico. The researchers identified the factors related to the consumption of traditional foods in central Mexico. Sijtsema, Reinders, Hiller and Guardia (2012) examined the relationship between the consumption of different types of fruit and other snacks and consumer taste preferences (consumers from Poland, Greece, Spain and The Netherlands) for sweet, salty and sour.

In the context of the undertaken subject a study needs to be mentioned related to food with reference to youngsters. Adelina and Nurwanti, (2018) investigated behaviours of Indonesian students regarding food in various study locations. The study covered two cities in two different countries – Indonesia and Taiwan. Duarte, Raposo and Ferraz (2013) investigated the influence of marketing-controlled external factors that motivated impulse buying behaviour of snack foods in cafeterias among young students. Kowalska and Tarnowska (2018) evaluated the eating habits of students in the field of food products management and engineering compared to students from faculties not related to food science and also taking into consideration gender. Students were also examined by Savelli, Murmura, Liberatore, Casolani and Bravi (2017). They proved that the Italian university students attach great importance to price and sales promotion, they are also well informed in food products and pay high attention to ingredients, origin and healthiness of food products that they buy. Chan, Tse, Tam and Huang (2016) investigated the snacking behaviour and perspectives on healthy and unhealthy food choices among adolescents in Mainland China.

The object of the researchers' attention has also been food marketing and behaviours of its consumers on the market. Anić, Piri Rajh and Rajh (2014) examined the impacts of demographic variables (gender, age, income, education) and food product involvement on food-related consumer decision-making styles. Haase, Wiedmann, Bettels and Labenz (2018) determined the effectiveness of advertising content comprising text (sensory, functional and symbolic messages) and pictures (product image) on food product evaluation. Bonaiuto, Caddeo, Carrus, De Dominicis, Maroni and Bonnes (2012) investigated the impact of food reputation dimensions' effects on consumers' food choices.

As the conducted query of scientific literature demonstrates until present there have been no studies conducted regarding a wide range of young people's preferences and behaviour concerning the food consumption in the aspect of sustainability. The problem: do people aged 15-23 consuming foodstuffs contribute to or hinder sustainable development? has not been solved.

Research Method

The main goal of the research was to explain whether the following generation, comprised by today's young people, has a tendency to aggravate or to eliminate ecological and social problems resulting from consumption of food products. Therefor it was necessary to determine young people's preferences and behaviour concerning food products in the aspect of sustainability. The research problems were formulated as follows: do young people consuming foodstuffs contribute to or hinder sustainable development? In order to explain the issues above, a survey of a group of Poles aged 15-23 was conducted. They are young people of the generation which will gradually take over the initiative and replace us in different aspects of life.

Before proceeding with the survey, its project was developed. The first phase of the survey was the method of analysis and criticism of literature, which proved the purposefulness and originality of the examined research problems (bibliographic query, at-desk research). For the purposes of the survey, a research tool in the form of a questionnaire was developed, the minimum sample size was determined, and the manner of communication with the respondents was specified. Having conducted the field study, its results were listed and analysed, and conclusions were formulated.

The achievement of the determined research goal was possible thanks to a study conducted using a representational method, which had been considered the most proper form of partial research. Random selection of individuals enabled obtaining of a sample as similar to the population as possible. This procedure became a basis for estimation of population property based on sample property.

The survey questionnaire was addressed to 440 people (290 women and 150 men), secondary school students and university students. Such a number of respondents meets the assumptions of a minimum sample size. The minimum sample size was specified in order to draw conclusions about the surveyed population, characterized by specific accuracy and degree of certainty, on the basis of the conducted measurements. When determining the necessary sample size, the following steps were taken:
- estimation accuracy was determined, assuming a specific maximum error of estimate;
- a high confidence level was assumed;
- assumptions concerning the proportion of the surveyed population were made.

Assuming that the success probability order of magnitude p is unknown, the minimum number of individuals was 422 at the following assumptions: significance level $\alpha=0.04$, maximum error of estimate $d=5\%$ ($u_{\alpha}=2.053749$).

The survey was anonymous. The respondents were contacted in person (face to face). The further part of the article shows the results.

Empirical Results

Irregular nutrition has an adverse effect on health, which may lead to various diseases, thus aggravating social problems. Research has shown that the highest irregularity occurs in case of having suppers by young people (41.2%), followed by breakfasts (20.6%) and dinners (18.4%). Fortunately, these are not predominant kinds of behaviour. As shown in Figure 1, most young people prefer having dinners (80.9%), breakfasts (71.3%), suppers (52.4%) on a regular basis.

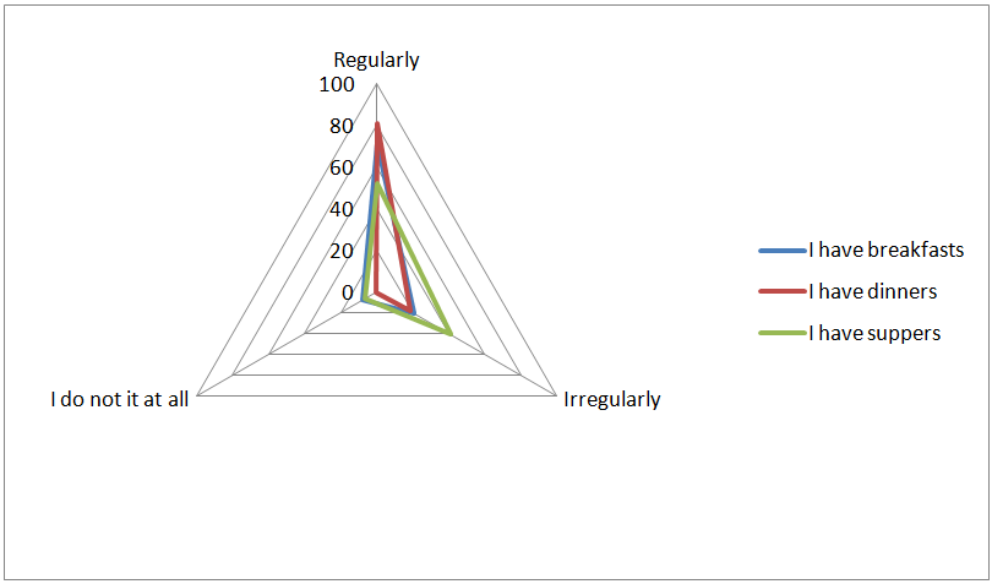

Fig. 1: Regularity of having breakfasts, dinners and suppers by the surveyed group of young people

Source: own study.

The health condition is also affected by the kind of consumed foods. This problem will be explained using the example of dishes consumed by the youth at dinner time. In Poland, dinner is the main, most copious meal, consumed between 12 p.m. and 4 p.m. The conducted study indicates the following three nutritional trends among the youth at dinner time:

a) the largest group of people (61.2%) prefers typical dishes of the Polish cuisine;
b) a group of respondents comprising 24.8% of the total consumes products which may be predominantly classified as fast food (hot dogs, hamburgers, wraps, tortillas, pizzas);
c) relatively few people (11.7%) consume vegetable and fruit salads as well as vegetable and fruit cocktails.

The remaining persons (2.3%) showed diverse preferences, beginning from classic dishes, such as pierogi dumplings, through ready-made foods including casseroles or kebab, to healthy products, e.g. legumes.

More than 20% respondents eat products of the fast food category or of a similar nature. This food is not healthy but it is tasty and filling. In many cases, it carries the so-called fifth taste, known as umami (from Japanese *umai*, "delicious"). Separate glutamic acid receptors respond to this taste. Young people eat such foods because they give more pleasure than other dishes.

Only more than 10% of the youth choose to eat vegetable-based and fruit-based products, which can be considered healthy, at dinner time. This is a minority trend. It requires a change of dietary habits.

The amount of consumed food affects the health condition. Therefore, young people were asked whether, when having breakfast/dinner/super, they usually overeat, eat their fill, do not eat their fill (feeling slight hunger after a meal), have small, rather token meals. The research has shown that 69.1% of the surveyed eat their fill, whereas 19.8% do not do this (feeling slight hunger after a meal). 8% of respondents prefer slight, token meals. Only 3.1% of the surveyed overeat. Not eating one's fill and preferring small, token-amount meals has a better effect on health. Followers of such practices comprise 27.8% of the surveyed young people, which is almost 1/3 of the surveyed population. Eating one's fill and overeating are practiced by 72.2% of respondents, or more than 2/3 of the total number.

The researchers were also interested in the preferences of young people concerning healthy food, vegetarianism and veganism. The structure of answers to questions concerning these issues is presented in Table 1. It shows that 42.3% of young people eat healthy foods often or very often. The remaining respondents (57.7%) consume healthy foods rarely, very rarely or never. Young people are virtually uninterested in veganism – only 0.5% respondents identify with it. Vegetarianism has slightly more adherents (4,3%).

Table 1: Young people's preferences concerning eating of healthy foods, vegetarianism and veganism

Do you eat so-called healthy foods (ecologic and organic products made without fertilizers, pesticides and chemical additives)?	
Very often	9.5%
Often	32.8%
Rarely	32.1%
Very rarely	17%
I do not eat such foods	8.6%
Are you a vegetarian, i.e. do you renounce eating meat, fish, seafood and other animal products?	
Yes	4.3%
No	95.7%

Are you a vegan, i.e. do you renounce eating meat, poultry, fish, milk, butter, eggs, cheese, honey and other animal products?	
Yes	0.5%
No	99.5%

Source: own study.

Food discarding means waste. Figure 2 explains whether young people discard food and what is the scale of these negative practices. Only 10.8% of the surveyed do not waste food. It is discarded rarely or very rarely by 67.8% of young people. 21.4% of the survey discard food often or very often. Therefore, there is twice as much respondents who discard food as those who do not.

Poverty is a significant social problem. By free sharing of food with the poor, one may contribute to at least partial elimination thereof. As the figure 2 shows, free donation of food for social purposes is not very widespread among young people. Only 12.4% of this age group do it often or very often. A much higher percentage of the surveyed, amounting to 29.6%, does not engage in free distribution of food. 58% of young people undertake such actions rarely or very rarely.

Segregation of food product packaging facilitates management of consumption waste and can thus contribute to environmental protection. Do young people segregate such packaging? The data in Table 2 allow us to answer this question. Two issues were considered: segregation of food product packaging at the place of residence and away from it.

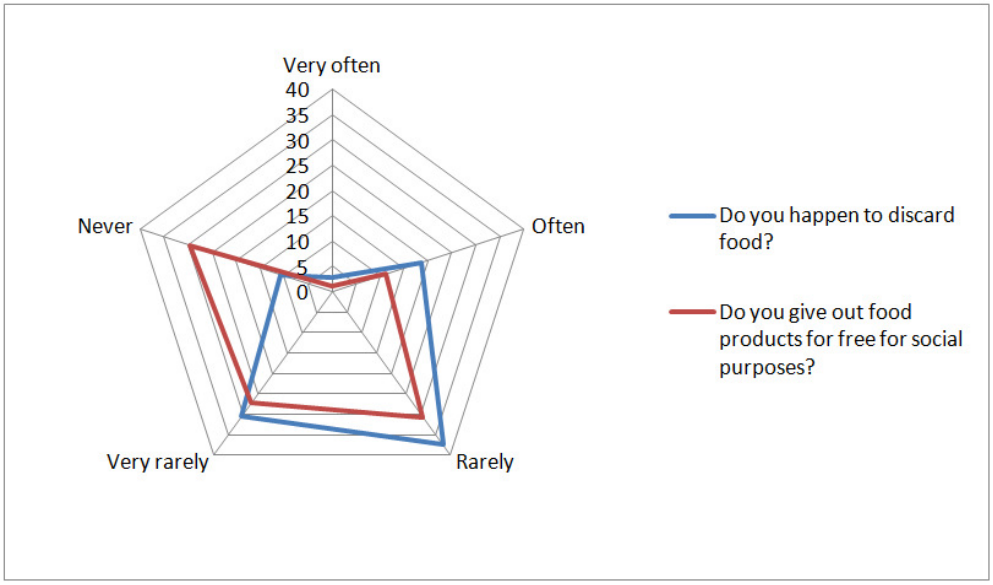

Fig. 2: Discarding of food by young people and sharing of food with the poor.

Source: own study.

Table 2: Young people's attitude to segregation of food product packaging

Do you segregate food product packaging while at home, i.e. do you throw it into specially marked containers?	
I segregate	46.2%
I sometimes segregate	30.4%
I do not segregate	23.4%
Do you segregate food product (beverages, sweets, chips, etc.) packaging while being away from home, i.e. do you throw it into specially marked containers when they are around?	
I segregate	33.3%

I sometimes segregate	39.7%
I do not segregate	27%

Source: own study.

More than 20% of young people do not segregate food product packaging (23.4% at home, 27.0% away from their place of residence). The remaining persons segregate or sometimes segregate such packaging (76.6% at home, 73.9% away from their place of residence).

Conclusions and Discussion

The amount of consumed food affects the volume of production. An increase in the volume of production adversely affects the natural environment, from acquisition of raw materials for production of foodstuffs to problems with packaging and waste. The research has shown that young people do not show a tendency for consumption of smaller amounts of food. Thus, they do not contribute to the reduction of the volume, and consequently, to environmental protection (72.2% of the surveyed eat their fill and overeat). Overeating has also a negative impact on health. Irregular nutrition affects a human similarly. In case of the young generation, the greatest irregularity applies to suppers (41.2% of the respondents have them on an irregular basis). All of this affects the aggravation of the social problem of increase of morbidity in the society.

The production of food is also affected by the structure of consumption of foodstuffs. For example, if a society is dominated by vegetarians, the demand for animal products decreases, leading to a drop in production thereof. As the research shows, consumption of food by young people at dinner time is a source of demand for three categories of foodstuffs: 1. products used in typical dishes of the Polish cuisine; 2. products used for production of fast food; 3. vegetable and fruit products.

Young people are not particularly interested in veganism or vegetarianism. However, 42.3% of them eat healthy food often or very often. Therefore, consumption practices of the youth predominantly affect the supply and demand of foodstuffs comprising the categories 1, 2, and 3 mentioned above, as well as products qualified as so-called healthy food. The structure of this food includes less products that are not subject to technical and technological processes, such as vegetables and fruit. The more technology is involved in production of foodstuffs, the greater damage is done to the environment. These processes require consumption of considerable amounts of energy and water and are often a source of different kinds of environmental pollution.

Examining the impact of food consumed by young people on their health, one can see a positive trend consisting in frequent and very frequent consumption of healthy foods by more than 40% of the surveyed. A certain part of the youth (11.7%) prefers vegetable and fruit products, which can also positively affect their health. However, the fact of consumption of products from the fast food category by almost ¼ of the surveyed population is alarming. They are usually high-calorific, and frequent consumption thereof leads to overweight. Most respondents (61.2%) consume typical dishes of the Polish cuisine. Consumption of some of them is favourable to healthy lifestyle.

The survey has shown that only 10.8% young people do not discard food. This is an alarming tendency, aggravating both ecological and social problems. By discarding food, one wastes not only raw materials needed for production and transport thereof but also water, energy and other production factors. Moreover, wasted food becomes waste contaminating the environment. The social problem results from the fact that food needed by millions starving people worldwide is being wasted.

As the research shows, young people make a slight contribution to the resolution of the aforementioned social problem connected with food waste. A very high percentage of the surveyed population (87.6%) rarely, very rarely or never distributes foodstuffs for social purposes, e.g. to the poor. This evidences low social sensitivity of this age group. Conversely, the survey confirms considerably higher ecological sensitivity of the surveyed generation. Only 23.4% people living at their homes and 27.0% of those away from their places of residence do not segregate food product packaging.

To sum up, the conducted research allows formulation of general conclusion: most young people in Poland do not contribute to the improvement of sustainability in the sector of food products. Through their preferences and behaviour, they show a tendency for aggravation of both ecological (overeating and eating one's fill require larger amounts of food, which should be produced first, than incomplete satisfaction of hunger, food waste consisting in discarding thereof, failure to segregate food product packaging) and social (overeating, irregular meals, consumption of unhealthy foods) problems. Most young people do not contribute to alleviation of the social problem of famine/malnutrition resulting from poverty (do not share food with the poor). All this poses a hazard of the following generation aggravating the state of unsustainability in the sector of food products.

The presented research results can also be used in marketing activities. This is not about aggravating negative trends, e.g. encouraging young people in advertising campaigns to eat fast food. The main challenge is to change the attitudes and behaviour of young people that relate to the purchase, consumption and handling of food products. Marketing messages targeted at young people should: 1. encourage them to change their eating habits 2. encourage them to buy organic food products 3. discourage them from wasting food 4. encourage them to share food with poor people and sorting packaging. Marketing messages may take different forms, typical of press, television, radio and online advertising, as well as outdoor and indoor. Such marketing campaigns should be implemented by the government and by organizations working for sustainable development.

Discussion on this article may relate to various problems. Here are some of them. The article presents nutritional preferences and behavior of the young Polish generation as seen through the lens of sustainability. In further research, it is worth focusing on other age groups. It is rather certain that the nutrition preferences and behavior of older people and middle-aged people will differ from the nutritional preferences and behavior of young people. Perhaps these age groups are more pro-ecological and pro-social in this sphere of consumption. This subject matter is also worth elaborating in international and global terms. The cultural and economic differences between nations have a significant impact on what, how much and when we eat. Young food consumers in different countries can contribute to aggravation or mitigation of ecological and social problems to varying degrees. Another problem concerns factors that affect young people's food preferences also in the aspect of sustainability. Probably the following factors play a big role here: financial situation, eating habits taken from the family home, education in the field of sustainability, availability of food products and others.

Sustainability is a challenge for all people and all nations of the world. All people and all nations should contribute to sustainable development because they are located on the same planet.

References

Adelina, R. and Nurwanti, E. (2018) 'Examining the differences of food-related behavior in two different countries', *Nutrition & Food Science*, 49 (4), 739-751.

AlJahani, A. and Cheikhousman, R. (2017) 'Nutritional and sensory evaluation of pumpkin-based (Cucurbita maxima) functional juice', *Nutrition & Food Science*, 47 (3), 346-356.

Anić, I.D., Piri Rajh, S. and Rajh, E.(2014) 'Antecedents of food-related consumer decision-making styles', *British Food Journal*, 116 (3), 431-450.

Avianas, N. and Nassos, G. (2014) Practical Sustainability Strategies, John Wiley & Sons Ltd.

Bonaiuto, M., Caddeo, P., Carrus, G., De Dominicis, S., Maroni, B. and Bonnes, M. (2012) 'Food reputation impacts on consumer's food choice', *Corporate Communications: An International Journal*, 17 (4), 462-482.

Bossink, B. (2012) Eco-innovation and Sustainability Management, Routledge, New York.

Brinkmann, R. (2016) Introduction to Sustainability, John Wiley & Sons Ltd., United Kingdom, Routledge Taylor & Francis Group, New York and London.

Chan, K., Tse, T., Tam, D. and Huang, A. (2016) 'Perception of healthy and unhealthy food among Chinese adolescents', *Young Consumers*, 17 (1), 32-45.

Duarte, P., Raposo, M. and Ferraz, M. (2013) 'Drivers of snack foods impulse buying behaviour among young consumers', *British Food Journal*, 115 (9), 1233-1254.

Fogel, D.S. (2016) Strategic Sustainability, Routledge Taylor & Francis Group, New York.

Guine, R., Ferrao, A. C., Ferreira, M., Correia, P., Cardoso, A. P., Duarte, J., Rumbak, I., Shehata, A.M., Vittadini, E. and Papageorgiou, M. (2019) 'The motivations that define eating patterns in some Mediterranean countries', *Nutrition & Food Science*, 49 (6), 1126-1141.

Haase, J., Wiedmann, K.P., Bettels, J. and Labenz, F. (2018) 'How to best promote my product? Comparing the effectiveness of sensory, functional and symbolic advertising content in food marketing', *British Food Journal*, 120 (8), 1792-1806.

Haugan, G. T. (2014) Sustainable Program Management, CRC Press, Taylor & Francis Group, New York.

Holden, E., Linnerud, K., Banister, D., Schwanitz, V.J. and Wierling, A. (2018) The Imperatives of Sustainable Development, Routledge Taylor & Francis Group, London and New York.

Jeanrenaud, S., Jeanrenaud, J.P. and Gosling, J. (2017) Sustainable Business. A One Planet Approach, John Wiley & Sons Ltd., United Kingdom.

K. Kitsawad, Joseph, B.A. and Tipvarkarnkoon, T. (2017) 'Effect on heat on the sensory quality of jaew sauce', *British Food Journal*, 119 (10), 2161-2171.

Kowalska, A.S. and Tarnowska, A. (2018) 'Eating habits of Polish university students depending on the direction of studies and gender', *British Food Journal*, 121 (1), 54-70.

Martin, D. and Schouten, D.J. (2014) Sustainable Marketing, Pearson, England.

Mitiku, D. H., Abera, S., Bussa, N. and Abera, T. (2018) 'Physico-chemical characteristics and sensory evaluation of wheat bread partially substituted with sweet potato (Ipomoea batatas L.) flour', *British Food Journal*, 120 (8), 1764-1775.

Pabian, A. (2017) 'Sustainable Enterprise as a Result of Organizational Changes', *Organization Review*, Warsaw, 8, 11-16.

Pabian A. et al. (2013) 'Sustainable Organizations of the Future in the European Union Structure', *International Journal of Management and Computing Sciences*, Canada, 3 (1), 1-9.

Rogall, H. (2010) Ekonomia zrównoważonego rozwoju. Teoria i praktyka [The Economy of Sustainable Development. Theory and Practice], Wydawnictwo Zysk i S-ka, Poznań.

Savelli, E., Murmura, F., Liberatore, L., Casolani, N. and Bravi, L. (2017) 'Food habits and attitudes towards food quality among students', *International Journal of Quality and Service Sciences*, 9 (3/4), 456-468.

Septianto, F. (2016) 'Chopin effect? An exploratory study on how musical tempo influence consumer choice of drink with different temperatures', *Asia Pacific Journal of Marketing and Logistics*, 28 (5), 765-779.

Serrano-Cruz, M. R., Espinoza-Ortega, A., Sepulveda, W.S., Vizcarra-Bordi, I. and Thome-Ortiz, H. (2018) 'Factors associated with the consumption of traditional foods in central Mexico', *British Food Journal*, 120 (11), 2695-2709.

Sijtsema, S.J., Reinders, M. J., Hiller, S. R.C.H. and Guardia, M. D. (2012) 'Frut and snack consumption related to sweet, sour and salty taste preferences', *British Food Journal*, 114 (7), 1032-1046.

Tadesse, A. Y., Ibrahim, A.M., Forsido, S.F. and Duguma, H.T. (2018) 'Nutritional and sensory quality of complementary foods developed from bulla, pumpkin and germinated amaranth flours', *Nutrition & Food Science*, 49 (3), 418-431.

Thiele, L.P. (2016) Sustainability, Polity Press, Cambridge.

Vanhonacker, F., Lengard, V., Hersleth, M. and Verbeke, W. (2010) 'Profiling European traditional food consumers', *British Food Journal*, 112 (8), 871-886.

Vignolles A. and Pichon P.E., (2014) 'A taste of nostalgia: Links between nostalgia and food consumption', *Qualitative Market Research: An International Journal*, 17 (3), 225-238.

Ziv, N. (2018) 'Musical flavor: the effect of background music and presentation order on taste', *European Journal of Marketing*, 52 (7/8), 1485-1504.

Taste Preferences of Young Consumers – Perspective of Sensory Marketing

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Abstract

Marketing that utilises taste sensations to affect customers is still a poorly investigated area of sensory marketing. Sensory marketing consists in appealing by manufacturers and sellers to the five human senses: sight sense, sound sense, smell sense, taste sense and touch sense. The research that has been conducted so far in the area of taste has primarily focused on: nutritional and sensory assessment of various food products, determining dietary patterns and behaviours related to food, investigating the relationships between taste and other types of sensory sensations, food marketing. The issues of taste sensations are associated exclusively with food products, beverages and catering. In the opinion of the authors of the present paper, the taste sense of customers may become engaged also to promote and sell many inedible products. It is particularly important in the marketing that utilises taste sensations to recognise taste preferences of consumer. The paper discovers taste preferences of young persons aged 15-23 with regard to five tastes: sweet, salty, bitter, sour, umami as well as spiciness of dishes and their temperature. It also finds out similarities and differences in taste preferences of young men and women. The research was conducted in Poland on a sample of 440 persons aged 15-23. The results may prove useful in the three areas of economic activity: food products manufacturing, preparing culinary offer by catering facilities, promoting inedible goods using food products.

Keywords: Sensory Marketing, Taste Preferences, Young Consumers.

Introduction

Taste marketing is presently at an initial stage of its development. It constitutes a part of sensory marketing, which engages the senses of consumers and has an impact on their behaviour (Krishna, 2010). Its objective is to affect all the five human senses: sight sense, sound sense, smell sense, taste sense and touch sense. The sensory gratification constitutes one of the most important purchasing incentives (Dahlen, Lange and Smith, 2010).

The taste has been underestimated in marketing and such a state of affairs does not contribute to an increase in brand awareness developing a sustainable brand image (Hulten, Broweus and van Gijk, 2009). The research conducted in 13 countries demonstrates that as far as 99 percent of all brand communication concentrates on two senses – sight and sound (Lindstrom, 2005). However, while appealing to other senses of consumers, including the taste sense, they can be triggered to purchase various types of goods. This does not concern food products alone (edible products), but also a wide range of goods and services that have nothing to do with satisfying hunger and the related consumption (inedible products).

The scientific background so far has concentrated on food products, beverages and catering. This primarily concerns the following: nutritional and sensory assessment of various food products, determining dietary patterns and behaviours related to food, investigating the relationships between the taste and other types of sensory sensations, food marketing.

The paper presents the results of the research whose goal was to discover poorly investigated taste preferences of young consumers aged 15-23. The research was conducted in Poland on a representative sample of 440 persons, secondary school students and university students. The following five senses were considered in the research: sweet, salty, bitter, sour, umami. Additionally, spiciness of dishes was considered (very spicy, spicy, mild, of diverse spiciness) as well as preferences related to their temperature. The objective of the research was also to discover the differences and similarities in taste preferences of young men and women.

The results of the research broaden the knowledge on preferences and behaviours of young consumers on the market. They may prove useful in the following areas of economic activity: food products manufacturing, preparing culinary offer by catering facilities, promoting inedible goods using food products.

Literature Review

Tastes are primarily experienced through the taste buds on the tongue, although the taste buds are also present in the palate and throat. Adults possess 10.000 taste buds through which information is registered and sent to the nerve cells that subsequently transmit signals to the brain. The taste is called the intimate sense as it is impossible to taste something from a distance (Hulten, Broweus and van Gijk, 2009). Within the globally conducted research activity related to the taste one can distinguish several themes, which have been discussed below. The research that has been conducted so far has not explained what taste preferences are characteristic of young consumers aged 15-23.

One of the most important issues analysed in the world literature is nutritional and sensory assessment of particular products intended for consumption. AlJahani and Cheikhousman (2017), developed a pumpkin-based functional juice and assessed its acceptability by various consumers. Mitiku, Abera, Bussa and Abera (2018), investigated what effect produced a partial substitution of wheat flour with sweet potato flour on the nutrient composition and sensory properties of bread. Tadesse, Ibrahim, Forsido and Duguma (2018) attempted to improve the nutritional and sensory qualities of enset-based food with pumpkin and amaranth. Schouteten, De Pelsmaeker, Juvinal, Lagast, Dewettinck and Gellynck (2018) investigated the impact of sensory attributes of milk chocolate on consumers' emotions as well as their hedonic ratings with the use of three commercial brands of milk chocolate.

A vital area of research constitutes determining the dietary patterns and behaviours related to food in various countries of the world. Guine, Ferrao, Ferreira, Correia, Cardoso, Duarte, Rumbak, Shehata, Vittadini and Papageorgiou (2019) focused their attention on Mediterranean countries. They investigated factors that influence food choices and consumption patterns in five countries: Croatia, Egypt, Italy, Greece and Portugal. They considered in their study health-related factors, economic and availability aspects, emotional determinants, impact of social, cultural and religious factors, marketing and advertising campaigns and environmental concerns. Serrano-Cruz, Espinoza-Ortega, Sepulveda, Vizcarra-Bordi and Thome-Ortiz (2018) covered in their study central Mexico. The researchers identified the factors related to the consumption of traditional foods (TFs) in central Mexico. Adelina and Nurwanti (2018) investigated behaviours of Indonesian students regarding food in various study locations. The study covered two cities in two different countries – Indonesia and Taiwan. The centre of attention for Tiu Wright, Nancarrow and Brace (2000) were the UK and France. They analysed the proposition by Bourdieu that our tastes in food actually betray our social origin and took advantage of interesting distinctions in the literature between the UK and France.

Attempts have also been made to investigate the relationships between the taste and other sensory sensations. Ezan, Pantin-Sohier and Lancelot-Miltgen (2019) examined the influence of the three-dimensional character of colour (i.e. brightness, saturation, vividness) on children's behaviour towards a food product and as a source of well-being. Tu, Ma, Wu and Yang (2018) were interested in the impact of a passive body touch experience on the perceived spiciness intensity.

The object of the researchers' attention has also been food marketing and behaviours of its consumers on the market. Haase, Wiedmann, Bettels and Labenz (2018) investigated the effectiveness of advertising content comprising text (sensory, functional and symbolic messages) and pictures (product image) on food product evaluation. Vanhonacker, Lengard, Hersleth and Verbeke (2010) presented a picture of the profile of European traditional food consumers (TFC) regarding their socio-demographics, attitudes, life-style orientations and behavioural characteristics. Anić, Piri Rajh and Rajh (2014) examined the influence of demographic variables (i.e. gender, age, income, education) and food product involvement (FPI) on food-related consumer decision-making styles (CDMS). Bonaiuto, Caddeo, Carrus, De Dominicis, Maroni and Bonnes (2012) investigated the impact of food reputation dimensions' effects on consumers' food choices.

Other issues related to the taste and food undertaken by researchers include, among others, the following: investigating the relationships between the consumption of different types of fruit and other snacks and taste preferences of consumers from various countries (Sijtsema, Reinders, Hiller and Guardia, 2012), the analysis of the links between nostalgia and food consumption (Vignolles and Pichon, 2014), determining a typology of experience providers that concerned eating-out (Carvalho de Rezende and Alberto Rodrigues Silva, 2014), understanding the role of emotions as well as sensual delight in dining experience (Arora, 2012).

In the context of the undertaken subject a study needs to be mentioned related to taste and food with reference to youngsters. Duarte, Raposo and Ferraz (2013) investigated the influence of marketing-controlled external factors that motivated impulse buying behaviour of snack foods in cafeterias among young students. Kowalska and Tarnowska (2018) evaluated the eating habits of students in the field of food products management and engineering compared to students from faculties not related to food science and also taking into consideration gender. Students were also examined by Savelli, Murmura, Liberatore, Casolani and Bravi (2017). They proved that the Italian university students attach great importance to price and sales promotion, they are also well informed in food products and pay high attention to ingredients, origin and healthiness of food products that they buy. Chan, Tse, Tam and Huang (2016) investigated the snacking behaviour and perspectives on healthy and unhealthy food choices among adolescents in Mainland China.

As the conducted query of scientific literature demonstrates until present there have been no studies conducted regarding a wide range of taste preferences of consumers aged 15-23, which refer to the five types of taste (sweet, salty, bitter, sour, umami), dish spiciness and preferences related to their temperature. Considering in the research widely understood taste preferences referred to above and applying them to a particular age group of consumers are certainly in line with the marketing nature, contrary to many other studies, which have not been conducted for the purposes of this area of knowledge.

Research Method

The underlying objective of the research conducted by the authors of the present paper was to discover taste preferences of young consumers aged 15-23. The following five tastes were considered in the research: sweet, salty, bitter, sour, umami. Additionally, spiciness of dishes was also considered (very spicy, spicy, mild, of diverse spiciness) as well as preferences regarding their temperature. It was vital to determine taste preferences with regard to gender-mixed groups of customers as well as individually for men and women. Determination of preferences, according to such a breakdown, will allow for a better adjustment of assortment, taste and temperature of beverages and dishes for those producers whose customers are both men and women as well as for the companies that provide services for one gender only. The objective of the research was also to discover the differences and similarities in taste preferences of young men and women.

For the purpose of the research its authors developed a research tool in the form of a survey questionnaire, determined the minimum size of the sample and defined the manner of communication with the respondents. Having conducted the field study, the authors summarised its results, analysed them and formulated conclusions.

The adopted research objective was achieved by means of the study conducted with the use of the representative method. The survey process comprised 440 persons aged 15-23. secondary school students and university students. The indicated number of respondents meets the assumptions of a minimum sample size. The minimum sample size was determined in order to formulate conclusions regarding the investigated population, characterised by specific accuracy and degree of certainty, based on the conducted measurements.

While determining the minimum sample size the following steps were taken:
- estimation accuracy was established, assuming a defined maximum estimation error,
- high trust level was assumed,
- assumptions regarding the proportion of the investigated population were adopted.

Given that the order of magnitude of p success probability is unknown the minimum number of units amounted to 385 at the following assumptions: statistical significance $\alpha=0,05$, maximum estimate error $d=5\%$ ($u_{\alpha}=1,959964$).

Empirical Results

The authors begin the presentation of the research results with demonstrating the taste preferences of young men and women without a breakdown with regard to gender. This breakdown will be applied in the second part of the present subchapter. The authors adopt such a convention as purchasers of products, including grocery ones, as well as customers of catering facilities are differentiated with regard to gender. Thus, in a majority of cases sellers should satisfy the taste preferences of mixed-gender customers taking into consideration their preferences.

Figures 1 and 2 have been prepared based on the data included in Table 1. In Figure 1 the authors present the distribution of the taste preferences regarding consumers aged 15-23 (men and women). As shown in Table 1 and Figure 1, each type of taste has a smaller or greater number of its proponents. Therefore, the distribution of preferences is not homogenous among young persons. However, in each case it is possible to indicate taste options represented by the largest group of the respondents. These options have been presented in Figure 2. As demonstrated in Table 1 and Figure 2, most young people like the taste of salt (66.0%), like sweet beverages/dishes (65.1%), like sour beverages/dishes (50.9%), really like sweets (50.7%), like bitter beverages/dishes (42.6%), infrequently consume products that contain natural glutamic acid (umami flavour) (40.7%). It has been surprising to discover that such a great number of young consumers like the taste of salt as well as sour and bitter beverages/dishes, which are rather associated with sensory discomfort.

Two additional issues have been reflected in Figure 2, namely: dish spiciness and temperature of dishes and beverages that are served hot. As the research shows, most of young consumers differentiate spiciness of dishes (46.3%). There are fewer proponents of very spicy dishes (8.2%), spicy ones (18.3%) and mild ones (27.2%). As far as the temperature of beverages and meals served hot is concerned, the distribution of responses was as follows: it is best when beverages/dishes are: hot (67.0%), lukewarm (22.7%), very hot (6.7%), cool (0.9%), cold (0.7%), I am unconcerned of the temperature of beverages/dishes (2.0%). The discovery pertaining to the temperature of beverages/dishes served hot provides important practical implications. It is not an uncommon mistake committed by restaurants, cafes and other catering facilities, which serve their customers beverages and dishes that are supposed to be, but fail to be hot, which leads to customer dissatisfaction.

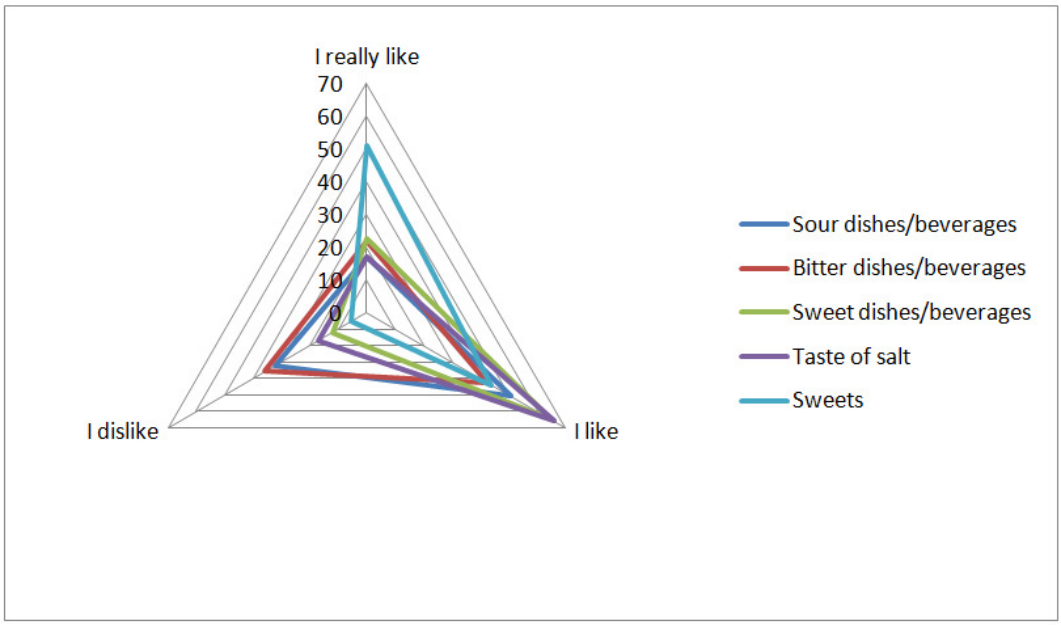

Fig. 1: Taste preferences of consumers aged 15-23 (men and women)
Source: own research.

Table 1: Taste preferences of consumers aged 15-23 (men and women) (%)

Type of taste	I really like	I like	I dislike
Sour beverages/dishes (e.g. sauerkraut juice, pickled sour cucumber soup, kefir)	17.0%	50.9%	32.1%
Bitter beverages/dishes (e.g. tea without sugar, tonic water, grapefruit juice)	21.6%	42.6%	35.8%
Sweet beverages/dishes	22.7%	65.1%	12.2%
Taste of salt (adding salt to dishes, eating products with a lot of salt, e.g. salty sticks, salty peanuts)	17.0%	66.0%	17.0%
Sweets (cookies, candies, chocolates, etc.)	50.7%	43.9%	5.4%

Source: own research.

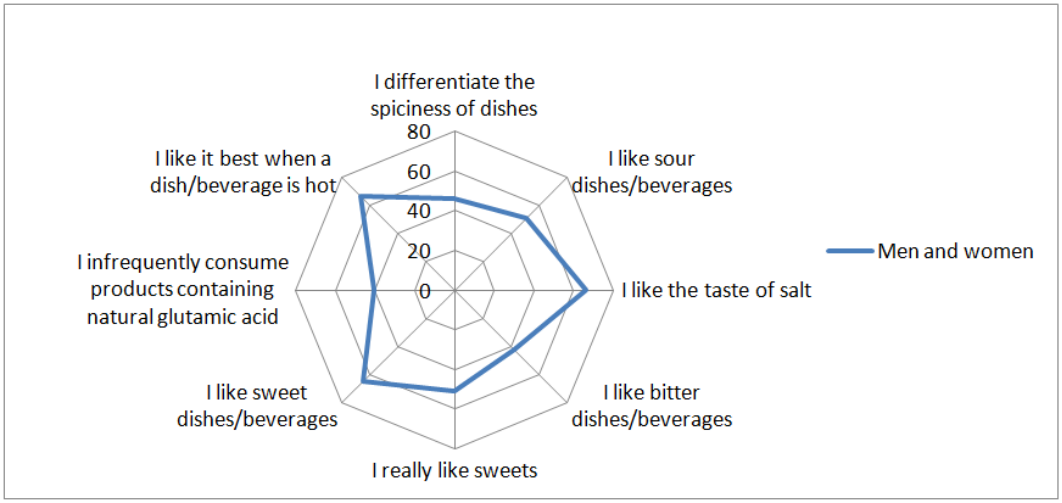

Fig. 2: Taste options and temperature of beverages and dishes preferred by the largest number of consumers aged 15-21 (men and women)

Source: own research.

When analysing the differences in the taste preferences of men and women, it is worth drawing attention to a few important issues. The study shows that in some taste options there is a clear percentage predominance of women over men or men over women. This problem has been explained in Figure 3 and Table 2. There are 17.5% more women who really like sweets than men, while the percentage predominance of women who prefer mild dishes most amounts 14.7%. In the remaining cases, presented in Figure 1, there is a percentage predominance of men over women. As can be observed in Table 2 (third column), it ranges from 8.5% to 11.8%. Hence, there are significantly more men than women who: like spicy dishes most, dislike sour dishes and beverages, like sweets, infrequently consume products containing natural glutamic acid (umami flavour).

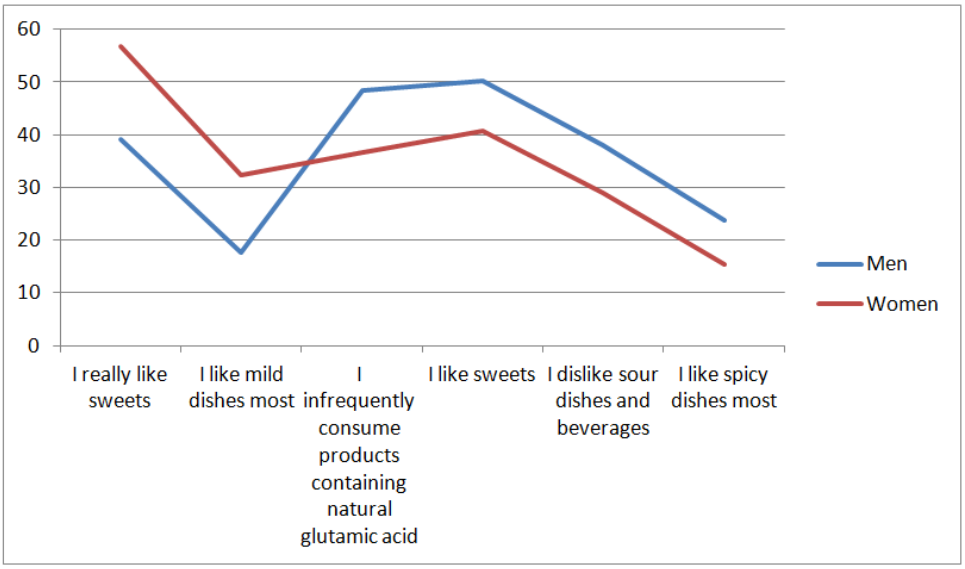

Fig. 3: The largest differences in the number of men and women (consumers aged 15-23) who prefer a given taste option

Source: own research.

Table 2: The largest differences in the number of men and women (consumers aged 15-23) who prefer a given taste option (%)

Preferences	Percentage predominance of women over men	Percentage predominance of men over women
I really like sweets	17.5%	-
I like mild dishes most	14.7%	-
I infrequently consume products containing natural glutamic acid (umami flavour)	-	11.8%
I like sweets	-	9.7%
I dislike sour dishes and beverages	-	8.9%
I like spicy dishes the most	-	8.5%

Source: own research.

Figure 4 and Table 3 demonstrate, on the other hand, the smallest differences in the number of men and women who prefer a given taste option. They range from 0% to 0.4%. The same or very similar number of men and women: differentiates the spiciness of dishes, really likes the taste of salt, very infrequently consumes products containing natural glutamic acid (umami flavour), dislikes sweet dishes/beverages, dislikes bitter dishes/beverages.

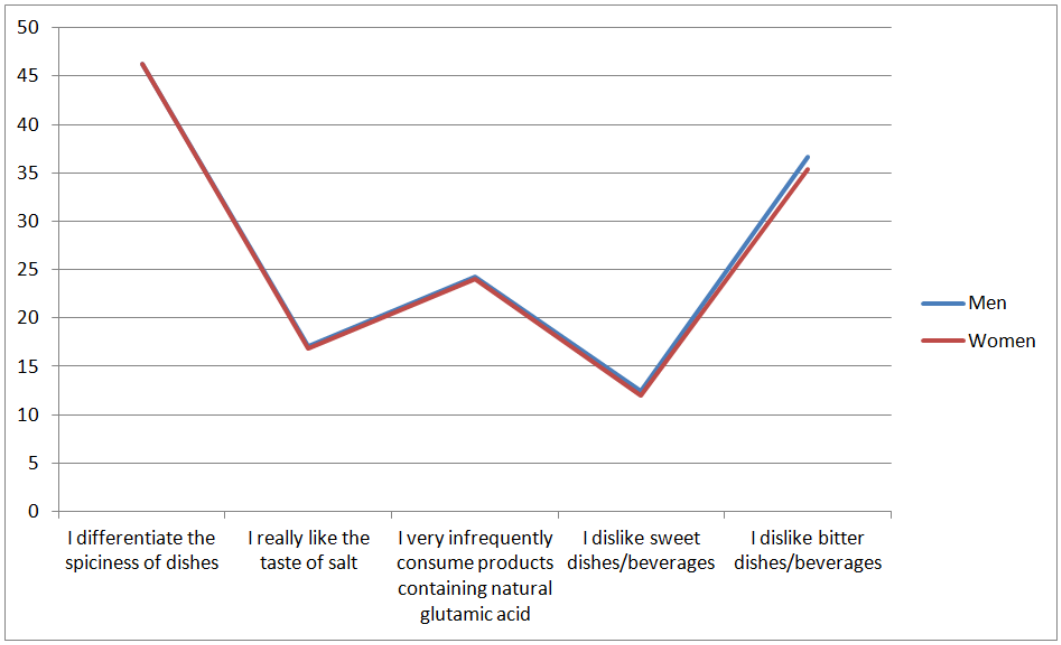

Fig. 4: The smallest differences in the number of men and women (consumers aged 15-23) who prefer a given taste option

Source: own research.

Table 3: The smallest differences in the number of men and women (consumers aged 15-23) who prefer a given taste option (%)

Preferences	Percentage predominance of women over men	Percentage predominance of men over women
I differentiate the spiciness of dishes	0%	0%
I really like the taste of salt		0.2%
I very infrequently consume products containing natural glutamic acid (umami flavour)		0.2%
I dislike sweet dishes/beverages		0.4%
I dislike bitter dishes/beverages		1.2%

Source: own research.

Conclusions

The research conducted by the authors of the present article has revealed taste preferences of young consumers aged 15-23. The research focused on preferences concerning five types of taste (sweet, salty, bitter, sour, umami), spiciness of dishes (very spicy, spicy, mild, of differentiated spiciness), and their temperature. As the research has proved, these preferences are not completely homogeneous. However, in each case more than half or nearly half of young consumers prefer the same type of taste, the same approach to the problem of spiciness of dishes and their temperature. Most young people: like the taste of salt (66.0%), like sweet beverages/dishes (65.1%), like sour beverages/dishes (50.9%), really like sweets (50.7%), like bitter beverages/dishes (42.6%), infrequently consume products with natural glutamic acid (umami flavour) (40.7%), differentiate the spiciness of dishes (46.3%). Furthermore, young consumers believe that hot beverages and dishes (e.g. tea, coffee, soups) should be genuinely hot, not lukewarm, cool or cold (67.0%). According to these figures, a significant percentage of young consumers prefer the taste of salt as well as sour and bitter beverages/dishes, and hence flavours that are more associated with discomfort rather than sensory comfort. This constitutes valuable information for producers and sellers of food products destined for young people, as well as for owners of catering facilities. They should include in their offers products and dishes with this kind of flavours. The research has also revealed the attitude of young consumers to the temperature of beverages and dishes which on principle are supposed to be served hot (e.g. tea, coffee, soups). They believe that such beverages and dishes served to customers in restaurants, cafes, bars and other catering facilities should be genuinely hot. The owners of catering outlets should take the result of this study into account since, in the opinion of the authors of the present article, beverages/dishes often served to the guests are not hot but lukewarm or cold. This causes customer dissatisfaction and discourages them from choosing such catering offers again.

While analysing taste preferences of young men and women separately, one may notice that in most cases they are very similar or even identical. The same percentage of men and women differentiates the spiciness of dishes. With regard to the following options: I really like the taste of salt, I very infrequently consume products containing natural glutamic acid (umami flavour), I dislike sweet dishes/beverages, I dislike bitter dishes/beverages the percentage difference between men and women does not exceed 1.2%. Only in six cases there is a distinctive percentage difference between the two genders ranging from 8.5% to 17.5%. Two of them show that significantly more women than men really like sweets and like mild dishes most. In four cases, considerably more men than women like sweets, dislike sour dishes and beverages, like spicy dishes the most and infrequently consume products containing natural glutamic acid (umami flavour).

The results of the conducted research expand the knowledge about the preferences and behaviours of young consumers on the market. They may prove useful in the following three areas of business activity: 1) food products manufacturing 2) creating culinary offers by catering facilities such as

restaurants, cafes, bars, canteens 3) promoting inedible goods using food products. The third point requires clarification. In many industries (household appliances, home electronics, vehicles, furniture, computer equipment, clothing, footwear and others) it is still generally believed that taste is relevant only in catering industry and in the production and sale of food products and beverages. This misconception means that the use of taste as a sensory stimulus in the process of selling inedible products and services is occasional or completely rejected by a great number of companies. Meanwhile in the inedible product sectors, there are many possibilities to influence the sense of taste of customers. They include the following activities:

a) adding a flavoured product free of charge to the purchased good,
b) treating customers with flavoured products while shopping,
c) shipment of flavoured products to customers along with commercial offers,
d) dissemination of flavoured advertising gadgets among customers.

If the customers are young people, it is worth considering the results of this research and choosing such food products for promotional purposes that will meet their taste preferences.

Discussion

Young consumers constitute an important and large market segment. They purchase food products, attend various types of catering facilities. They also take advantage of promotional offers regarding food products. Promotions that engage customers' sense of taste are often organised in the catering industry and in the sale of food products. These include: tasting, sweets as company gadgets, free groceries attached to a purchased food product, increased quantities of the food item at a current price, and others (Pabian, 2008).

However, promotions involving the sense of taste are not widespread in inedible product sectors. In this area of marketing activity there is a significant and poorly exploited potential which requires broader research and analysis.

Wherever the sense of taste of a young consumer is influenced, it is essential to know his/her taste preferences. It is beyond doubt that the higher a degree of satisfying taste preferences, the higher the probability that a consumer will purchase a food product or use a catering offer. This relationship applies to the food and catering industry. However, it is not clear whether and to what extent utilisation of food products with a specific taste is effective (prompts consumers to purchase) in the promotion of inedible products (household appliances, electronics, cars, furniture, computer equipment, clothing, footwear and others). It can be assumed that using food products that meet consumer taste preferences in the promotion of inedible products may be an additional incentive to make a purchase. This issue may be worth explaining by conducting research not only on the younger generation of consumers.

In the conducted research, its authors have focused on a group of young consumers aged 15-23, since the ability to distinguish flavours decreases as we age (Hulten, Broweus and van Gijk, 2009). Therefore, in the future, all age groups of consumers, from the youngest to the oldest, should be included in the research concerning taste preferences. This will enable a more accurate selection of a range of flavours, both in case of promoted food products and catering offers, as well as food products that are used in a promotion of inedible goods, to a given age group.

The authors suggest that studies regarding taste preferences in particular age groups should be conducted both with reference to the whole group of respondents, composed of women and men, as well as from the perspective of each of the genders. Such an orientation of research makes it more useful in practice. Purchasers of food and catering products are usually mixed in terms of gender, which means that both men and women purchase the same food products, attend catering facilities, and are recipients of promotional campaigns for inedible goods that should be supported by food products. From the practical point of view, the study of taste preferences only from the perspective

of one of the genders (men or women) makes sense when either only women or only men are customers of a producer/seller of a given good or one of the genders dominates among customers.

Knowledge regarding taste preferences of consumers is the basis for creating appropriate offers in the catering industry as well as manufacturing and sale of food products. Knowledge of taste preferences can also prove very beneficial in promotion campaigns for inedible products in which foodstuffs are used.

References

Adelina, R. and Nurwanti, E. (2018) 'Examining the differences of food-related behavior in two different countries', *Nutrition & Food Science*, 49 (4), 739-751.

AlJahani, A. and Cheikhousman, R. (2017) 'Nutritional and sensory evaluation of pumpkin-based (Cucurbita maxima) functional juice', *Nutrition & Food Science*, 47 (3), 346-356.

Arora, R. (2012) 'A mixed method approach to understanding the role of emotions and sensual delight in dining experience', *Journal of Consumer Marketing*, 29 (5), 333-343.

Bonaiuto, M., Caddeo, P., Carrus, G., De Dominicis, S., Maroni, B. and Bonnes, M. (2012) 'Food reputation impacts on consumer's food choice', *Corporate Communications: An International Journal*, 17 (4), 462-482.

Chan, K., Tse, T., Tam, D. and Huang, A. (2016) 'Perception of healthy and unhealthy food among Chinese adolescents', *Young Consumers*, 17 (1), 32-45.

Dahlen, M., Lange, F. and Smith, T. (2010) Marketing Communications. A Brand Narrative Approach, John Wiley & Sons Ltd, United Kingdom.

Anić, I.D., Piri Rajh, S. and Rajh, E.(2014) 'Antecedents of food-related consumer decision-making styles', *British Food Journal*, 116 (3), 431-450.

Ezan, P., Pantin-Sohier, G. and Lancelot-Miltgen, C. (2019) 'Colour of food as a vector for children's well-being', *International Journal of Retail & Distribution Management*, 47 (6), 659-679.

Guine, R., Ferrao, A. C., Ferreira, M., Correia, P., Cardoso, A. P., Duarte, J., Rumbak, I., Shehata, A.M., Vittadini, E. and Papageorgiou, M. (2019) 'The motivations that define eating patterns in some Mediterranean countries', *Nutrition & Food Science*, 49 (6), 1126-1141.

Haase, J., Wiedmann, K.P., Bettels, J. and Labenz, F. (2018) 'How to best promote my product? Comparing the effectiveness of sensory, functional and symbolic advertising content in food marketing', *British Food Journal*, 120 (8), 1792-1806.

Hulten, B., Broweus, N., van Gijk, M. (2009) Sensory Marketing, Palgrave Macmillan, New York.

Kowalska, A.S. and Tarnowska, A. (2018) 'Eating habits of Polish university students depending on the direction of studies and gender', *British Food Journal*, 121 (1), 54-70.

Lindstrom, M. (2005) 'Broad sensory branding', *Journal of Product & Brand Management*, 14 (2), 84-87.

Mitiku, D. H., Abera, S., Bussa, N. and Abera, T. (2018) 'Physico-chemical characteristics and sensory evaluation of wheat bread partially substituted with sweet potato (Ipomoea batatas L.) flour', *British Food Journal*, 120 (8), 1764-1775.

Pabian, A. (2008) Promocja. Nowoczesne środki i formy, Difin, Warszawa.

Duarte, P., Raposo, M. and Ferraz, M. (2013) 'Drivers of snack foods impulse buying behaviour among young consumers', *British Food Journal*, 115 (9), 1233-1254.

Krishna, A. (ed) (2010) Sensory Marketing, Routledge, New York 2010.

Carvalho de Rezende, D. and Alberto Rodrigues Silva, M.(2014) 'Eating-out and experiential consumption: a typology of experience providers', *British Food Journal*, 116 (1), 91-103.

Savelli, E., Murmura, F., Liberatore, L., Casolani, N. and Bravi, L. (2017) 'Food habits and attitudes towards food quality among students', *International Journal of Quality and Service Sciences*, 9 (3/4), 456-468.

Serrano-Cruz, M. R., Espinoza-Ortega, A., Sepulveda, W.S., Vizcarra-Bordi, I. and Thome-Ortiz, H. (2018) 'Factors associated with the consumption of traditional foods in central Mexico', *British Food Journal*, 120 (11), 2695-2709.

Sijtsema, S.J., Reinders, M. J., Hiller, S. R.C.H. and Guardia, M. D. (2012) 'Frut and snack consumption related to sweet, sour and salty taste preferences', *British Food Journal*, 114 (7), 1032-1046.

Schouteten, J.J., De Pelsmaeker, S., Juvinal, J., Lagast, S., Dewettinck, K. and X. Gellynck, (2018) 'Influence of sensory attributes on consumers' emotions and hedonic liking of chocolate', *British Food Journal*, 120 (7), 1489-1503.

Tu, Y., Ma, C., Wu, Y. and Yang, Z. (2018) 'Passive body touch and perceived intensity of spice: softer means spicier', *British Food Journal*, 120 (4), 864-875.

Tiu Wright, L., Nancarrow, C. and Brace, I. (2000) 'Researching taste: layers of analysis', *British Food Journal*, 102 (5/6), 429-440.

Tadesse, A. Y., Ibrahim, A.M., Forsido, S.F. and Duguma, H.T. (2018) 'Nutritional and sensory quality of complementary foods developed from bulla, pumpkin and germinated amaranth flours', *Nutrition & Food Science*, 49 (3), 418-431.

Vanhonacker, F., Lengard, V., Hersleth, M. and Verbeke, W. (2010) 'Profiling European traditional food consumers', *British Food Journal*, 112 (8), 871-886.

Vignolles, A. and Pichon, P.E., (2014) 'A taste of nostalgia: Links between nostalgia and food consumption', *Qualitative Market Research: An International Journal*, 17 (3), 225-238.

Technological, Behavioral, and Organizational-Procedural Aspects of Management of Safety Information in Companies

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Abstract

An analysis of contemporary publications on information security demonstrates a clear increase in awareness among information protection professionals that traditional technical aspects of security must coexist with behavioral aspects describing human behavior in the process of information processing and organizational-procedural aspects that determine the ways in which modern security systems are created. What can also be seen is a clear increase in interest in information security factors that involve human behavior. However, do managers of business entities responsible for the security of intangible resources share this approach of information protection specialists and are they aware of the importance of the human factor? The aim of this article is to present a contemporary, multi-faceted approach to information resource security that is shaped directly by the methods of attacks on digital information resources. The article describes the most important types of safeguards in business entities, makes an attempt to synthetically describe individual areas of information security and to answer the question of what actions should be taken to minimize the negative impact of the so-called "human factor." Some of the issues analyzed in the article have been supplemented by the results of research conducted by the largest intelligence companies in the world. The empirical part of the article presents original research conducted in medium and large business organizations in order to show the current status of the security systems in selected areas of business operations.

Keywords: Information Security, Technology, Human Factor, Information Management

Introduction

Nowadays, in the digital age, information is treated by business entities as a key resource of a business that determines its competitiveness on the economic market and constitutes the basis for determination of operations. The development of the Internet, cellular and satellite networks, storage methods, and computer technologies, including mobile technologies that enable communication at any time and location, have resulted in the possibility to transmit information in the digital format over any geographical distances in a few seconds and have made it accessible from virtually any place regardless of its physical allocation. Modern technical capabilities of mobile and personal devices enable practically unlimited processing of information and storing it in quantities of up to tens of terabytes. The digital transformation is changing the current shape of business and affecting companies in every industry and consumers around the world. Nowadays, information (its generation and processing) is associated with everything we do, both at work and privately. Nowadays we are experiencing a digital revolution, also called the fourth industrial revolution, and we live in an information society. According to an IDC report (Reinsel et al., 2018, p. 3), 33 zettabytes of data were stored worldwide in 2018 and this number is expected to increase to 175 zettabytes by 2025. This is both private and business sector data and information and is mostly connected to the global network. Every Internet user can potentially gain access to all data and information resources connected to this network. Access to the digital resources of any business organization or any other network user, therefore, depends on two factors: the knowledge and skills of the person who wants to access it and the state of the safeguards developed and implemented by the organization. Thus, physical security of buildings and premises is no longer relevant (from the point of view of information resources). Nowadays, it is possible to gain access to an organization's information from practically any place on Earth. These opportunities foster the development of such areas as remote

working, virtual teams, and creation of branches of companies worldwide using shared database resources (Big Data). They also encourage the development of so-called cyber crimes.

Nowadays, in business entities where information resources are managed, Information Security Management Systems (ISMS, a set of rules describing the procedures for such systems is currently included in the ISO/IEC 27000 series of standards) are implemented, which covers people, processes, and information systems. On the basis of theoretical and practical deliberations concerning information security, three aspects of information protection are distinguished:

the technical aspect;
the behavioral aspect; and
the organizational-procedural aspect.

The aim of this article is to present a contemporary, multi-faceted approach to information resource security that is shaped directly by the methods of attacks on digital information resources. The empirical part of the article presents original research conducted in medium and large business organizations in order to show the current status of the security systems in selected areas of business operations.

Theoretical, Technological Aspects of Information Resource Security

The most popular information security solutions, also in business entities, are all kinds of solutions based on configuration of hardware and software. They can be divided into two categories:

Appropriate configuration of existing hardware and software solutions used for information processing;
Installation and configuration of additional information security solutions.
The first category refers to such configuration of computer hardware and application software used by an entity that minimizes the risk of loss of basic security functions: authenticity, non-repudiation, confidentiality, integrity, availability, accountability, and anonymity. This is done through:

Establishing a specific system of access rights;
Setting up access passwords, PIN numbers, etc.;
Encrypting transmitted information;
Ensuring appropriate configuration of network devices (e.g. blocking ports, establishing NAT network address translation, establishing network domains, and assigning IP addresses to MAC addresses);

Saving backup copies and saving simultaneously to at least 2 memory areas (e.g. RAID 1);
Ensuring updates of the software being used in the company.

The second category of safeguards concerns implementation of third-party solutions cooperating with the solutions already existing in the company and minimizing the risk of information threats. Solutions of this type include:

Local network security, e.g. Unified Threat Management (UTM) devices integrating such solutions as firewalls, Intrusion Prevention Systems (IPS), Virtual Private Networks (VPN) servers, spam protection, URL filters, and antivirus protection;

Security of desktop computers and servers, including installation of security software, encryption of storage of portable devices using external software, and implementation of additional identification devices, e.g. for biometric identification.

Technical and software safeguards are the basis for all safeguards in business entities. They are the starting point for developing further aspects of information protection. Development of these safeguards is correlated with the development of illegal methods and ways of obtaining information. It can be said that the development of newer and newer methods used by cyber criminals stimulates

the development of security technologies and, vice versa, new protection technologies "inspire" cyber criminals to develop new methods of attack. New methods should be defined as new concepts of attack that use mechanisms that have not been used so far or that improve the mechanisms and concepts that have been used for a certain period of time. As D. Reinsel, J. Gantz, and J. Rydning (2018, p. 2) put it, "*The data-driven world will be always on, always tracking, always monitoring, always listening and always watching – because it will be always learning."*

Theoretical, behavioral aspects of Information Security

Increasingly sophisticated technical and software security solutions force cyber criminals to seek methods that will allow them to acquire information without having to overcome the complex safeguards they encounter. In this way, many techniques have been created that belong to the so-called social engineering category, which make it possible to achieve the goal by way of appropriate manipulation of other people (Breda et al., 2017, p. 4204). The attacking party tries to manipulate an employee's actions in such a way that the employee, unaware of the threat, discloses passwords and ways in which information is secured in the company, or runs a specially developed spying program or a virus. There are many methods of manipulation and social-engineering activities and their number keeps increasing. One of the most famous hackers in the world who use social engineering and socio-technical activities is Kevin David Mitnick, who never broke the technical safeguards and used the so-called "human factor": "*I broke people, not passwords.*"

As a result, business organizations need to minimize the risk in the area of the so-called behavioral aspect of information security, often referred to in many publications as the "human factor." The "human factor" in the area of information security most often refers to all the errors made by an employee who processes information that can be taken advantage of by third parties to illegally obtain information (Kobis, 2019, pp. 37, 38). For example, Y. Wang (2008, p. 75) generally defines this concept as: "*Human factors are the roles and effects of humans in a system that introduce additional strengths, weaknesses, and uncertainty."* He also defines the taxonomy of human factors, in which he specifies the factors that are part of the three categories listed in the definition (Wang, 2008, p. 75).

As a human factor aspect, social engineering techniques are directly related to research topics concerning human interaction with new technologies. In the area of information protection related to human behavior towards digital processing of intangible resources, new terms are currently in use that describe specific mechanisms, such as cyber psychology and cyber hygiene.

Cyber psychology is a sub-discipline of psychology that describes the mechanisms governing the human mind and behavior in the context of new technologies. Modern research focuses on man-machine interaction, the psychological consequences of use of cyberspace, virtual and augmented reality, artificial intelligence, and other digital innovations that are gradually reaching a growing number of users. On the one hand, the research enables understanding of human behavior in relation to technology and, on the other hand, it examines the impact of technology on the social behavior of individuals, groups, and organizations (Clock, 2019). According to G. Kirwan (2016, p. 3), "Cyberpsychology is the branch of psychology that examines how we interact with others using technology, how our behavior is influenced by technology, how technology can be developed to best suit our needs, and how our psychological states can be affected by technologies." The very notion of cyber psychology is, therefore, very broad and extends far beyond the subject matter of this article. However, it also includes issues related to digital information security: direct dependence of the risk to which information is exposed on human behavior in the virtual environment (Hadlington & Parsons, 2017; Janicke et al., 2018; Nemati, 2008; Parsons et al., 2017).

Cyber hygiene, on the other hand, is a term directly related to the concept of hygiene in the broadest sense. Just as personal hygiene practices are used to maintain good health and well-being, cyber-hygiene practices ensure security and protection of data (Brook, 2018). Similarly, the European

Union Network and Information Security Agency (ENISA) has adopted the following definition of cyber hygiene: "*cyber hygiene should be viewed in the same manner as personal hygiene and, once properly integrated into an organization will be simple daily routines, good behaviors and occasional checkups to make sure the organizations online health is in optimum condition"* (ENISA, 2016, p. 6). In the area of cyber hygiene, some basic activities are listed: regular updates of the operating system and software, taking care of software security features, ensuring regular changes of access passwords and their appropriate level of complexity, and taking care of the privacy of access to one's own workstation. Some authors also mention effective patch management, awareness of the prohibition to use certain types of software, computer backups, avoidance of cyber-bullying, and detection of false messages (Vishwanath et al., 2020, p. 2).

Behavioral aspects of information security are currently a major challenge for business entities. Social engineering and socio-technical activities are the biggest challenge in ensuring the expected level of security in economic organizations. According to a KPMG report, as much as 63% of the surveyed companies in Poland believe that the human factor constitutes the greatest threat to the information resources of companies (KPMG, 2019, p. 5).

Theoretical organizational-procedural aspects of information security

Information resource management also requires appropriate organization of data and information security processes. This area includes:

Implementation of legal aspects universally applicable in a given country;
Implementation of the organization's internal rules and procedures;
Implementation of risk management processes, e.g. according to ISO/IEC 27005; and
Training.

An important element of an information security structure in business entities is development of a security policy and an IT system management instruction. These documents, which are available to all employees, should constitute the initial guidelines for information protection that take into account all laws and company policies. They should provide guidance on how information is to be treated in a given job. Every business entity should individually estimate the value of its own resources in the various departments and, on this basis, should develop guidelines for specific jobs. Company managers should ensure that each employee becomes familiar with the guidelines and confirms this, e.g. with his or her own signature. Such practices make it possible for employees to have a sense of responsibility for information resources and, at the same time, they affect security.

Risk management is an important organizational-procedural aspect. Risk assessment and analysis related to security of information resources is the starting point for development of effective safeguards. Reliable classification of an organization's resources and safeguards makes it possible to effectively assess the risk of an incident and to develop procedures preventing and minimizing loss or theft of intangible assets. It enables development and implementation of new information protection safeguards that take into account the cost and benefit analysis related to the value of the information held (see Kuś, Pypłacz, 2019).

Training is a very important element of any information security system. The pace of development of information techniques and technologies (see Haseeb et al., 2019), sociotechnical activities, and social engineering techniques, and thus the methods of illegal acquisition of information, is now so high that the life cycle of information concerning security aspects - its timeliness - does not currently exceed one year. It is therefore important to implement training programs for employees who process information. Appropriate training makes it possible for them to become familiar with the current methods of both information protection and illegal information acquisition. Lack of training exposes the business entity to the risk of loss of intangible assets: as a result, employees who manage information to a different extent are not aware of the reality in which they must function.

The organizational-procedural aspects also include all activities related to the management of employees from the time they are hired to the time they are dismissed or quit. In the case of selected employees with specific jobs involving information that is sensitive to the company, appropriate

recruitment procedures are required. To this end, all possible lawful measures should be taken to determine the suitability of the candidates for the post. Similar measures should be implemented at the time of an employee's dismissal. Appropriate procedures (perhaps as early as during hiring) should be developed to minimize the risk of disclosure of the business organization's information to others. People holding key positions during their employment have access to information that is the most important to the organization. Accidental or deliberate disclosure to third persons or third parties may significantly weaken the market position of the company or, in extreme cases, cause the company to cease operations.

Research Methodology

The research was conducted in the period from May 2019 to November 2019 on a sample of 185 medium and large non-financial enterprises operating in Poland. The entities were selected using the purposive sampling method. The study sample included business organizations that satisfied the following conditions:

The company processes information in a digital way;
There is a job or a department in the company, represented by a person or a group of persons, that is directly responsible for information security;
The company applies risk management methods to any extent in terms of protection of information resources.

Micro and small enterprises were deliberately excluded from the study due to the fact that these entities relatively rarely establish a separate job in charge of information protection. Usually the owner is responsible for information security or this responsibility is distributed among the individuals processing digital resources.

The search and selection of business entities were carried out on the Internet. The companies were contacted electronically (by e-mail or chat if the company offered such a solution on its website) or by telephone. The key study was conducted using the CAWI (Computer-Assisted Web Interview) technique, by means of an electronic questionnaire placed on the author's website. People working in jobs that involved responsibility for security of information resources in the company were asked to fill in the questionnaire. Out of the 185 completed questionnaires, 179 were qualified for further analysis. The others were found to be filled out incorrectly.

Research Results

With reference to the theoretical part of this paper, there are 3 aspects of information protection: technical and technological, behavioral, and organizational-procedural. The study has shown that, in the opinion of information security managers in medium and large companies, the technical and technological aspect plays the most important role (the average grade 4.8) (Fig. 1). This this approach must be considered to be correct. Hardware and software security is now the foundation of all types of safeguards. System software makers include basic security software as a component of the system, which demonstrates the status of these solutions. It is also important to note that most of the risks, especially originating in the computer network, are caused by certain automatically spreading forms of threats. They work by searching for "gaps" and "vulnerabilities" in network elements and then explore these "gaps" to cause specific damage. Software and hardware safeguards are used to block this type of threats. To this day, they form the backbone of security in virtually all business entities.

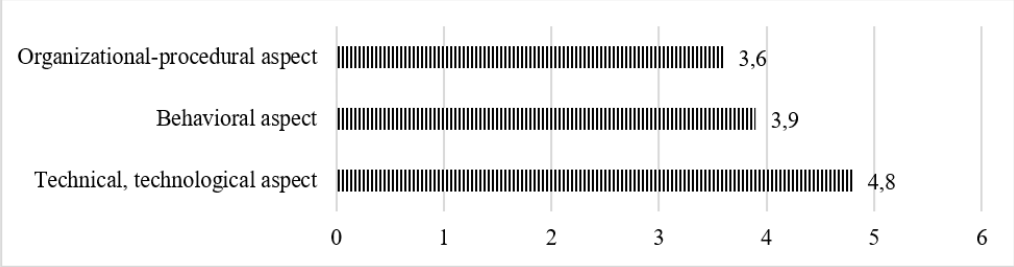

Fig. 1: Respondents' answers to the following question: "Please estimate the importance of the different aspects to the protection of information resources on a scale of 1 to 5, where 1 is the aspect that is the least important to information protection and 5 is the aspect that is the most important to information protection."

Source: prepared by the author

In the second place, the respondents indicated the behavioral aspect (average grade 3.9). This is an average result, which demonstrates the average awareness of the respondents of the risks caused by the so-called human factor. The most advanced security features cannot function properly if a person, intentionally or unknowingly, discloses information or enables access to information to third parties. As the results of research carried out by the largest intelligence companies in the world indicate, errors committed by humans result in up to 90% of all information security breaches (Sedgwick, 2019). The question arises: How can one minimize the impact of the human factor? An analysis of publications on this subject leads to the conclusion that the most frequent answers are: selection of appropriate staff at the recruitment stage and carrying out regular training. Information security training should constitute a permanent part of each business entity's schedule. The pace of development of information management methods and thus the types of threats is so high that the optimum frequency of training is 1 year. Figure 2 shows the respondents' answers related to the frequency of training in the surveyed business entities. Only 17% of the surveyed organizations declare annual training and 4% more declare that they conduct it more often than once a year. As many as 27% of companies conduct training less than once a year and 18% believe that it is the employees themselves who should make sure to have the knowledge related to protection of intangible resources. Out of all the surveyed companies, 34% declare that they provide training once for each employee before assigning him or her to a specific job.

An analysis of the responses and their comparison with current studies related to the importance of the human factor to information security (see Kaspersky Lab, 2018; Proofpoint, 2019) leads to the conclusion that business entities pay too little attention to training of their employees in this area. It should be noted that this knowledge cannot be acquired to the full extent before starting work. The pace of changes in this matter is so fast that a continuous learning process is inevitable. This is a process on which business entities should depend most, as it is their information resources that are a key factor that can enable them to improve their competitiveness in the economy.

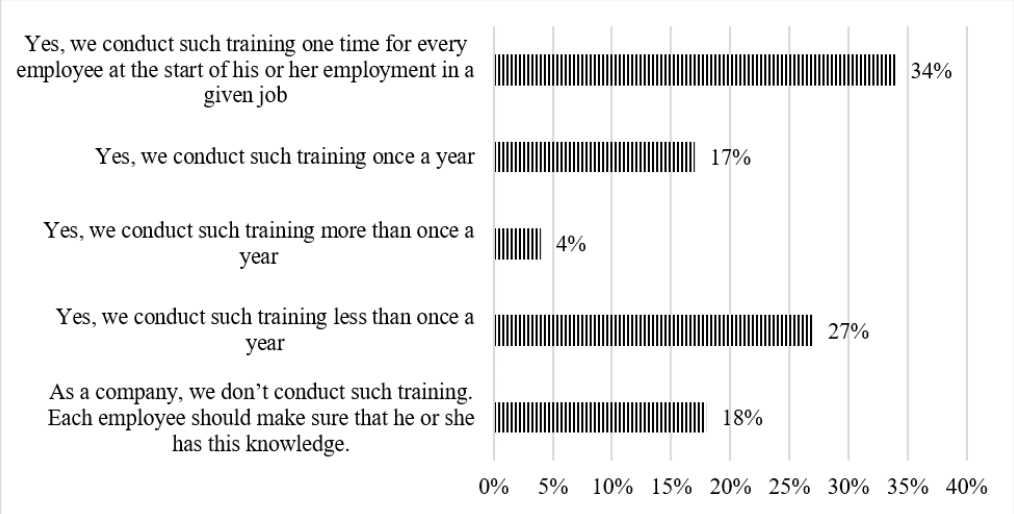

Fig. 2: Respondents' answers to the following question: "Does your company provide information protection training to all employees who process information resources and at what frequency?"

Source: prepared by the author

As shown in Figure 1, the smallest average was obtained for the answer to the question concerning the organizational-procedural aspect. Although 3.6 is not a very low score, it places the problems it represents in last place. The result can be interpreted as an attitude where business people value existing safeguards and information management skills more than the regulations, laws, obligations specified in specific security policies. It should be noted, however, that e.g. risk estimation and risk analysis, which are included in the procedural area, provide guidelines for other aspects. They must be carried out with due diligence and regularly, at even the smallest changes in the environment of the information system. They are the foundation for security systems. Risk assessment should take into account both technical and behavioral aspects. However, according to the research, most business entities only consider technical safeguards (Fig. 3).

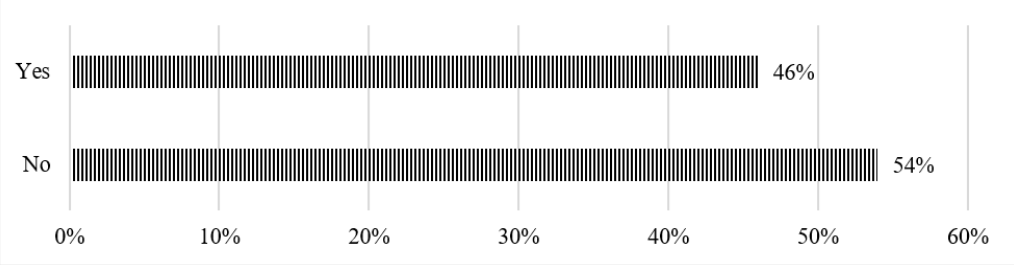

Fig. 3: Respondents' answers to the following question: "Does information security risk assessment in your company include social engineering techniques?"

Source: prepared by the author.

It is procedurally quite difficult to include social engineering techniques in risk assessment. Perhaps that is why only 46% of companies do it. In order to effectively anticipate the consequences and plan a possible defense against actions of cyber criminals practicing in sociotechnics, it is necessary to develop a number of probable scenarios and to carry out simulated actions (penetration tests) (see Lee et al., 2016; Tang, 2014) in order to identify the strengths and weaknesses of employees (their

vulnerability to sociotechnics). An additional difficulty is that the most probable results can only be obtained when working on unsuspecting employees. This causes great organizational difficulties and requires a large amount of time and money (preferably if the simulated activities are carried out by a hired external company).

Another question asked of the respondents concerned the technical area of the safeguards. The answers shown in Figure 4 show a complete map of the most popular information resource safeguards. The most visible aspect of the results is the fact that none of the security factors received 100% of the responses. Anti-virus software is still the most popular method of protection of devices and systems. The study deliberately divided the responses into paid and free software. This was intended to get the answer to the following question: What percentage of companies do not buy basic protection against computer viruses? Although the choice of free software is nowadays very wide (also due to the actions of operating system makers), its performance in relation to the wide range of modern-day threats is typically much lower than that of its paid equivalents (see Chakraborty, 2017; Zarghoon et al., 2017). However, 13% of business entities do not pay much attention to this. On the other hand, 86% of respondents declared the use of paid antivirus protection systems. Thus, 1% do not use such software at all, which seems completely irresponsible given the current vulnerability to attacks from the global network. However, these companies are likely to use standard security features built into their operating systems.

Other most common ways to protect information are to establish access passwords and PIN numbers for computer devices and software and to establish a specific system of access rights. Thus, each employee has access only to a given range of information necessary in his or her job, which is protected by a password or, in 26% of companies, additionally by biometric safeguards (fingerprint, retina scan, or face recognition). 74% of business entities back up their digital resources. This number is relatively high. However, given the scale of the ransomware threat in recent years, as much as 26% of organizations may never regain access to information if their resources are encrypted. In the case of most companies, this can result in a virtual stop to their operations or in major problems in the area of both their operations and their image. The least frequently used safeguards are solutions designed to protect the local network. This concerns both encryption of transmitted information (only 13% of respondents) and security at the interface between the local network and the Internet (hardware firewall - 43%, IPS - 34%).

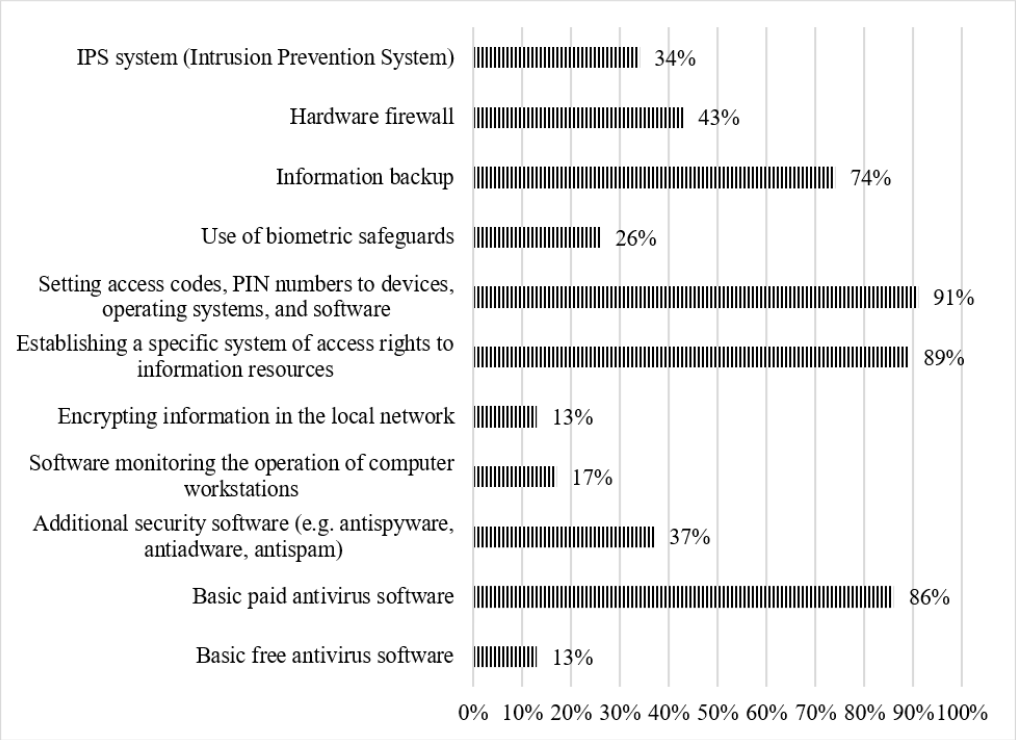

Fig. 4: Respondents' answers to the following question: "Please indicate which of the listed security techniques are used in your company."

Source: prepared by the author.

Conclusion

Security of information resources in business entities is currently one of the biggest challenges facing modern companies. Information is currently one of the most important resources of companies. Therefore, it becomes the target for people who, for various reasons, want to acquire it illegally. The multitude of threats occurring in modern information systems forces business entities to maximize the effectiveness of their protective actions. Ensuring information security is currently not a one-time or multi-stage operation. It is now a process that involves all employees with any contact with information resources. and requires continuous acquisition of new knowledge and experience, as well as improvement of existing procedures and implementation of new ones.

Surveys conducted among medium and large business entities prove that there is a high awareness of information security issues among people responsible for this area of operations. However, actions are lacking in the behavioral aspect (average of 3.9, as shown in Fig. 1) and the related areas of training (Fig. 2) and risk estimation (Fig. 3). There is a great need to make those who decide about information security aware that only properly prepared employees can build an effective security system. State-of-the-art technical and software measures, security policies, and external and internal regulations are only tools in the hands of people, who can act either responsibly or irresponsibly.

References

• Breda, F., Barbosa, H., and Morais, T. (2017), “Social Engineering and Cyber Security”, Proceedings of the 11th International Technology, Education and Development Conference (INTED2017), ISBN: 978-84-617-8491-2 / ISSN: 2340-1079, 6-8 March 2017, Valencia, Spain, 4204–4211.

- Brook, C. (2018), "What is Cyber Hygiene? A Definition of Cyber Hygiene, Benefits, Best Practices, and More", [Online], Data Insider, Digital Guardian's Blog, [Retrieved January 11, 2020], Available: https://digitalguardian.com/blog/what-cyber-hygiene-definition-cyber-hygiene-benefits-best-practices-and-more
- Chakraborty, S. (2017), "A Comparison study of Computer Virus and Detection Techniques", *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 2(1), 236–240.
- Connolly, I., Palmer, M., Barton, H. and Kirwan, G. (2016), "An Introduction to Cyberpsychology", Routledge, Abingdon, UK.
- ENISA (2016), "Review of Cyber Hygiene practices", [Online], European Union Agency for Network and Information Security, [Retrieved January 11, 2020], Available: https://www.enisa.europa.eu/publications/cyber-hygiene
- Hadlington, L. and Parsons, K. (2017), "Can Cyberloafing and Internet Addiction Affect Organizational Information Security?", *Cyberpsychology, Behavior, and Social Networking*, 20(9), 567–571.
- Hadlington, L., Popovac, M., Janicke, H., Yevseyeva, I., and Jones, K. (2019), "Exploring the role of work identity and work locus of control in information security awareness", *Computers & Security*, 81, 41-48
- Haseeb, M., Hussain, H. I., Ślusarczyk, B. and Jermsittiparsert, K. (2019), "Industry 4.0: A Solution towards Technology Challenges of Sustainable Business Performance", *Social Sciences*, 8(5), 154.
- Kaspersky Lab. (2018), "The Human Factor in IT Security: How Employees are Making Businesses Vulnerable from Within", [Online], Kaspersky official blog. [Retrieved January 08, 2020], Available: https://www.kaspersky.com/blog/the-human-factor-in-it-security/
- Kobis, P. (2019), "Human factor in the aspect of digital information in business enterprises", Proceedings of the 9th International Conference on Management (ICOM) vol. II, ISBN: 978-963-269-882-3, 13-14 June 2019, Gödöllő, Hungary, 35–42.
- KPMG. (2019), "Barometr cyberbezpieczeństwa. W obronie przed cyberatakami", [Online], KMPG Poland, [Retrieved January 07, 2020], Available: https://assets.kpmg/content/dam/kpmg/pl/pdf/2019/04/pl-Raport-KPMG-Barometr-Cyberbezpieczenstwa-W-obronie-przed-cyberatakami.pdf
- Kuś, A. and Pypłacz, P. (2019), "The Importance of Information Management in the Context of Industry 4.0: Evidence from the Kuyavian-Pomeranian Forbes Diamonds", *Social Sciences*, 8(6), 1–13.
- Lee, I. H., Son, H. S., Kim, S. W. and Kang, H. G. (2016), "A Proposal for a Methodology to Develop a Cyber-Attack Penetration Test Scenario Including NPPs Safety", [Online], Proceedings of the KNS 2016 Autumn Meeting, Korea, Republic of: KNS, [Retrieved January 08, 2020], Available: http://inis.iaea.org/Search/search.aspx?orig_q=RN:48067725
- Nemati, H. R. (2008), "Information security and ethics: Concepts, methodologies, tools and applications, Information Science Reference", Hershey, New York.
- Parsons, K., Calic, D., Pattinson, M., Butavicius, M., McCormac, A. and Zwaans, T. (2017), "The Human Aspects of Information Security Questionnaire (HAIS-Q): Two further validation studies", *Computers & Security*, 66, 40–51.
- Proofpoint. (2019), "The Human Factor 2019 Report—Modern Cyber Attacks", [Online], Proofpoint, [Retrieved January 12, 2020] Available: https://www.proofpoint.com/us/resources/threat-reports/human-factor
- Reinsel, D., Gantz, J. and Rydning, J. (2018), "Data Age 2025—The Digitization of the World. From Edge to Core", [Online], IDC, [Retrieved January 11, 2020], Available: https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf

- Sedgwick, S. (2019), "The Human Factor of Cyber Security", [Online], CSO Online. CSO from IDG, [Retrieved January 10, 2020], Available: https://www.csoonline.com/article/3504813/the-human-factor-of-cyber-security.html
- Tang, A. (2014), "A guide to penetration testing", *Network Security*, 8, 8–11.
- Vishwanath, A., Neo, L. S., Goh, P., Lee, S., Khader, M., Ong, G. and Chin, J. (2020), "Cyber hygiene: The concept, its measure, and its initial tests", *Decision Support Systems*, 128, 113160.
- Wang, Y. (2008), "On Cognitive Properties of Human Factors and Error Models in Engineering and Socialization", *International Journal of Cognitive Informatics and Natural Intelligence*, 2(4), 70–84.
- Zarghoon, A., Awan, I., Disso, J. P. and Dennis, R. (2017), "Evaluation of AV systems against modern malware", Published in: 2017 12th International Conference for Internet Technology and Secured Transactions (ICITST), 11-14 Dec. 2017, Cambridge, UK, 269–273.
- Zegarow, P. (2019), "Cyberpolicy NASK - Psychologiczne aspekty cyberbezpieczeństwa", [Online], Cyberpolicy NASK, [Retrieved January 09, 2020], Available: https://cyberpolicy.nask.pl/psychologiczne-aspekty-cyberbezpieczenstwa

Romanian Target Market Identification for a New Spinal Orthosis

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Abstract

Taking into consideration the fact that the global aging population is increasing every year and that the number of people with disabilities constantly on the rise, it becomes vital to allow and sustain the development process for new medical devices that will satisfy the specific needs of these categories of people. Considering these facts, every country is in a continuous process of developing and updating proper regulations and laws in order to provide necessary information and facility for companies that embrace the manufacturing of assistive devices. To align to international standards, manufacturers strive develop assistive devices that meet customers' requirements. Any development process which targets a new product, starts with customer needs, specifically customer requirements. Thus, the current study is aimed at the identification of the specific Romanian target market for the development process of a new spinal orthosis. In this regard, within the study, it was identified which categories of people with disabilities are targeted to be taken into consideration when new product development process will be deployed. Also, it was identified the exact county that will be targeted and the number of people that would potentially benefit by using a redesigned assistive device like a spinal orthosis.

Keywords: Regulation, Legislation, Standard, Assistive Devices.

Introduction

According to Lantada and Morgado (2012) the proportion of the population over 60 years was 8% in 1950, over 10% in 2000, and it is estimated to reach 21% in 2050. Partial or complete loss of mobility affects not only the ability to walk, but also the ability to perform personal tasks, which is a determining factor in the quality of life and determines the dependence of others in daily activities.

Lantada and Morgado (2012) also considering that in an aging society it is extremely important to develop devices that can support and assist older people and people with neuromotor disabilities in their daily activities. Thus, it is becoming increasingly relevant to find ways and tools to compensate, improve or restore specific mobility functions.

Monge et al. (2016) consider that the conservation of a person's posture requires complex stabilization mechanisms formed by the skeleton and the nervous, cardiovascular muscle and sensory. The medical device market includes a plethora of assistive products which simplify routine tasks for people with neuromotor disabilities. Assistive technology generally includes devices like mobility,

hearing, visual, cognitive and multi-sensorial aids. In particular, mobility aids can be: wheelchairs, scooters, walkers, canes, crutches, prosthetic devices, orthotic devices and a variety of specific physical modification in the built environment. All these can be either mechanical products, or "smart products", the latter including both hardware and software. The use of these "technical aids" as they are called, are not a regression, but rather, a way to live better. Some are traditional like the wheelchair or cane, but others are relatively new, so they are little or poorly known. Their appearance on the market has been as a result of technological progress to increase the autonomy of people who use them. The result is a wide range covering almost all needs. For several years, researchers have addressed the needs of people with neuromotor disabilities through alternative or augmentative devices. Most commonly, these solutions are selected according to the disability degree of the user.

According to Helal et al. (2008) many simple, low-tech devices can be bought in stores, through catalogues and on the internet without a physicians' prescription or any professional guidance whatsoever. Regardless of the price and technical complexity, to be useful, assistive technology must match the individual's specific needs, do the job for which it is intended, be compatible with the environments in which it will be used and be available and affordable to the person who needs it.

The devices can be custom made, designed to meet the functional requirements of each individual user, or prefabricated and designed to meet certain classes of functional requirements. The prefabricated devices are adjustable, meaning they need adjustment for each individual user, or are ready to use, meaning they do not need any adjustment for each individual user.

Considering the aforementioned, the main objective of the current study is to identify the profile of the romanian potential customer and the target market for the development of a new spinal orthosis. In order to differentiate a new product from its competitors and create a reliable and sustainable competitive advantage, it is necessary to conduct a situational analysis of the external (macro) factors facing the development process. Perera (2017) suggests that a PESTLE model should be best used when evaluating the dynamics of a competitive business environment. The model is targeted to evaluate several external environment factors: political, economic, socio-cultural, technological, legal, ecological and geographic. For the current product development process, the authors propose a two stage PESTLE model. In the first stage, the political, economic, socio-cultural, legal and geographic factors are evaluated. The second stage will target the technological and ecological factors. The reasoning is that technological and ecological factors are strictly interconnected with the product requirements analysed in the first stages of the product development process, as from Ulrich and Eppinger (2012). The current study focuses on the implementation of first stage PESTLE, evaluating regulations, political environment, legislation, standards and market segmentation for the development of a new spinal orthosis in Romania (figure 1).

Fig. 1: Analysed macro factors for the development of a new spinal orthosis

Regulations

In order to develop a new spinal orthosis, it was necessary to evaluate what institutions regulate the main activities in field of assistive devices development. Authors identified the World Health Organisation and the United Nations as the two main actors in regulating the development process of assistive medical devices for neuromotor disabilities.

World Health Organization

According with web site of World Health Organization (2014), the Constitution was adopted by the International Health Conference held in New York from 19 June to 22 July 1946, signed on 22 July 1946 by the representatives of 61 and entered into force on 7 April 1948. Amendments adopted by the Twenty-sixth, Twenty-ninth, Thirty-ninth and Fifty-first World Health Assemblies came into force on 3 February 1977, 20 January 1984, 11 July 1994 and 15 September 2005 respectively.

The objective of the World Health Organization shall be the attainment by all people of the highest possible level of health. In order to achieve its objective, few functions of the Organization shall be:

- to stimulate and advance work to eradicate epidemic, endemic and other diseases;
- to promote co-operation among scientific and professional groups which contribute to the advancement of health;
- to promote and conduct research in the field of health.

Convention on the Rights of Persons with Disabilities

Don MacKay, Chairman of the committee that negotiated the United Nations (2016) treaty said what the Convention on the Rights of Persons with Disabilities endeavours to do is to elaborate in detail the rights of persons with disabilities and set out a code of implementation. On the fundamental issue of accessibility, the Convention developed by the United Nations (2016), requires countries to identify and eliminate obstacles and barriers and ensure that persons with disabilities can access their environment, transportation, public facilities and services, and information and communications technologies.

The European Parliament and the Council of the European Union

According with Regulation 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices (2017) this Regulation aims to ensure the smooth functioning of the internal market as regards medical devices, taking as a base a high level of protection of health for patients and users, and taking into account the small and medium-sized enterprises that are active in this sector. At the same time, this Regulation sets high standards of quality and safety for medical devices in order to meet common safety concerns as regards such products. Both objectives are being pursued simultaneously and are inseparably linked whilst one not being secondary to the other. As regards Article 114 of the Treaty on the Functioning of the European Union, this Regulation harmonises the rules for the placing on the market and putting into service of medical devices and their accessories on the Union market thus allowing them to benefit from the principle of free movement of goods.

Political environment and legislation

For better understanding of the rules that are applied in development process of new medical devices, it was consulted both, european and romanian law.

European Environment

The European Pillar of Social Rights (2017) aims to serve as a guide towards efficient employment and social outcomes when responding to current and future challenges which are directly aimed at fulfilling people's essential needs, and towards ensuring better enactment and implementation of social rights.

The European Pillar of Social Rights expresses principles and rights essential for fair and well-functioning labour markets and welfare systems in 21st century Europe. It reaffirms some of the rights already present in the Union acquis. It adds new principles which address the challenges arising from societal, technological and economic developments. For them to be legally enforceable, the principles and rights first require dedicated measures or legislation to be adopted at the appropriate level.

Everyone has the right to timely access to affordable, preventive and curative health care of good quality.

Romanian Environment

The law 448/2006 (2006) regulates the rights and obligations of persons with disabilities granted in the purpose of their social inclusion. The protection and promotion of the rights of persons with disabilities are based on the following principles (here are extracted few of them):

- respect for human rights and fundamental freedoms;
- preventing and combating discrimination;
- equalization of opportunities;
- equal treatment in terms of employment;
- social solidarity;
- empowering the community;
- subsidiarity;
- adaptation of the company to the disabled person;
- the interest of the disabled person.

Standards

There are many products that can help people with disabilities to improve the quality of life: hearing aids, wheelchairs, Braille equipment, communication devices, software equipment, oxygen devices and mobile lifting devices. All help people with disabilities to function better in everyday activities and to actively participate in society. Support product subdivisions can be found in several classifications and nomenclatures. The most important at the international level are ISO 9999 (products for people with disabilities - Classification and terminology), GMDN (global medical devices classification), EMDN (The European Medical Device Nomenclature) (2020) and SNOMED CT (Systematic nomenclature of Medicine - Clinical terms). For better understanding of the environment, hereafter, the authors provide a thorough analysis of the main classes, subclasses and divisions of the main standard, targeted at neuromotor disabilities.

ISO 9999:2016

ISO 9999 (2016) establishes a classification and terminology of assistive products, especially produced or generally available, for persons with disability. Assistive products used by a person with disability, but which require the assistance of another person for their operation, are included in the classification.

The best known classification of Assistive Technologies is the international classification ISO 9999, is a three-level system that groups Assistive Technologies, firstly into classes (mobility, communication, recreation) – extras in table 1, secondly into subclasses, (in the "mobility" class:

wheelchairs, motor adaptations) – extras in table 2, and thirdly into divisions (in the "motorized wheelchairs" subclass: power steering wheelchairs) – extras in table 3.

Table 1: ISO 9999 main classes [extracted from ISO 9999 (2016)]

Class	Description
04	Assistive products for measuring, supporting, training or replacing body functions
05	Assistive products for education and training in skills
06	***Assistive products attached to the body for supporting neuromusculoskeletal or movement related functions (orthoses) and replacing anatomical structures (prostheses)***
09	Assistive products for self-care activities and participation in self-care
12	Assistive products for activities and participation relating to personal mobility and transportation
15	Assistive products for domestic activities and participation in domestic life
18	Furnishings, fixtures and other assistive products for supporting activities in indoor and outdoor human-made environments
22	Assistive products for communication and information management
24	Assistive products for controlling, carrying, moving and handling objects and devices
27	Assistive products for controlling, adapting or measuring elements of physical environments
28	Assistive products for work activities and participation in employment
30	Assistive products for recreation in leisure

Each entry in ISO 9999 has a numeric code: in this case, "cervical-thoracic-lumbar-sacral orthoses" has the code 06.03.18, where the first two digits represent Class 06 "orthoses", the next two subclasses 06.03 "spinal and cranial orthoses", and the last two represent the specific division. ISO 9999 class, subclass and divisions are that present interest for this study is in the following tables.

Table 2: Subclasses for main class 06 [extracted from ISO 9999 (2016)]

Class	Subclass	Description
06	***03***	***Spinal and cranial orthoses***
06	04	Abdominal orthoses
06	06	Upper limb orthoses
06	12	Lower limb orthoses
06	15	Functional neuromuscular stimulators and hybrid orthoses
06	18	Upper limb prostheses
06	24	Lower limb prostheses
06	30	Prostheses other than limb prostheses

Table 3: Division for subclass 03 [extracted from ISO 9999 (2016)]

Class	Subclass	Division	Description
06	03	03	Sacro-iliac orthoses
06	03	06	Lumbo-sacral orthoses
06	03	09	Thoracic-lumbar-sacral orthoses
06	03	12	Cervical orthoses

06	03	15	Thoracic-cervical orthoses
06	03	18	Cervical-thoracic-lumbar-sacral orthoses

In order to find all requirements and functions for assistive device that will be developed, it was studied other standards regarding assistive technologies.

Few of that standard are: ISO 8548:1993 – Prosthetic and orthotic - limb deficiencies; ISO 8549:1989 – Prosthetic and orthotic - vocabulary; ISO 10328:1996 – Prosthetics - Structural tests of prostheses; ISO 13405:1996 – Prosthetics and orthotics - Classification and description of prosthetic components; ISO 15032 – Prosthetics - Structural tests; ISO 13485:2016 Medical devices — Quality management systems — Requirements for regulatory purposes (2016).

Market Analysis

The market is made up of buyers who differ in their wishes, power purchase, geographic location, purchasing behaviour and buying practices. It is important to identify the market size differentiated by disability type, geographical location, age group and gender.

Market Size

On September 30, 2019, the total number of persons with disabilities communicated to the National Authority for Persons with Disabilities within the Ministry of Labour and Social Justice (2019), through the general directions of social assistance and the protection of the county child, respectively local of the sectors of the municipality of Bucharest, was 839,632 persons. Out of these, 97.89% (821,939 persons) are in the care of families and / or live independently (non-institutionalized) and 2.11% (17,693 persons) are in public residential social assistance institutions for adults with disabilities (institutionalized). After analysing data collected from National Authority for Persons with Disabilities, the authors present in figure 2 the evolution of the number of people with disabilities from Romania in the last 13 years.

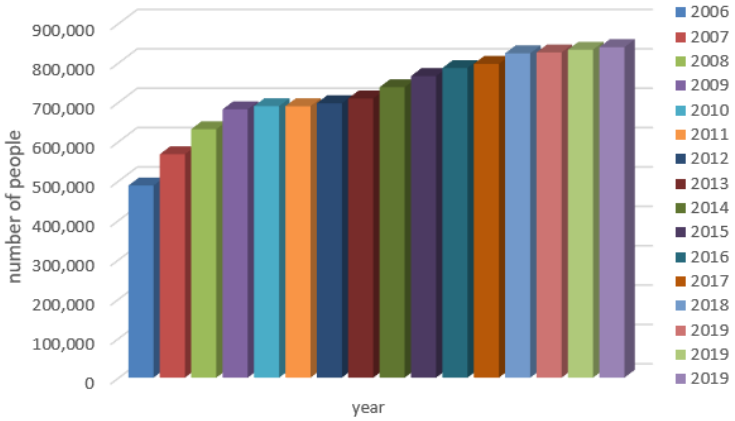

Fig. 2: Evolution of the number of people with disabilities in Romania [*data collected from National Authority for Persons with Disabilities, Ministry of Labour and Social Justice (2019)*]

On September 30, 2019, the rate of persons with disabilities in the population of Romania was 3.79%. From the centralization of the data by age groups it follows that 54.23% are persons between the ages of 18-64 (418,629 persons) and 45.77% are over 65 years (353,364 persons), in total adults with disabilities. Those numbers are split in accordance with the type of disability. For this study the relevant category is physical disability and the number of people with this disability is shown in figure 3.

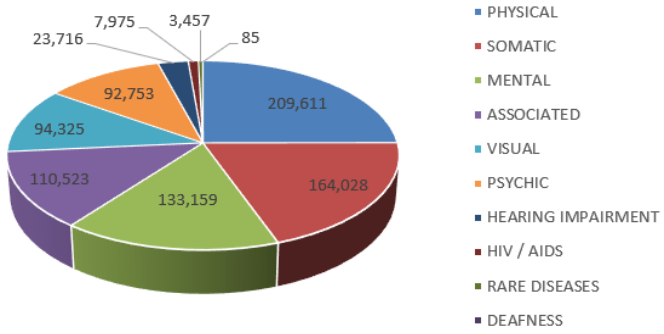

Fig. 3: Number of people with disabilities by type of disability in Romania [*data collected from National Authority for Persons with Disabilities, Ministry of Labour and Social Justice (2019)*]

The total number of people with physical disability was categorised according with county from where they come. In this way it can be easily to identify the region from Romania were the proposed type of medical devices is more suitable and affordable. These categories are shown in figure 4.

Compared to the 3.79% rate of persons with disabilities per 100 inhabitants, calculated at the level of Romania, the South-West Oltenia, South-Muntenia and North-West regions have the highest rates. By counties / municipalities, the highest number of persons with disabilities is registered in the municipality of Bucharest (70,107 persons) followed by Prahova county (37,633 persons), and the smallest number is registered in Covasna county (6,273 persons).

Women represent 53.10% of the total number of persons with disabilities. The number of people over the age of 50 represents 72.12% of the total number of adults with disabilities. From the centralization of the data by age groups it is shown that 54.23% are persons between the ages of 18-64 (418,629 persons) and 45.77% are over 65 years (353,364 persons), in total adult persons with disabilities.

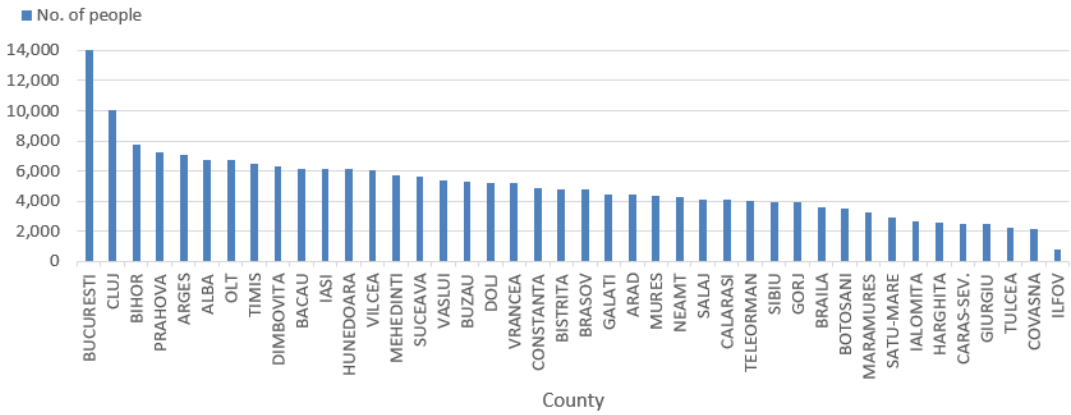

Fig. 4: Number of people with physical disabilities by county in Romania [data collected from National Authority for Persons with Disabilities, Ministry of Labour and Social Justice (2019)]

The number of public social welfare institutions for adults with disabilities on September 30, 2019 is 502 (compared to 489 on September 30, 2018), of which: 442 residential (compared to 427 as of September 30, 2018) and 60 non-residential - day (compared from 62 to 30 September 2018). About two-thirds (60.40%) of public residential institutions for adults with disabilities are: care and assistance centre's (28.05%), with 6,341 beneficiaries and protected housing (32.35%), with 1,035 beneficiaries. They represent 41.69% of the total number of 17,693 persons in residential institutions. A significant number of beneficiaries also exist in the 74 neuropsychiatric recovery and rehabilitation centres, respectively 6,214 persons (35.12%).

Market Segmentation

Tion (2006) says that the market is a group of current or potential customers who may want a good or service and who also have: purchasing power, willingness to spend money, authority to do these expenses. From an economic point of view the market is regarded as the meeting place of the demand with the offer, that is, represents all the buyers and sellers who are engaged in one transaction. The market share of an enterprise or product is determined as a ratio between sales of the company or product and total sales recorded in the respective market, in a certain period.

Market segmentation is the process of dividing a market into distinct groups of buyers, based on their needs, characteristics or purchasing behaviour. Market segmentation is done to achieve better customer satisfaction than competitors.

The market segment is the group of consumers with similar needs or requirements. The market niche is an even smaller consumer group that requires a special combination of advantages, for which they are willing to pay a higher price.

Not every criterion is suitable for market segmentation of a product. To be get effective segmentation, a criterion must have, cumulatively, three main qualities: be relevant, measurable and operational for the market studied.

A segmentation criterion is relevant when the segments you are identifies behavioural differences in relation to the analysed product. Not just the criterion chosen must be relevant, but also how uses it in the concrete segmentation process.

Thus, for the market segmentation of a new spinal orthosis, the following criteria presented in table 4 were considered:

- *Geographic*: · Region; · County; · Medium.
- *Demographic*: · Type of disability; · Age; · Gender.

Following the analysis of the statistical data within the Statistical Bulletin developed by the National Authority for Persons with Disabilities of the Ministry of Labour and Social Justice (2019), developed on September 30, 2019, table 4 was completed.

Table 4: Market segmentation for the development of a new spinal orthosis

No.	Criteria	Topic	Segment	Value
1	Geographic	Region	South-Muntenia	137,649
			North-East	124,534
			North-West	118,171
			South-West-Oltenia	104,772
			South-East	98,557
			Centre	94,541
			Bucharest-Ilfov	83,320
			West	78,088
		County	Bucharest	70,107
			Prahova	37,633
			Arges	32,361
			Iasi	28,224
			Cluj	28,075
			Timis	26,566
		Environment	Rural	-
			Urban	-

2	Demographic	Type of disability	Physic	209,611
			Somatic	164,028
			Associate	110,523
			Mental	133,159
			Visual	94,325
			Psychic	92,753
		Age	Children	67,639
			Adults	771,993
		Gender	Male	393,787
			Female	445,845

Demographic segmentation entails the breakdown of the total market into categories of consumers, according to variables such as: age, gender, family size, life cycle of family. Demographic variables are most often used in the segmentation of commodity markets for three main reasons: they are measurable, they are operational, and they are relevant. Geographic segmentation involves the breakdown of the market into sub-markets, according to criteria such as: country, region, county, city.

Following the analysis of the data presented in table 4 and figure 5, it turned out that the market segment for the development of a new spinal orthosis has the following characteristics:

- *Geographic*:

· Region - South-Muntenia and Bucharest-Ilfov;
· County - Bucharest, Ilvof, Prahova, Dambovita, Arges and Giurgiu;
· Environment - rural and urban.

- *Demographic*:
· Type of disability - physical;
· Age - Adults;
· Gender - male and female.

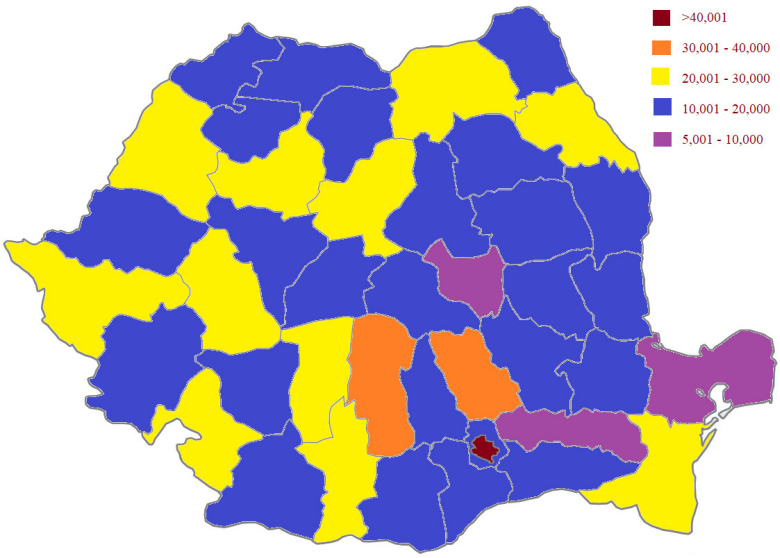

Fig. 5: Number of people with disabilities by county, in Romania

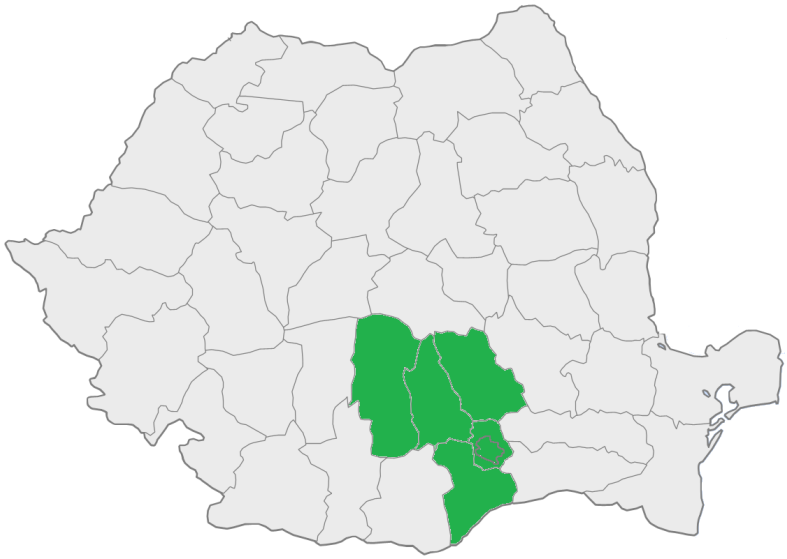

Fig. 6: Geographical localization of the target market of a new spinal orthosis

The market segment that presents interest in the development of a new spinal orthosis is comprised of persons with physical neuromotor disabilities, both, adult men and women. They are located in South-Muntenia and Bucharest-Ilvof, both from the rural area and from the urban area (figure 6).

The next step in the development process is to define the real needs of the identified customers within the targeted market segment. Based on the needs, functions will be constructed and translated into customer/ product requirements. At this point, the second step of the PESTLE model will be completed.

Conclusion

The paper presents a thorough research on EU and specific Romanian regulations and how these can influence the possibility to develop new spinal orthosis through the difficulties that appear before commercialization. It was also studied how European and national laws help and allow to develop a device that will potentially pass all necessary approvals. For development team the most difficult step is to follow the standards recommendation in order to meet all requirements for the new product that will be developed. In this case, the standards that describe the assistive devices development and manufacturing were studied and presented. Specific market segmentation was undertaken, and a possible customer profile was identified. The market segment that presents interest is made up of persons with physical disabilities, adult men and women from the South-Muntenia and Bucharest-Ilvof. Because of lack of data, it was taken in target market both, from the rural area and from the urban area. Further research involves undertaking the second step of the PESTLE model.

References

- Helal AA., Mokhtari M. and Abdulrazak B. (2008), The engineering handbook of smart technology for aging, disability and independence, Hoboken, N.J.: John Wiley.

- ISO (2016), Standards, *ISO 9999 – Classification and Terminology of Assistive Products*, [Retrieved on 08.01.2020], https://www.iso.org/standard/60547.html

- ISO (2016), Standards, *ISO 13485 - Medical devices — Quality management systems — Requirements for regulatory purposes*, [Retrieved on 22.02.2020], https://www.iso.org/obp/ui/#iso:std:iso:13485:ed-3:v1:en

- Lantada AD. and Morgado PL. (2012), 'Rapid Prototyping for Biomedical Engineering: Current Capabilities and Challenges', *Annu Rev Biomed Eng.*, 14:73-96. doi: 10.1146/annurev-bioeng-071811-150112

- Medical Devices (2020), The European Medical Devices Nomenclature (EMDN), [Retrieved on 22.02.2020], https://ec.europa.eu/docsroom/documents/39009/attachments/1/translations/en/renditions/native

- Ministry of Labour and Social Justice (2019), National Authority for Persons with Disabilities, Statistic Data, *Statistic Bulletin*, [Retrieved on 13.01.2020], http://anpd.gov.ro/web/transparenta/statistici/trimestriale

- Monge M., D'Amore MC., Muse J., Jeremias N., Iriso E., Gonzalez J. and Zanuttini D. (2016), 'Detection sensors appliedto orthopedic devices elderly', *IEEE Xplore Digital Library*, 978-1-5090-2938-9/16.

- Official Monitor, Romanian Law 448/2006, *Expert Monitor*, [Retrieved on 15.01.2020], http://www.monitoruloficial.ro/?lang=en

- Perera R. (2017), The PESTLE Analysis, Nerdynaut Publishing, 1st Edition, ISBN 9781549790546.

- European Pillar of Social Rights (2017), *Social Summit*, [Retrieved on 12.01.2020], https://ec.europa.eu/commission/sites/beta-political/files/social-summit-european-pillar-social-rights-booklet_en.pdf

- The European Parliament and the Council of the European Union, Regulation 2017/745 of the European Parliament and of the Council, *Official Journal of the European Union*, [Retrieved on 22.02.2020],https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0745

- Tion MD. (2006), Marketing – Case studies and applications, *Edition Solness*.

- Ulrich K.T. and Eppinger S.D. (2012), Product design and development, McGraw-Hill International, 5th Edition, ISBN 978-007-108695-0.

- United Nations (2016), Convention on the Rights of Persons with Disabilities and Optional Protocol, Department of Economic and Social Affairs Disability, [Retrieved on 20.01.2020], https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html

- World Health Organization (2014), 'Basic Documents, [Retrieved on 24.01.2020], http://apps.who.int/gb/bd/

Functional Development of a Posture Correction Orthosis, From Need to Concept

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Abstract

A rapidly aging society and a consistent growth in injury occurrence led over the last decade to an increase of neuromotor disabilities and impairments among the global population. Thus, assistive technologies have become a focus point in the product development process for medical device manufacturers. In their race to achieve sustainable competitive advantage manufacturers offer a variety of medical aids purposed to improve the customers' quality of life. Addressing these issues, the current paper proposes a process for the functional design and development of five posture correction orthosis concepts. Smart assistive devices are constantly developed through an array of methods, that are ultimately targeted at performing specific neuromotor tasks. There is no "universal pill", no ideal methodology which can be unanimously applied to the design and development of successful products. Selection of such methods is ultimately up to the company's requirements: experienced professionals, tradition, internal regulations, national or international requirements, specific standards etc. Based on Ulrich and Eppinger's product design and development process and on Miles's technical functional analysis tools, the authors propose an integrated method for the functional development of a new medical assistive device for the upper body. To develop a new medical device, especially a new spinal orthosis it is necessary to understand that these types of products refer to physiological needs and they should fit perfect to the needs of the potential customers. In this scope, 25 potential customers were interviewed in order to determine their expectations for a new medical device, which potentially could help them correct their posture. Target specifications and specific functions were developed based on the correlation of identified customer needs and existing product metrics. Five concepts of posture correction orthosis were generated, which meet both, customer needs and economic efficiency criteria. Further research will be undertaken for concept selection, manufacturing and testing of the final selected concept.

Keywords: product development, needs, specifications, functions, concepts.

Introduction

Product design and development of medical products starts with understanding the biology, physiology, pathology and biomechanics of the targeted body part.

Galbusera and Wilke (2018) describe the biomechanical aspects of spinal pathologies and their surgical treatment, revealing that one of most common pathology is scoliosis. Scoliosis is manifested

by the appearance of curves of the spine, especially in the lumbar region, in the frontal plane, the column taking the form of the letter "C", often followed by a compensatory modification that appears in the neighbouring area, the spine being in the form of the letter "S". Untreated, scoliosis leads to the appearance of an unsightly aspect of the back but especially to the appearance of back pain and ultimately to loss of mobility.

To address the pathology described above it is mandatory to know what the customer physiological needs are. Understanding customer needs is a crucial contribution to the product development process and, at the same time, a very big challenge. Conceptually, understanding customer needs leads to products that are desirable, achievable, marketable and ultimately successful

From the plethora of product development tools and instruments, the authors selected as the most appropriate for the current study, the methodology proposed by Ulrich and Eppinger (2015), constructed of seven main stages (figure 1).

Fig. 1: Product specifications within the concept development process [adapted from Ulrich K.T. and Eppinger S.D. (2012)]

The present paper is targeted at detailing the first three stages from the development process of a posture correction orthosis. Identification of customer needs is undertaken by defining the customer needs portfolio, data collection through interviews from potential customers, data interpretation and hierarchisation of needs. Product target specifications lay out in precise, measurable detail what a product must do in order to satisfy the previously identified customer needs. Authors constructed the specifications, as proposed by Ulrich and Eppinger (2015), from a metric and a value. The product needs and target specifications are translated into hierarchical functions which are ranked according to their importance. Posture correction orthosis concepts were generated to exactly fulfil the defined product functions. The identification and definition of functions are undertaken in accordance with the concepts defined by Miles LD (2008).

According to Shane (2003), there are five levels of needs, ranging from the basic needs that are present at birth, to the psychological needs, which become important only once the lower level of needs have been met. From this point of view, to develop a new medical device and especially a new spinal orthosis it is necessary to understand that this type of product refers to physiological needs and it should fulfil perfect the need of potential customer. In this regard, 25 potential customers were interviewed, in order to find out what expectations they have from a new medical device that will help them correct their posture. Prior to this research, authors conducted a detailed market analysis and managed to establish the main target market and the customer profile. With a clear picture of the customer it was a simple and concise hierarchical process to define the specific needs, target

specifications and product functions for a posture correction orthosis. Based on the functions five new medical device concepts were developed by the authors.

Need Identification

According with Woinaroschy (2015), the development of a new product begins with the identification of the customer's requirements, where the notion of customer means both those who buy and those who consume that product, which can be individual consumers or large corporations. Delimiting the client's requirements involves three sequential steps: Interview customers; Interpret the expressed needs/ requirements; Translate the requirements into the product specifications.

Roemer (2012) proposed for the process of identifying needs a structure with six stages: 1. Defining the purpose: - Mission; 2. Data collection: - Observation; - Interviews; - Target groups; 3. Data interpretation: - Interpretation of needs; 4. Organization of needs: - Hierarchization; 5. Establishing importance: - Examining the relative importance; 6. Reflections on the process: - Continuous improvement.

In this case, the **mission** can be formulated as follows: *Develop a new medical device which can improve the performance of specific neuromotor tasks for disabled people*.

According to Ulrich and Eppinger (2015) the first step into fulfilling the stated mission is to establish the customers' needs portfolio. Next, the design team establishes a set of restrictions and selects the appropriate product for further analysis. Data collection is undertaken through interviews with potential customers.

Prior to conducting the current research, the authors undertook a thorough market analysis in order to identify the target market and the profile of the customer. Following the analysis of the market and its segmentation, five needs were formulated. In the process of formulating the needs, the following observations were considered: The needs formulated must clearly result from the surrounding reality (in which people live and work); All the needs formulated should refer to a significant number of individuals; Needs should be formulated starting from shortcomings identified in various everyday situations.

Market research revealed that the customer needs portfolio is composed of **five imperative needs**: The need to walk independently; The need to coordinate and to have strength in the upper limbs; The need for a correct posture; The need to balance when rising/ sitting; The need to coordinate and to have strength in the lower limbs.

The product developed by the team should meet one of the needs specified above. Also, the product should meet a set of restrictions, imposed by all lifecycle phases (concept development, manufacture, usage, recycle/ reuse/ disposal). The product identified **restrictions** are as follows: Be a product of mechanical construction; Have as few components as possible; Have a simple constructive shape; Have small overall dimensions; Contain parts made from cheap and readily available materials; Contain components made by conventional processing technologies; Have a large potential market; Present a high degree of innovation; Have a minimum cost.

Five types of products are identified by the authors, that fully meet the needs of the target customers. In order to select the most appropriate product to further develop, the team applies a tool proposed by Ulrich and Eppinger (2015), namely the Decision matrix for **product selection** (table 1).

Table 1: Decision matrix for product selection

Product / Restriction	Exoskeleton for the lower limbs	Orthosis for the upper limbs	Orthosis for the spine	Exoskeleton for balance	Orthosis for the lower limbs
Mechanical construction	-	0	+	-	0
Have as few components	0	0	+	0	-
Simple constructive form	-	0	+	-	0
Small dimensions of gauge	0	0	0	-	-
Made from cheap materials	0	0	+	0	0
made by conventional processing techniques	0	0	0	0	0
Large potential market	0	0	0	0	0
High degree of innovation	0	0	+	+	0
Minimum cost	-	0	+	-	-
Σ +	0	0	6	1	0
Σ -	3	0	0	4	3
Σ 0	6	9	3	4	6
Scoring	-3	0	6	3	-3
Rank	4	3	1	2	4

Products are evaluated in correlation with the group of restrictions and a referential product. In this case, the referential product is the Orthosis for the upper limbs, thus its' column in the matrix will be allocated with zero values for all corresponding restrictions. Similar product proposals get zero values, inferior products are allocated a "-" sign and superior products are allocated a "+" sign. The rank is calculated as the sum of symbols and products with more pluses are ranked higher.

Because the medical device "Orthosis for spine correction" best meets the restrictions (rank 1), it was selected for further development. The orthosis product for posture correction will be portable (will allow it to be worn under clothes), easy (its total mass will allow daily movements without inconvenience to the user). The orthosis for posture correction will be programmable and electrically driven, thus allowing continuous correction of the spine according to the established schedule. In addition to the posture correction regime, the orthosis will have a regime of relaxation of the spine and prevention of diseases of the spine.

After selecting the most appropriate product for further development, **data collection** is necessary.

According with Griffin A. and Hauser RJ. (1993), it turns out that by interviewing between 25 and 30 people, a percentage of over 90% of needs is identified (figure 2). Thus, for data collection in the development process of the spinal orthosis, an interview guide was developed, and was applied to 25 potential customers.

Because the information collected from two or more customers may have the same content, but expressed in different forms, the "translation" of customer statements into needs was accomplished. Translation of needs led to the definition of several primary needs regarding the posture correction orthosis (table 2). Relative importance and ranking of the identified primary needs were undertaken in order to facilitate the conceptual design process (table 2). This step is important, as several concepts will be developed within the conceptual design process and each of them cover as many

primary needs as possible. The optimal constructive variant is chosen by the development team depending on the relative importance and ranking of the needs.

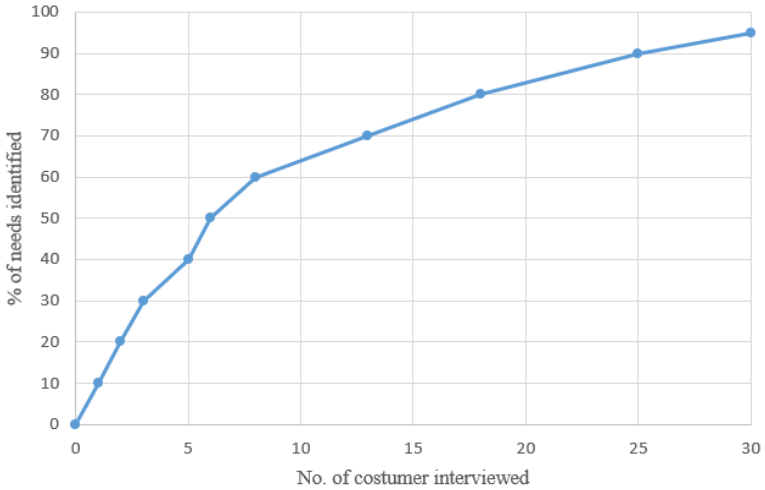

Fig. 2: Correlation between % of needs identification and no. of interviewed costumer [adapted from Griffin A. and Hauser RJ. (1993)]

Table 2: The relative importance of primary needs for a posture correction orthosis

Customer needs	Importance	Rank
The device performs therapeutic movements	5	1
The device allows posture correction	5	1
Use of the Device ensures user comfort	5	1
The device avoids injury during use	5	1
The device is operated in safe conditions	5	1
The device is adjustable and allows its customization	5	1
The device can be used during daily activities	4	2
The device allows periodic sterilization	4	2
The device is accompanied by a technical book	4	2
The device has user proportional dimensions	4	2
The device allows the skin to breathe	4	2
The device is easy to maintain	3	3
The device allows its effortless handling by the user	3	3
The device allows dynamic correction	2	4
The device is a multifunctional product	1	5

Target specifications for a new posture correction orthosis

Target specifications are established after the needs of the customers have been identified, but before generating the product concepts and selecting the most promising one. An arbitrary setting of specifications may make them impossible to achieve technically.

Customers' needs are generally expressed in "customer language". In order to provide precise guidance, close to what will be projected and close to the technical product, the development team

establishes a set of target specifications, which mean precise and measurable outputs. The specifications must reflect the needs of the customers, should differentiate the product from the competing products and be technically and economically feasible.

The target specifications represent the hopes and aspirations of the team, but they are established before knowing the restrictions that the technology of the product will impose. The team's efforts may fail to meet certain specifications, and others may exceed them, depending on the details of the product concept that the team has selected.

The most useful metrics are those that reflect as directly as possible the degree to which the product meets the needs of customers. The relationship between needs and metrics is at the heart of the process of designing specifications. The working hypothesis is that moving from the needs of customers to a set of precise, measurable specifications is possible and that they will lead to meeting the associated needs of customers.

The relationship between the new product and the competing ones is essential for determining the commercial success. While the team started the product development process with a number of ideas on how it wants to compete in the marketplace, the target specifications are the language used by the team to discuss and agree on the precise positioning of the product or report with existing products, both its own and its competitors'.

This step synthesizes the information available to determine the actual values of the metrics. Two types of objectives are useful: an ideal objective and another acceptable limit objective. The ideal objective is the best expected result. The acceptable limit objective is the value of the size that would allow the product to be commercially viable. Both objectives are useful for guiding in the next steps of generating concepts and selecting the right concept as well as for finalizing the specifications after the concept has been selected.

To agree on objectives, several iterations are required. The reflections after each iteration contribute to the verification of the concordance between the obtained results and the project goals. Target specifications are used to choose a concept and determine when it is commercially viable, and they are set by correlating the metrics and needs using the metrics-needs matrix (table 3).

Table 3: The metrics-needs matrix

Needs \ Metrics		Dimensions	Sizes	Target	Type	Locking system	Drive system	Wear period	Warning	Weight	Supply voltage	Colour	Composition	Action area	Technical book	Adjustability	Injury	Therapeutic	Reinforcing	Price
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	The device can be used during daily activities			*				*												
2	The device performs therapeutic movements													*				*		
3	The device allows posture correction			*	*									*						
4	The device allows periodic sterilisation												*							
5	Use of the device ensure user comfort							*		*						*				
6	The device is easy to maintain						*				*									
7	The device is operated in safe conditions					*			*								*			
8	The device is accompanied by a technical book														*					
9	The device avoids injury during use																*		*	
10	The device has user proportional dimensions	*																		
11	The device allows it's effortless handling by the user		*							*					*					
12	The device is a multifunctional product				*									*						
13	The device is adjustable and allows its customisation											*				*				*
14	The device allows dynamic correction						*											*	*	
15	The device allows the skin to breathe												*							

Based on the correlation of needs and metrics presented in table 3, the objective limit and ideal values can be defined. Thus, the target specifications for the posture correction orthosis is presented in table 4.

Table 4: Target specifications for a new posture correction orthosis

No. Crt.	Needs	Metrics	Relative importance	Measuring units	Limit values	Ideal values
1	10	Dimensions	4	cm	70 - 110	50 - 130
2	11	Sizes	3	No.	4	6
3	1, 3	Target disability	5	-	Posture correction	Posture correction Kyphosis
4	3, 12	Type	3	-	Semi-rigid	Semi-rigid
5	7	Locking system	5	-	Velcro	Magnetic
6	6, 14	Drive system	3	-	Mechanic	Electric
7	1, 5	Wear period	5	h/day	10	24
8	7	Warning	4	-	Audible	Audible, Visual
9	5, 11	Weight	5	g	4000	1500
10	6	Supply voltage	2	V	6	4
11	13	Colour	1	-	Monochrome	Multichromatic
12	4, 15	Composition	5	-	Polyester	Cotton
13	2, 3, 12	Action area	5	-	Lumbar	Thoracic, Lumbar, Sacral
14	8, 11	Technical book	3	Yes/No	Yes	Yes
15	5, 13	Adjustability	5	Yes/No	Yes	Yes
16	7, 9	Injury	5	Yes/No	No	No
17	2, 14	Therapeutic movements	3	-	No	Yes
18	9, 14	Reinforcing	4	-	Da	Da
19	13	Price	5	RON	500	350

The finalization of specifications is made through existing technical restrictions and estimated production costs using analytical and physical models. During this phase of completion, compromises must be made between different desired characteristics of the product.

Concept Generation for A New Posture Correction Orthosis

As Ulrich and Eppinger (2012) discussed, following the creation of the database of conceptual solutions known and new for the main functions of the product, a few technically possible solutions are established by combining the concepts. Since, in general, the number of technically possible solutions is very high, considering the objective specifications previously established, a few conceptual solutions are excluded.

The general function is defined as the whole of the properties of the product through which it satisfies the need for which it is designed. Starting from the identified need, it was established that the general function of the developed product is posture correction. The general function is subjected to an analysis process which will result first the main functions (table 5) and then the secondary functions. The main functions are features of the product that determine the general function. Secondary functions result from the interaction of the main functions between them and the bearing the name of

internal interactions and interactions between the main functions and the environment in which they develop and represent external interactions.

From the previously established functions, the list of critical functions has been created, which determines the commercial success of the product (table 7). These critical functions correspond to the sizes and needs with maximum relative importance. Using the hierarchical analytical process, the relative importance of each function was established (table 6).

Table 5: Main functions of a new posture correction orthosis

Function no.	Main functions
φ_1	Adapting to different categories of people
φ_2	Fixing the orthosis on the human body
φ_3	Programming the wearing intervals
φ_4	Operating status indication
φ_5	Setting the treatment regime
φ_6	Ensuring retainment
φ_7	View all operating indicators
φ_8	The physical continuity of the component elements
φ_9	Joining components together
φ_{10}	Aesthetics of the orthosis

Table 6: The hierarchy of the main functions

	φ_1	φ_2	φ_3	φ_4	φ_5	φ_6	φ_7	φ_8	φ_9	φ_{10}	$\sum$	$\prod$
φ_1	1	0.33	0.50	2	0.50	0.33	0.50	1	1	0.50	**7.66**	**0.064**
φ_2	3	1	1	2	1	1	2	2	3	1	**17.0**	**0.142**
φ_3	2	1	1	2	1	1	2	2	2	1	**15.0**	**0.125**
φ_4	0.50	0.50	0.50	1	0.33	0.50	1	1	1	0.50	**6.83**	**0.057**
φ_5	2	1	1	3	1	1	3	2	3	1	**18.0**	**0.150**
φ_6	3	1	1	2	1	1	3	2	2	1	**17.0**	**0.142**
φ_7	2	0.50	0.50	1	0.33	0.33	1	0.50	1	0.50	**7.66**	**0.064**
φ_8	1	0.50	0.50	1	0.50	0.50	2	1	2	1	**10.0**	**0.083**
φ_9	1	0.33	0.50	1	0.33	0.50	1	0.50	1	0.50	**6.66**	**0.056**
φ_{10}	2	1	1	2	1	1	2	1	2	1	**14.0**	**0.117**

Following the analytical hierarchical process, the critical functions and their weight are presented in table 7.

Table 7: Critical functions

Functions no.	Critical function	Weight
φ_2	Fixing the orthosis on the human body	0.142
φ_3	Programming the wearing intervals	0.125
φ_5	Setting the treatment regime	0.150
φ_6	Ensuring retainment	0.142
φ_{10}	Aesthetics of the orthosis	0.117

As Ulmeanu M. et al. (2019) specify, concepts are generated based on the integral concepts table. The main physical systems defined are as follows: Size adjustment system, System for fastening on the body, Timing system for the wearing period, System for choosing the area of action, System for

performing therapeutic movements, Restraint insurance system. For each physical system the designer registers all possible materializations of each sub-function, ensuring a comprehensive coverage of concept solutions. The first three systems had eleven registered components each and the last three physical systems had seven components each. The theoretical concepts solutions are generated by combining every element from one physical system with all other elements from the other six columns. Thus, the theoretical concept possibilities group is calculated by multiplying the number of all elements. For the new posture correction orthosis, the partial conceptual solution database can comprise several 456,533 theoretical concepts. It is unrealistic to say that all these concepts will be analysed or even tested. Thus, various solutions need to be eliminated from this comprehensive list.

Considering the main selection criteria – safety and cost, five medical device concepts were developed and detailed. The constructive solutions for each system identified is detailed hereafter for all concepts.

Concept 1

Concept 1 (figure 3) is presented as an orthopaedic vest for posture correction and has the body (1) made of cotton. The adjustment of the dimensions is made progressively by means of the ratchet system, which is composed of the toothed belt (2) and the flap (3). Thus, with the help of the ratchet system, the orthopaedic vest can be adjusted on the human body. After the dimensional adjustment of the vest on the body, it is fixed by means of staples (5). According to the prescriptions of the specialist doctor, the user can set the daily wear interval with the help of the timer switch (4).

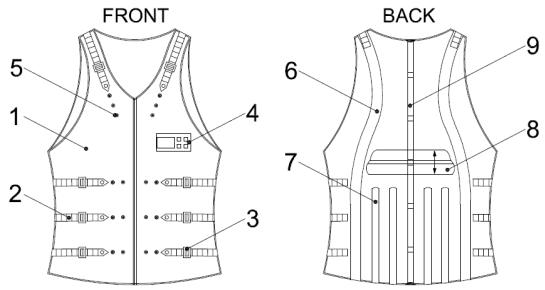

Fig. 3: Concept 1 of a new posture correction orthosis

With the help of the timer switch (4), the user can set an "alarm" for the memory, both for the dressing time and for the end of the wearing period. Depending on the condition of the user, the area of action of the orthopaedic vest (cervical, thoracic, lumbar) can be chosen through the mechanical system, which consists of the rigid plate (8) and the guide (9). The rigid plate (8) may be positioned in one of the said areas by translating it into the guide (9) and fixing it to the required area. The therapeutic effect of the orthopaedic vest is given by the kinesiological bands (6) which directly stimulate the peripheral and lymphatic circulatory systems, and indirectly, the muscular and neurological systems. The containment is ensured by means of metallic splinters (7), these "enclose" the user's body in the orthopaedic vest, so the spine is supported by them.

Concept 2

Concept 2 (figure 4) is designed as an orthopaedic vest for posture correction and has the body (1) made of cotton. The adjustment of the dimensions is made progressively with straps (2). After the dimensional adjustment of the vest on the body, it is fixed using buckles (3) which are located on the vest. According to the prescriptions of the specialist doctor, the user can set the daily wear interval using the analogous time relay (5). Depending on the disability type degree of the user, the area of action of the orthopaedic vest (cervical, thoracic, lumbar) can be chosen through the mechanical system, which is composed of the driving screw (6) and the nut (7). The bar system (8) may be positioned in one of the said areas by translating it onto the driver screw (6) and fixing it to the required area. The therapeutic effect of the orthopaedic vest is given by the brush system (4) which

directly stimulates the peripheral and lymphatic circulatory systems, and indirectly, the muscular and neurological systems.

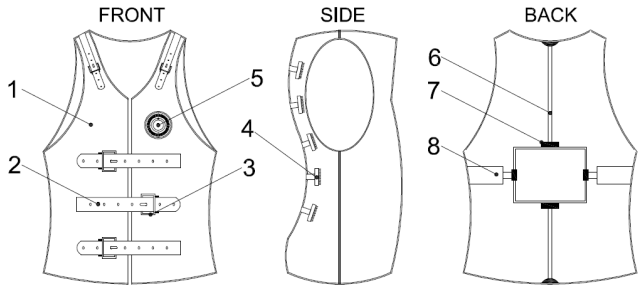

Fig. 4: Concept 2 of a new posture correction orthosis

Concept 3

The third posture correction orthosis concept (figure 5) is a memory harness (1). The memory harness (1) ensures the containment of the entire device on the patients' body. The adjustment of the dimensions is made progressively through the magnet system, which is composed of two magnets, a movable magnet (4) and a fixed magnet, positioned underneeth.

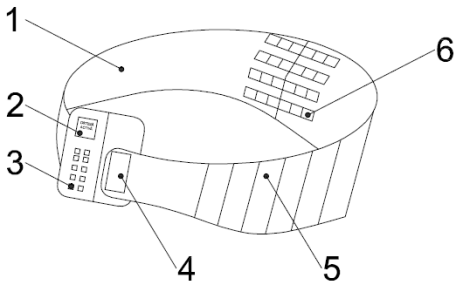

Fig. 5: Concept 3 of a new posture correction orthosis

According to the prescriptions of the specialist doctor, the user can set the daily wear interval using the digital time relay (2). The therapeutic effect of the orthopaedic vest is given by the therapeutic massage system (6) which directly stimulates the peripheral and lymphatic circulatory systems, and indirectly, the muscular and neurological systems. Through the electronic system (3), the orthosis can be programmed to act after certain pre-set cycles. Likewise, this system allows the user's preferences to be stored, thus offering as much comfort as possible.

Concept 4

The fourth concept (figure 6) is designed as an orthopaedic vest for posture correction and has the main body (1) made of cotton. Dimensions can be adjusted progressively using the straps (5). After the dimensional adjustment of the vest on the body, it can be fixed using the Velcro system (6) which is located on the vest to cover all the dimensional ranges of the vest (XS - XXL). The user can set the daily wear interval using the modular electronic device (4), according to the prescriptions of a specialist. Depending on the condition of the user, the area of action of the orthopaedic vest (cervical, thoracic, lumbar) can be chosen through the sensory system, which acts exactly in the selected area. The stretching system (3) ensures the restraint of the orthosis on the human body. The therapeutic effect of the orthopaedic vest is given by the postural akinetic system (2) which directly stimulates the peripheral and lymphatic circulatory systems, and indirectly, the muscular and neurological systems.

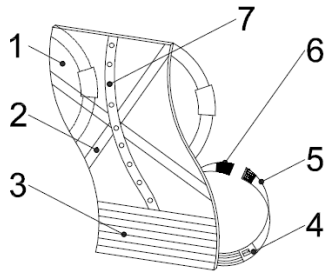

Fig. 6: Concept 4 of a new posture correction orthosis

Concept 5

The fifth and final concept (figure 7) proposed by the development team is also an orthopaedic vest for posture correction and has the body (1) made of cotton. The user cand adjust the dimensions progressively using the Velcro system (2). The user can also set the daily wear interval with the help of the digital timer (3). Usually this wear interval is prescribed to the patient by a medical professional. With the help of the timer (3), the user can set an "alarm", for notifications regarding the dressing time and for the end of the wearing period. Depending on the condition of the user, the area of action of the orthopaedic vest (cervical, thoracic, lumbar) can be chosen through the electronic system (5). The therapeutic effect of the orthopaedic vest is given by the massage pillows (4) that directly stimulate the peripheral and lymphatic circulatory systems, and indirectly, the muscular and neurological systems. The containment is ensured by means of metallic splinters (7), these "enclose" the user's body in the orthopaedic vest, so that the spine is supported by them.

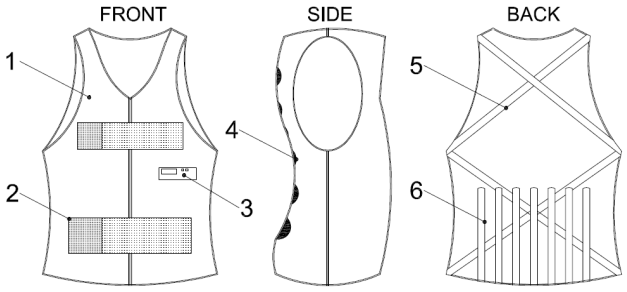

Fig. 7: Concept 5 of a new posture correction orthosis

Conclusion

As the society evolves, the needs of its members increase in complexity and gradually people are presented with more and more options of interactive smart products. The posture correction orthosis concepts presented in this paper come in response to these multiple requests, managing to cover a diverse range of requirements and to bring an innovative contribution in order to exceed the classic expectations of the clients.

Identifying needs consists of analysing the clients' requirements. After collecting the requirements and ordering them, they were evaluated. Subsequently, these needs were transformed into target specifications. Understanding customer needs is a crucial contribution to the product development process and, at the same time, a very big challenge. The interview was used as a tool for the identification of the clients' needs. Customer needs have been transformed into a set of target specifications, meaning precise measurable outputs that the product should accomplish in order to be a commercial success. Once the specifications of the selected product have been established, it was necessary to generate concept ideas to meet these specifications. The success of this stage of product design and development is favoured by generating as many ideas as possible. Successful product developers believe that, with case-by-case variations, about 100 ideas need to be investigated in order to find a valuable one. Many ideas come from customers, competing producers, consultants, members

of the product development team. The generation of these ideas must be as free and as unrestricted as possible.

Five concepts were developed and presented within the current research, with specific physical elements that meet customer needs. Further research includes concept selection and the definition of final product specifications in relation with technological requirements.

References

- Doicin, C., Murzac, R., Gheorghita, V., Ulmeanu, M., Tunsoiu, N. and Salvan, M. (2018), 'Research on the design and testing of a new product development methodology', *Proceedings of the 32nd IBIMA Conference*, pp. 5479-5490, ISBN 978-0-9998551-1-9.

- Galbusera, F. and Wilke, HJ. (2018), 'Biomechanics of the Spine: Basic Concepts, Spinal Disorders and Treatments', *Academic Press*, ISBN: 9780128128510.

- Griffin, A. and Hauser, RJ. (1993), 'The Voice of the Customer', *Marketing Science*. vol. 12, no. 1.

- Miles, LD. (2008), 'Value methodology: A pocket guide to reduce cost and improve value through functional analysis, GOAL/QPC Publishing, ISBN 1576811050.

- Roemer, TA. (2012), 'Identifying customer needs', *European Journal of Operational Research*.

- Shane, SM. (2003), 'Handbook of Technology and Innovation Management', *Wiley Publication.*

- Ulmeanu, M., Doicin, C., Murzac, R., Tunsoiu, D. and Tunsoiu, N. (2019), 'Product Development of a Bio-composite Medical Device', *Materials Science Forum*, ISSN: 1662-9752, Vol. 957, pp 71-80.

- Ulrich K.T. and Eppinger S.D. (2012), Product design and development, McGraw-Hill International, 5th Edition, ISBN 978-007-108695-0.

- Woinaroschy A. (2015), Product engineering – component of company development through innovation, *10th Edition of annual conference ASTR*, Bucharest.

Teaching the Values of Environmental Citizenship in A Developing Country; The Difference Level of Responsiveness Across the Gender

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Abstract

Pleasant living environment and health is a fundamental right of every citizen. However, significant problems in Indonesia now is environmental issues, including the river in an unhealthy condition coupled with a lack of awareness and wrong attitude of the citizens, toward the environment. Research on environmental citizenship in Indonesia is still minimal. This study aimed to evaluate the environmental citizenship teachers are expected later to instil the values of ecological against students at the school. The research method is quantitative descriptive. The technique of collecting data used questionnaires. Analysis of data applied Mean and SD. The results showed that male students and female-only able to achieve moderate levels of all dimensions of environmental citizenship. The level of female students is higher than male students on the dimensions of sustainability and responsibility. Level conditions of students cannot be expected to inculcate of ecological values. The implication is that dimensions worthy of environmental citizenship grown, developed and enhanced through the integration of ecological values, implemented in the learning activities and extracurricular activities, and among them are explicitly designed to improve the competence of male students in the dimensions of sustainability and responsibility.

Keywords: Environmental citizenship, Student, Gender, Ecological Values

Introduction

Environmental issues in Indonesia are now a significant problem. According to the Survey of Research and Development Koran Sindo (2018), there are 10 big problems of the environment in Indonesia, namely trash (40%), floods (20%), the river is polluted (11%), global warming (10%), air pollution (6%), the destruction of marine ecosystems (4%), the difficulty of clean water (3%), deforestation (2%), abrasion (2%), and pollution (2%). The same tone expressed by Nahruddin (2018) that the strategic issues of environmental challenges consist of illegal logging, illegal mining, marine pollution, and conversion of agricultural land.

Issues relating to the environment in South Kalimantan are Mount Meratus problems, pit, and smog (Rifani, 2019). Besides the poor environmental conditions, the damage continues to increase, because of mining, plantation activities with less open land clearing or comply with the provisions of the Law on Environment (Hasan, 2015), even index the worst environmental quality South Kalimantan in Borneo and ranks 26 out of 33 provinces in the country (Susanto, 2017).

South Kalimantan topography is mostly on wetlands, including rivers. Condition of the major rivers in South Kalimantan like Barito Martapura and Nagara rivers over the last five years have been severely polluted (PPKL KLHK RI, 2019). The cause is the uncontrolled amount of faecal coliform bacteria and total coliform which come from animal and human fecal waste, especially the number of latrines in the river, and the activity of the coal mine waste disposal recklessly became the source of the problem. (DLHD South Kalimantan, 2018)

Environmental problems in Banjarmasin city related to the destruction of several rivers because of high levels of acidity, due to the exploitation of peatlands, such as the massive oil fields, fields and settlements. Thus, the coli bacterial content is very high above the normal range. Also, the turbidity level of the river in Banjarmasin contaminated sludge and degradation due to upstream erosion region. Banjarmasin river conditions are already in the category of dangerous and in the borderline of heavily polluted. Besides the river ecosystem is in danger because of the bad habits that residents throw garbage into the river. If the first form of household waste were vegetables and fish, now in the form of plastic waste (Irmita, 2018).

The leading cause of the problems of environmental degradation is the lack of awareness of citizens in protecting and preserving the environment and caused by the wrong attitude of the citizens towards the environment (Prasetiyo and Budimansyah, 2016; Sudarmadi et al., 2001; Irmita, 2018).In facing the environmental degradation and its management, are required role of government, legislators, law enforcement, and society as citizens. In Indonesia, a pleasant living environment and health is a fundamental right of every citizen of Indonesia as stipulated in Article 28H of the Constitution of the Republic of Indonesia Year 1945 and Law No. 23 of 1997 on environmental management (UUPLH) Article 5 (3) explains that everyone has the right to participate in environmental management.

Participation and responsibilities of citizens sorely needed in protecting the environment as a form of awareness of the rights, obligations, sustainability and ecological justice, because humans are part of the environment. This is in line with the development of citizenship concept which is no longer refers to the concept of classic citizenship in the dimension of civil, political, and social (Abowitz and Harnish, 2006), or the legal, political and social (Iija, 2011), but has crossed dimensions of the other, social, economic and political (MaCregor et al., 2005), cultural (Rosaldo, 1994; Ong, 1996), and environment (Jagers and Martisson, 2010).

Environmental citizenship refers to the activity of local community-based citizenship, nation-states, and the world (McGregor, 2006), involves the concept of virtues that play a crucial role (Carme Melo-Escrihuela, 2008), and used (Martinho, Nicolau, Caeiro, Amador, and Oliveira, 2010), to teach values and practices appropriate for achievement of sustainability, through changes in personal behaviors, become responsible citizens on the environment; disciplined "good", behave "green", and more emphasis on environmental rights. Not only that, environmental citizenship empowerment requires citizens to have the knowledge, skills, and attitudes needed to identify the values and goals concerning the environment, but also can act on his knowledge of the consequences that will occur (Berkowitz, 2005: 228).

Studies of environmental citizenship are still limited (Uysal, 2018; Mohtar & Rajiani, 2016; Erdilmen, 2012; Ozden, 2011; Jagers & Matti 2010; Jagers, 2009) with the most recent studies conducted by Karatekin (2018, 2019). Similarly, in Indonesia, studies of environmental citizenship / ecological still limited, because it is still new, among others; community development of citizens concerned about the environment (Prasetiyo and Budimansyah, 2016), strategy formation of ecological citizenship through schooling (Mariyani, 2017), reconstruction of ecological citizenship through civic education based eco-literacy (Rondli and Yuli, 2017), creating ecological citizenship through the digital era (Jannah, 2018). None of these studies has assessed students of *Pancasila* – the state ideology - and Citizenship Education mainly to do with the level of ecological citizenship, including in the perspective of gender differences. Therefore this study aimed to evaluate the environmental citizenship of students from the perspective of gender.

Theoretical Framework

Environmental citizenship has been discussed since 1990 in policy documents, academic and campaign institutions (Carme Melo-Escrihuela, 2008). The traditional concept of Marshall on citizenship will change when dealing with the needs, rights, duties, and obligations that grow concerning the environment and sustainability, particularly global threats such as depletion of natural resources and the degradation of the environment, so was born the proposal 'we all now are nationals

environment' (Newby, 1996). Therefore contemporary citizenship has four dimensions, namely civil rights, political and social, and environmental or ecological citizenship (Steenbergen, 1994).

Citizenship ecological/environmental citizenship based on the scope of activities of local communities, nation-states, and the world (MacGregor, 2006a, 85-96), involves the concept of virtues that play a key role (Carme Melo-Escrihuela, 2008), is used (Martinho, Nicolau, Caeiro, Amador, and Oliveira, 2010) to teach values and practices that are appropriate for the achievement of sustainability through changes in personal behaviors, become responsible citizens on the environment; disciplined "good", behave "green", and more emphasize environmental rights. Environmental citizenship also demonstrated a pro-environmental behavior, either publicly or privately, which is driven by a belief in the fairness of the distribution of the merits of the environment,

Pro-environmental behavior is rooted in a commitment to the principles and underlying values. Environmental citizenship is a value-based approach to encourage pro-environmental behavior, with a way of trying to pull out the values that are hidden within the individual, rather than approaches based on values aimed at changing the values there, 'value' key is justice among human beings, rather than caring for the environment for the sake of his own, or even for what he was given to us. (Dobson, 2010)

Due to environmental citizenship primarily includes an understanding of ecological issues, rights, responsibilities of citizens in environmental issues, the action taken is not only address environmental problems, but also to promote human interaction a positive and sustainable with the environment (Berkowitz et al., 2005: 227; Clarke & Agyeman, 2011: 1775; Latta, 2007: 18; Gabrielson & Cawley, 2010: 605; Gebbels, Evans, & Delany, 2011: 13). For that integrate environmental education and civic education, feasible through the integration of ecological values, inquiry, interdisciplinary and practice reflexively with pedagogy affection in civic education environment, implemented by teachers in schools, to foster nationals environment as defenders of social order new(MacPherson, 2005; Dobson, 2003; Akyüz, 1978), including in this case the student teachers.

One way to foster environmental nationals who have an awareness of the values and ecological behavior is to evaluate the level of environmental citizenship teachers and student teachers. It thus carried out, to know the condition of achieving environmental citizenship level student teachers. From the condition of a certain level is reached, will determine the dimensions of anything that contains values and ecological behavior of environmental citizenship that will be grown and strengthened, and the charge or the exercise pattern of pre-service and in-service environmental citizenship.

The level of environmental citizenship refers to the scale of environmental citizenship newly developed by Karatekin (2018), and with the scale used to conduct a study of teachers (2019). Four dimensions emphasize environmental citizenship, namely responsibility, sustainability, rights and justice, and participation. The responsibilities grow apart responsibilities contract and non-contract is the responsibility of the citizens of the environment to support the ecological balance, and "responsibility" is an essential dimension of environmental citizenship. Environmental citizenship is the type of citizenship that encourages individuals, communities, and organizations as citizens of the world.

Participation is one of the concepts that are used when determining the developed democracies. Participation is the involvement of the people in the decision-making process involving individuals and communities in a way that affects the processes (Karatekin and Elvan, 2016). The citizen should behave participation in efforts to meet the responsibilities and obligations, as the realization of the rights of the environment, such as affecting the making, change, protection and sustainable development of the people who live in an environment (Akyüz, 2001). Because of the participation in the resolution of environmental problems is right at the same time as responsibility is as a task (Karatekin, Kus and Merey, 2014). In this sense, environmental citizenship will be seen as a mechanism of political participation in the processes of decision making (Martinho, Nicolau, Caeiro, Amador & Oliveira, 2010). However, research shows that the low level of civic participation of

young people (Karatekin, Kus and Merey, 2014; Harris, Wyn & Younes, 2010; Doganay, Çuhadar and cider, 2007; Henn, Weinstein, and Forrest, 2005; Erdoğan, 2003; Torney-Purtra & Amadeo, 2003). To make the young generation as a citizen of the environment can be done through educational activities. Research suggests that low levels of civic participation of young people (Karatekin, Kus and Merey, 2014; Harris, Wyn & Younes, 2010; Doganay, Çuhadar and cider, 2007; Henn, Weinstein, and Forrest, 2005; Erdoğan, 2003; Torney- Purtra & Amadeo, 2003). To make the young generation as a citizen of the environment can be done through educational activities. Research suggests that low levels of civic participation of young people (Karatekin, Kus and Merey, 2014; Harris, Wyn & Younes, 2010; Doganay, Çuhadar and cider, 2007; Henn, Weinstein, and Forrest, 2005; Erdoğan, 2003; Torney- Purtra & Amadeo, 2003). To make the young generation as a citizen of the environment can be done through educational activities.

The level younger generation and elaborating citizenship from a gender perspective, including student teachers is essential because they will become teachers of civic education in the future that will affect the values and behavior of environmental citizenship young protege. Because research shows, women tend to have higher scores on environmental values that underlie environmental behavior (Srbinovski, 2016) as well as the views of pro-environment and concern for environmental problems (Xiao and McCright, 2015). A gender perspective is also interesting to be elaborated because the findings Borden and Francis (1978, in Zelezny et al., 2000) compared with men, women are more powerful in the level of social responsibility towards the environment.

Method

The research is descriptive quantitative research with a survey method. The study population was a student of *Pancasila* and Citizenship Education of Lambung Mangkurat University. The sample will be determined by the technique respondents proportional random sample per batch of students from the class of 2013-2018. The respondents were 100 people, consisting of 46 men and 46 women, techniques of data collection using the questionnaire. Questionnaires were used to adopt the Level Scale questionnaire from Karaktekin Environmental Citizenship (2018). Data analysis was performed using the Mean and SD. To measure the level of Citizenship Environment using the criteria and categories Environmental Citizenship rate by category of Karetekin (2018), namely: Mean score 1.00-1. 80 (Almost never/Very Low); 1.81-2.60 (Rare/Low); 2.61-3.40, (Sometimes/Moderate); 3.41 to 4.20 (Normally / High); and 4.21 to 5.00 (Always /Very High).

Findings and Discussion

Level Environmental Citizenship Prospective Students Teachers

Environmental citizenship	$\overline{X}$	SD	Level
Dimensions of Participation	2.48	0.812	low
Dimensions of Sustainability	3.26	0.736	moderate
Dimensions Responsibility	3.42	0.776	high
Rights and Justice	3.76	0.970	high
Total Dimensions	3.09	0.639	moderate

The above data shows that student of *Pancasila* and Citizenship Education is at a low level or rarely perform in the dimension of participation, dimensions of sustainability occupies a moderate level, sometimes just done, only the dimensions of responsibility and dimensions of rights and justice occupy a high level, used to do. However, the overall level of environmental citizenship student of *Pancasila* and Citizenship Education at the level of being.

Environmental Citizenship Achievement Level Views of Gender

Environmental citizenship	$\overline{X}$		SD		Level	
	men	women	men	women	men	women
Dimensions of Participation	2.48	2.48	0.793	0.839	low	low
Dimensions of Sustainability	3.08	3.45	0.756	0.677	moderate	high
Dimensions Responsibility	3.37	3.47	0.776	0.782	moderate	high
Rights and Justice	3.66	3.87	0.845	1.078	high	high
Total Dimensions	3.06	3.17	0.639	0.635	moderate	moderate

Environmental citizenship dimensional views of gender show the position of the same level, which is lower in the dimensions of participation, and high in the dimension of rights and justice. However, different levels of the dimensions of sustainability and responsibility, the men are at moderate levels, while women are at a high level. Nevertheless, the overall level of environmental citizenship both men and women were on the same level, namely the level of moderate or sometimes do.

Associated with the condition of the already alarming environmental degradation and growing (Hasan, 2015), even index the worst environmental quality South Kalimantan in Borneo and ranks 26 out of 33 provinces in the country.(Susanto, 2017). Coupled with the finding that the overall level of environmental citizenship student teachers Pancasila and Citizenship Education at the level of being, or sometimes, especially on the dimensions of sustainability and responsibility, the prospective teachers who thus cannot be expected (Karatekin, 2018) to instil the values and behaviors environmental citizenship, because the activity is merely incidental, showing the regularity and consistency.

This level indicates that the required increase in the level of environmental citizenship for student teachers Pancasila and Citizenship Education, better knowledge, awareness, skills, and participation related to the competence of the ecological and environmental citizenship activities. To increase the level of environmental citizenship, especially given birth behavioral regularities and consistent student teachers of civic education needs to be done planting, development, and cultivation of values, competencies, behavioral ecology through the variables that influence the growth of environmental citizenship (Karatekin, 2018), such as the level of curiosity about the environment and the frequency of participation in community activities. Besides ecological competence form of knowledge, Prasetiyo and Budimansyah, 2016), strategy formation of ecological citizenship through schooling (Mariyani, 2017), the reconstruction of civic ecological through civic education based eco-literacy (Rondli and Yuli. (2017), and create a citizenship ecological digital age (Jannah, 2018). All of these variables need to be implemented in learning activities in Study Program of *Pancasila* and Citizenship Education specialized in eye-course Citizenship, Environmental Education, Environmental Law and Environmental Citizenship Prodi Wetlands in Pancasila and Citizenship Education Study, which is expected to give birth to Pancasila and Citizenship Education teachers who have a high level and very high on the scale Environmental Citizenship.

The findings of concern are the low level of environmental citizenship student teachers Pancasila and Citizenship Education of the dimension of participation. Since the element of participation by Steenbergen, 1994) plays a key role in environmental citizenship. Participation indicates the involvement of individuals and communities and ways to influence the decision-making process (Karatekin and Elvan, 2016), shows the participatory behavior to fulfill the responsibilities and obligations. Akyüz (2001) describes participation in the perspective of environmental rights such as to affect the manufacture, alteration, protection and sustainable development of the people living in an environment. Because of the participation in the resolution of environmental problems is right at the same time as the responsibility as a task (Karatekin, Kus and Merey, 2014). Environmental citizenship is a mechanism of political participation in the processes of decision making (Martinho, Nicolau, Caeiro, Amador & Oliveira, 2010).

However, the low level of environmental citizenship of student after being taught *Pancasila* – the state ideology - and Citizenship Education strengthen research findings about the low level of civic participation of young people (Karatekin, Kus and Merey, 2014; Harris, Wyn & Younes, 2010; Doganay, Çuhadar and cider 2007; Henn, Weinstein, Forrest, 2005; Erdoğan, 2003; Torney-Purtra & Amadeo, 2003).

The fourth dimension of the level of environmental citizenship, only the dimensions of rights and justice are to be at a high level, which means that student teachers always feel sad about the forest fires that occurred in other areas. Environmental citizenship is a value-based approach to encourage pro-environmental behavior, with a way of trying to pull out the values that are hidden within the individual, rather than approaches based on values aimed at changing the values there, 'value' key is justice among human beings, rather than caring for the environment for the sake of his own, or even for what he was given to us. (Dobson, 2010). The high level on the dimensions of rights and justice has attracted equity value from within the student, that cares for the environment, not just for himself, but also intended for someone else. Although a small scale in this dimension of responsibility, student teachers always file a complaint against the torture of animals, especially endangered animals, that damage the plants in the garden, who cut down a protected tree. The same thing on the dimensions of sustainability, student teachers usually pay attention to the products purchased, are included in foods genetically modified or not.

The research findings have illustrated that environmental citizenship is a way to discuss the risks differently to human bodies specifically, and how governments and corporations often trample on the rights of the environment of the -the specifics. This is according to Horton (2006) a discourse of the struggle for social justice and is an integral part of the concept of citizenship ecological, where the citizens of the neighborhood "doing good" like the right thing to do, rather than for the sake of gifts or economic penalties (Dobson, 2003), made a commitment to goodness together and consider their behavior under conditions of justice and injustice Dobson (2007).

Although overall there is a similar position among male and female students in the level of environmental citizenship, the different levels of the dimensions of sustainability and responsibility exist where the men are at moderate levels, while women are at a high level. These findings reinforce the results of several studies, that women tend to have higher scores on environmental values that underlie environmental behavior (Srbinovski, 2016) as well as the views of pro-environment and concern for the problems of the environment (Xiao and McCright, 2015).

This distinction is interesting to be elaborated because it reinforces the findings of Borden and Francis (1978, in Zelezny et al., 2000) that compared with men, women are more powerful in the level of social responsibility towards the environment. Why are women more pro-environmental attitude? Theoretically, the gender differences in environmental perspective by Zelezny, Chua, and Aldrich (2000) are strong linkages between socialization and values, especially the socialization of the value of the needs of others, the behavior is more helpful and altruistic, thereby affecting gender differences in awareness and environmental behavior (Dietz et al., 2002; Berenguer, 2007).

Conclusion

Environmental citizenship level achieved as a whole are at moderate levels, while views dimensions, the low level of participation in the dimension, the dimension of sustainability occupies a moderate level, only the dimensions of responsibility and dimensions of rights and justice occupy a high level. Judging from the gender, the overall level of environmental citizenship both men and women were on the same level, namely the level of medium, low in participation dimension, height in the dimensions of rights and justice. However, different levels of the dimensions of sustainability and responsibility, the men are at moderate levels, while women are at a high level.

With such level conditions may not be desirable, implying teachers are not able to embed, develop, and foster the values, competencies and ecological behavior that manifests in environmental citizenship. The implication is necessary to increase the level of achievement of environmental

citizenship for teachers by designing a better delivery for *Pancasila* and Citizenship Education subjects containing knowledge, awareness, skills, and participation concerning the values, competencies and activities and ecological behavior.

References

- Abbas, E.W., Hadi, S. and Rajiani, I. (2018), 'The prospective innovator in public university by scrutinizing particular personality traits,' *Polish Journal of Management Studies*, *18*.
- Abowitz, Kathleen Knight and Harnish, Jason. (2006), 'Contemporary Discourses of Citizenship,' *Review of Educational Research,* Winter 2006, Vol.76, No.4, pp.653-690.
- Agyeman, Julian and Evans, Bob. (2006) Justice, governance, and sustainability: perspectives on environmental citizenship from North America and Europe, In Environmental Citizenship, Dobson A, Bell D (eds), MIT Press, Cambridge, MA; 185-206.
- Akyüz, Y. (1978). Türkiye'de öğretmenlerin toplumsal değişimdeki etkileri 1848-1940. Ankara: Doğan Basımevi. In Karatekin, Kadir (2019) 'Model Review Related to the Effects of Teachers' Levels of Ecological Citizenship,' *International Electronic Journal of Environmental Education*, Vol.9, Issue 1, 2019, 46-61.
- Akyüz (2001), Akyüz, E. (2001). Çocuk hakları sözleşmesinin Eğitim Temel ilkeleri ışığında çocuğun Hakki, MEB Dergisi, sayi: 151. In Karatekin, Kadir and Uysal, Cevdet (2018), 'Ecological Citizenship Scale Development Study,' *International Electronic Journal of Environmental Education*, Vol.8, Issue 2, 2018, 82-104.
- Berenguer, J. (2007) 'The effect of empathy in pro-environmental attitudes and behaviors,' *Environment and Behavior*, 39, 269-283.
- Berkowitz, AJ, Ford, MA, & Brewer, CA. (2005) A framework for integrating ecological literacy, Civics literacy, and environmental citizenship in environmental education. In EA Johnson & MJ Mapping (Eds.), Environmental education and advocacy: Changing perspectives of ecology and education (pp. 227-266), Cambridge, Cambridge University Press.
- Carme Melo-Escrihuela. (2008) 'Promoting Ecological: Citizenship; Rights, Duties and Political Agency*,' ACME: An International E-Journal for Crotocal geographies*, 7 (2) 113-134.
- Clarke, L., & Agyeman, J. (2011), 'Shifting the balance in environmental governance: Ethnicity environmental citizenship and discourses of responsibility,' *Antipode*, 43 (1) Pp. 1773-1800.
- DLHD South Kalimantan, 2018. [Online]. [Retrieved May 7, 2019]. Available at http://kalsel.prokal.co/read/news/13501-lima-tahun-air-sungai-di-kalsel-tercemarberat,
- Dietz, T., Kalof, L., & Stern, PC. (2002), 'Gender, values, and environmentalism,' *Social Science Quarterly*, 83, 353-364.
- Dobson, A. (2003) Citizenship and the environment, New York, Oxford University Press.
- Dobson, A. (2007) 'Environmental Citizenship: Towards Sustainable Development, '*Sustainable Development*, 15, 276-285.

- Dobson, A. (2010) *Environmental citizenship and pro-environmental behavior*. Rapid research and evidence review The Sustainable Development Research Network. November 2010.

- Doganay, A., Çuhadar, A. & cider, M. (2007), Ogretmen adaylarının siyasal katılımcılık düzeylerine çeşitli etmenlerin democratic etkisinin vatandaşlık eğitimi bağlamında incelenmesi. Kuram Uygulamada ve Eğitim Yönetimi. (50), 213-246. In Karatekin, Kadir and Uysal, Cevdet (2018), 'Ecological Citizenship Scale Development Study,' *International Electronic Journal of Environmental Education*, Vol.8, Issue 2, 2018, 82-104.

- Environment Canada (2003). [Online]. [Retrieved, May 8, 2019]. Available at www.ec.gc.ca.

- Erdilmen, Ş. (2012) Niğde Üniversitesi Eğitim fakültesi öğrencilerinin Çevresel vatandaşlık düzeylerinin incelenmesi bilgiler ve Sosyal öğretmenliği Lisans programi ile karşılaştırılması öğrencilerinin durumu. Yuksek Yayınlanmamış Lisans Tezi, Eğitim Bilimleri Enstitüsü, Niğde. In Karatekin, Kadir (2019), 'Model Review Related to the Effects of Teachers' Levels of Ecological Citizenship,' *International Electronic Journal of Environmental Education*, Vol.9, Issue 1, 2019, 46-61.

- Erdoğan, E. (2003). Gençliği Türk ve siyasal katılım: 1999-2003, İstanbul: Toplumsal Katılım ve Gelisim Vakfi. In Karatekin, Kadir (2019), 'Model Review Related to the Effects of Teachers' Levels of Ecological Citizenship International,' *Electronic Journal of Environmental Education*, Vol.9, Issue 1, 2019, 46-61.

- Gabrielson, T., & Cawley, RM. (2010), 'Plain member and citizen: Aldo Leopold and environmental citizenship,' *Citizenship Studies*, 14 (1). Pp. 605-615.

- Gebbels, S., Evans, SM, & Delany, JE. (2011), 'Promoting environmental citizenship and corporate social responsibility through a school/industry/university partnership,' *Journal of Biological Education*, 45 Pp. 13-19.

- Hasan, Shamsuddin. (2015) *Environmental Damage Alarming South Kalimantan*, [Online]. [Retrieved May 8, 2019]. Available at https://kalsel.antaranews.com/berita/24317/kerusakan-lingkungan-kalsel-memprihatinkan

- Harris, A., Wyn, J. & Younes, S. (2010), 'Beyond apathetic or activist youth: 'ordinary' young people and contemporary forms of participation,' *Young*, 18 (1), 9-32.

- Henn, M., Weinstein, M. & Forrest, S. (2005), 'Uninterested youth? Young people's attitudes towards party politics in Britain, ' *Political Studies*, 53 (3), 556- 578.

- Horton, D. (2006). Demonstrating environmental citizenship? A study of everyday life among green Activists. In A. Dobson and D. Bell (Ed.) Environmental Citizenship (p.127-151), London, The MIT Press.

- Humphreys, David. (2009) 'Environmental and ecological citizenship in civil society,' *International Spectator*, 44 (1) pp. 171-183.

- Iija, Veera Ilona. (2011) An Analysis of the Concept of Citizenship: Legal, Politics and Social Dimensions. University of Helsinki Faculty of Sciences Social and Moral Philosophy, Master's Thesis. December 2011. [Online]. [Retrieved May 8, 2019]. Available at https: //helda.helsinki.fi/bitstream/handle/10138/29256/veerasthesisFINAL.pdf?

- Irmita, Rizky. (2018). *When rivers in Banjarmasin Being "Sick" As a result of land exploitation*. [Online]. [Retrieved May 8, 2019]. Available athttps://www.kanalkalimantan.com/saat-sungai-sungai-di-banjarmasin-menjadi-sakit-akibat-eksploitasi-lahan/

- Jagers, SC and Matti, S. (2010), 'Ecological citizens: Identifying values and beliefs that support individual environmental responsibility among Swedes, ' *Sustainability*, (2), 1055-1079.

- Jannah, Raudlatul. (2018) 'Creating Ecological Citizenship in the Digital Age through Kampoeng Recycle Jember,' *Journal of Urban Sociology*, Volume I. 2. October 2018.

- Jensen, BB. (2002) 'Knowledge, action and pro-environmental behavior,' *Environmental Education* Research, 8 (3), 325-334.

- Karatekin, Kadir and Uysal, Cevdet. (2018), 'Ecological Citizenship Scale Development Study,' *International Electronic Journal of Environmental Education*, Vol.8, Issue 2, 2018, 82-104.

- Karatekin, Kadir. (2019) 'Model Review Related to the Effects of Teachers' Levels of Ecological Citizenship,' *International Electronic Journal of Environmental Education*, Vol.9, Issue 1, 2019, 46-61.

- Koran Sindo (2018). *10 Problem of the Environment in Indonesia*. [On line]. [Retrieved May 7, 2019]. Available athttps://nasional.sindonews.com/read/1302781/15/10-problem-besar-lingkungan-di-indonesia-1525347778,

- Latta, P. Alex. (2007) 'Locating in ecological citizenship democratic politics, '*Environmental Politics,* 16 (3), 377-393.

- Latta, P. Alex and Wittman, Hannah. (2010), 'Explorations Environment and Citizenship in Latin America: A New Paradigm for Theory and Practice, ' *European Review of Latin American and Caribbean Studies,* 89, October 2010, 107-116.

- MacGregor, Sherilyn. (2006a) Beyond Mothering Earth: Ecological Citizenship and the Politics of Care, Vancouver, UBC Press.

- MacGregor, Sherilyn and Simon Pardoe with Andrew Dobson and Derek Bell. (2005) Environmental Citizenship: The Goodenough Primer. Summary report of an ESRC seminar series. [On line]. [Retrieved May 17, 2019]. Available at http: //www.environmentalcitizenship. Net.

- MacGregor, S. and Szerszynski, B. (2003*)* Environmental citizenship and the administration of life. Paper presented at 'Citizenship and the Environment' Workshop, Newcastle University, 4 to 6 September.

- MacPherson, S. (2005) 'Educating the blue planet's ecological citizens,'*Canadian Journal of Environmental Education*, 10, 141-156.

- Mariyani, (2017) 'Ecological Citizenship Strategy Formation,' *Proceedings of the National Conference on Citizenship* III, November 11, 2017, The University of Ahmad Dahlan, Yogyakarta. p-ISSN 2598-5973 E-ISSN 2599-008X, p 10-17.

- Martinho, Nicolau, Caeiro, Amador, and Oliveira. (2010) *Environmental Citizenship and Participation*, The Role Of Education Programs, Knowledge Collaboration & Learning for Sustainable Innovation-EMSU ERSCP conference, Delft, The Netherlands, October 25-29, 2010.

- Mohtar, N. S., & Rajiani, I. (2016), 'Conceptual Model in Using Ability and Opportunity as GHRM, ' *International Business Management*, *10*(17), 3840-3846.

- Newby, Howard. (1996). Citizenship in a green world: Global commons and human stewardship. In, Martin Bulmer and Anthony M. Rees (eds.), Citizenship Today: The Contemporary Relevance of TH Marshall, London, UCL Press, pp. 209-222.

- PPKL KLHK RI, 2019. [Online]. [Retrieved May 8, 2019]. Available athttp://kalsel.prokal.co/read/news/13501-lima-tahun-air-sungai-di-kalsel-tercemarberat,

- Ong, A. et al. (1996), 'Cultural citizenship as subject-making: immigrants negotiate racial and cultural boundaries in the United States,' *Current anthropology,* (1996): 737-762.

- Ozden, 2011. Ozden Ozdemir, D. (2011). İlköğretim okullarında çevresel vatandaşlık eğitimi. Yayımlanmamış doktara tezi. Marmara Üniversitesi Sosyal Bilimler Enstitüsü, İstanbul. In Karatekin, Kadir. (2019) 'Model Review Related to the Effects of Teachers' Levels of Ecological Citizenship,' *International Electronic Journal of Environmental Education*, Vol.9, Issue 1, 2019, 46-61.

- Pertiwi, Shinta and Samsuri. (2017), 'Formation of Ecological Competence Model Contextual Learning and Problem Based in Pancasila and Civic Education in secondary schools, '*Civics Journal*, Volume 14, Number 2, October 2017.

- Prasetiyo, Heru Wibowo and Budimansyah, Dasim. (2016), *Citizens and Ecology; Case Study Development of Citizen Care for Environment in Bandung Community Gardening*, [Online]. [Retrieved May 8, 2019]. Available at htpp: //journal.um.ac.id/index.php/ JPH / article / view / 8221/3784.

- Rifani, Reza. (2019). *Three Environmental Issues South Kalimantan*, WALHI: Mandatory Priority So candidates. [Online]. [Retrieved May 6, 2019]. Available at www.iklancapres.id/.../tiga-isu-lingkungan-kalsel-walhi-wajib-jadi-

- Rondli, WS and Khoirinnida, Yuli. (2017). *Based Citizenship Education Learning Ecoliteracy: Ecological Citizenship reconstruction efforts*. [Online]. [Retrieved May 10, 2019]. Available at eprints.umk.ac.id/7379/17/14_Wawan_UMK.pd.

- Rosaldo, R. (1994) 'Cultural Citizenship in San Jose, California,' *Polar: Political and legal anthropology review,* 17.2 (1994), 57-64.

- Sarbaini, Jumadi, Abbas, E.W. and Rajiani, I. (2019), 'Managing E-Learning in Public Universities by Investigating the Role of Culture, '*Polish Journal of Management Studies*, 2019, Vol.20. No.1
- Sarbaini, Fatimah, and Rajian, I. (2019), '*The Struggle of Women's Traders In Floating Market From The Perspectives Of Citizenship: Implications For Citizenship Studies*, 'The Proceeding 5th Conference on Advances in Education and Social Sciences 21-23 October 2019- Istanbul, Turkey

- Srbinovski, Mile. S. (2016), 'Gender Differences in Environment: A Case Study of Macedonian Students,'*Teaching Innovations*, Volume 29, Issue 4, pp.101-114.

- Steenbergen, B.V. (1994) Towards a global ecological citizen. Bart van Steenbergen (Ed.) *The condition of citizenship*, (pp.141-152), London, SAGE Publications.

- Sudarmadi, S., et al. (2001) 'A survey of perception, knowledge, awareness, and attitude regarding enviromental problems in a sample of two different social groups in Jakarta Indonesia,' *Journal of Environment, Development and Sustainability*, Kluwer Academic Publishers, 3, 169-183.

- Susanto, Denny. (2017) *Indeks Kualitas Lingkungan Hidup Kalsel Terburuk di Kalimantan*, [Online].[Retrieved Mei 7, 2019]. Available at https://mediaindonesia.com/read/detail/131706-indeks-kualitas-lingkungan-hidup-kalsel-terburuk-di-kalimantan.

- Torney-Purta, J. & Amadeo, J. (2003), 'A Cross-national analysis of political and civic involvement among adolescents,' *Political Science and Politics*, 36, (2), 269-274.

- Uysal, 2018. Uysal, C. (2018). Sınıf öğretmeni adaylarının ekolojik vatandaşlık düzeylerinin belirlenmesi. Yayımlanmamış Yüksek Lisans Tezi, Kastamonu Üniversitesi Sosyal Bilimler Enstitüsü, Kastamonu. In Karatekin, Kadir. (2019) 'Model Review Related to the Effects of Teachers' Levels of Ecological Citizenship,' *International Electronic Journal of Environmental Education*, Vol.9, Issue 1, 2019, 46-61.

- Xiao, Chenyang and McCright, Aaron M. (2015), 'Gender Differences in Environmental Concern: Revisiting the International Trust Hypothesis in the USA,' *Environment and Behavior*, 2015. Vol.47(1) 17-37.

- Zelezny, Lynnette C., Chua, Poh-Pheng and Aldrich, Christina. (2000), 'Elaborating on Gender Diffierences in Environmentalism,' *Journal of Social Issues*, Vol 56, No.3, 2000, pp.443-457.

Corporate Volunteering as A Management Tool Shaping Employee Behavior

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Abstract

It is commonly argued that corporate volunteering leads to various positive results for companies and their employees. However, there is still a significant lack of knowledge regarding how and why such programs shape employee behavior. To fill this gap, the following research question is proposed: *How does participation in corporate volunteer projects influence employee behaviors and attitudes?* The study is based on interview data collected from 18 companies operating in Poland. The results of the research confirm the beneficial impact of employee involvement in corporate volunteer programs on work meaningfulness, development of employee competences and positive interpersonal relationships at work.

Keywords: Corporate Volunteering, Employee Behavior, CSR, Sustainable Development.

Introduction

The latest global report published by the United Nations (2019) indicates that the world faces a complex set of ecological and social issues that still have not been solved. Fighting such problems as catastrophic climate change, increasing inequalities, poverty, biodiversity loss or depletion of natural resources requires cooperation and integration of activities, both at the macro (i.e. global economy, national economies) and micro (i.e. companies) levels (Bitzer and Glasbergen, 2015). The idea of sustainable development (SD) will fail without involving business in this process because it affects not only the economy but also society and natural environment (Eccles et al., 2012). For this reason, business is experiencing increasing social and political pressure to engage in corporate social responsibility (CSR) (van Huijstee, 2010).

Although today CSR becomes a priority for all types of organizations, including companies (Kanji and Chopra, 2010), there is a discrepancy between declared and real actions undertaken by companies in this area (Doda, 2015). It is claimed that implementation of CSR in a company, i.e. in its strategy, procedures and organizational culture is very difficult (Glavas and Kelley, 2014). For various reasons many businesses still focus mainly on profits rather than on integrating economic, social and environmental issues in their performance (Laszlo, 2008). Therefore, it is assumed that active engagement of managers and employees is key in this respect, leading to a real change in business approach through changes in attitudes and behaviors of organizational members (Glavas and Kelley, 2014, Glińska-Neweś et al., 2020).

Studies suggest that very often companies express a sense of CSR through involving employees in corporate volunteering (CV) (Cavalaro, 2006; Muthuri et al., 2009; Grant, 2012). This form of active membership in local communities has been found to positively impact corporate role as responsible corporate citizen (de Gilder et al., 2005; Muthuri et al., 2009; Grant, 2012). Moreover, studies on CV suggest it can lead to positive effects for both companies and employees. CV supports, among others, work meaningfulness (Rodell, 2013; Chaudhary and Akhouri, 2018), volunteers' competence development (Booth et al., 2009; Bellé, 2013; Haski-Leventhal et al., 2019) and interpersonal relationships at work (Boštjančič et al., 2018).

However, there is still significant gap regarding knowledge about how and why CV, as one of CSR tools, influence employee performance in the organization (Glavas and Kelly, 2014). Additionally, although the literature suggests the aforementioned benefits of CV, there is still a lack of their empirical evidence (Peterson, 2004).

The aim of this article is to examine the effects of CV on employees. The following research question is posed: *How does participation in corporate volunteer projects influence employee behaviors and attitudes?* Specifically, the emphasis is placed on three main effects of employee involvement in CV, i.e. work meaningfulness, employee competences' development and strengthening interpersonal relationships between employees. The study is based on interview data collected from 18 companies operating in Poland.

The study contributes to the conceptualization of CV and understanding of its impact on organizations. It also contributes to the organizational behavior field, specifically regarding the aforementioned effects of CV on employee behaviors and attitudes and their antecedents in the organization. The article provides practical implications as well, especially for how companies can improve their volunteering programs to make them more beneficial for all parties involved.

In the article, firstly the existing literature is examined to clarify the essence of CV and its influence on selected dimensions of employee behavior. Then the methodology and results of empirical study are presented. Finally, the findings in reference to existing literature on CV and work meaningfulness are discussed.

Nature of corporate volunteering

Corporate volunteering (CV) refers to voluntary activities taken by employees outside their organization, which are socially and/or environmentally beneficial, and encouraged by employers through formal programs (Gratton and Ghoshal, 2003; do Paço et al., 2013; Cook and Burchell, 2018). Therefore, CV represents business engagement in SD and shifts attention on CSR from institutional level to individual (employee) perspective. The role of CV is constantly growing because, as a CSR tool, brings many effects for companies implementing it (do Paço et al., 2013; Boštjančič et al., 2018). Similarly, Licandro (2017) proves empirically that implementation of CV is effectively associated with the incorporation of CSR into corporate management.

Volunteering is about giving time or skills for a beneficiary or beneficiaries' group (Rodell, 2013). It is a proactive form of support, opposed to more passive ones e.g. monetary donations (Wilson, 2000). Furthermore, volunteering is a planned activity in contrast to spontaneous acts of helping (Clary and Snyder, 1999). In CV, the employees use their key competences for collective action while being supported and encouraged by employers through formal and informal policies or programs (Muthuri et al., 2009; do Paço et al., 2013). There are different types of CV programs that differ on a variety of dimensions. For instance, Cnaan et al. (1996) mention four dimensions: free choice, remuneration, structure and intended beneficiaries. Companies can participate in formal agreements or more informal and flexible arrangements. In formal projects, they collaborate with specific volunteer organizations, creating volunteer programs. In informal arrangements, employees have greater autonomy in choosing volunteer organization to collaborate with, and there are fewer formalities (Booth et al., 2009).

Effects of corporate volunteering

Research on CV indicate that it leads to various positive effects, both at organizational (Greening and Turban, 2000; Booth et al., 2009; Mirvis, 2012) and individual (Cook and Burchell, 2018) levels. It is well documented that at individual level CV has a substantial influence on employee behavior (Booth et al., 2009; Grant, 2012; Rodell, 2013). Recent, though limited studies in this context confirm that CV affects, among others, work meaningfulness (Rodell, 2013; Chaudhary and Akhouri, 2018), employee competence development (Booth et al., 2009; Bellé, 2013; Haski-Leventhal et al., 2019) and interpersonal relationships at work (Boštjančič et al., 2018).

Work meaningfulness is a derivative of the value of work purpose and the experienced relationship with other people; it is a sense that individuals are useful and their actions bring significant effects (Kahn, 1990; May et al., 2004). It is also understood as subjective beliefs, values and attitudes regarding work (Rosso et al., 2010). Work meaningfulness is argued as the key factor of employee motivation and engagement.

Various researchers emphasize that working for socially responsible company gives employees a sense of meaning, purpose and value in their lives leading to personal growth (e.g. Rodell, 2013; Chaudhary and Akhouri, 2018). Particularly, an active engagement in the projects related to CSR in an organization can enhance employees' sense of work meaningfulness through making valuable social contribution (Lavine, 2012; Chaudhary and Akhouri, 2018). Experienced meaningfulness makes employees feel confident of their generative competences and encourage them to engage in solving problems creatively (Cohen-Meitar et al., 2009).

CV also offers employees a chance to learn and practice new competences, as well as to develop existing ones (Sundeen and Raskoff, 1994; Mirvis, 2012; Haski-Leventhal et al., 2019). Competences are defined in various ways. For instance, Winterton et al. (2005) present a holistic view in which competences include knowledge, skills, and behavioral and psychosocial features. Developing employee competences is among key factors improving organizational performance and guaranteeing its competitive position (Lado and Wilson, 1994; Boyd, 2003). Participation in CV programs provides employees with the opportunity to develop job-related skills, such as teamwork, effective communications, project management, and leadership (Wild, 1993). Also, socially responsible behavior and emotional competence increase among the participants of such programs (Bartsch, 2012).

As it was mentioned earlier, the effects of CV include better acquaintance and employees' integration achieved through collective actions. A significant role in this area is attributed to positive interpersonal relationships built on various levels of interactions: in dyads, in employee teams, between teams, and in inter-organizational cooperation (Ragins and Dutton, 2007; Reich and Hershcovis, 2010; Glińska-Neweś et al., 2018). There are different dimensions of positive interpersonal relationships identified in literature, including mutual kindness, interest and liking (Glińska-Neweś, 2017). Various researchers indicate that positive interpersonal relationships are associated with better individual and work-related outcomes (e.g. Ragins and Dutton, 2007; Heaphy and Dutton, 2008; Peyrat-Guillard and Glińska-Neweś, 2014; Glińska-Neweś, 2017).

Summing up, all aforementioned benefits of CV are argued in the literature but empirical evidence in this regard is scarce. Results of the study presented in the next paragraph may, therefore, contribute to reducing this gap.

Research Method

The study described in the article was part of a larger research project that has been implemented in cooperation with Polish and Finnish academics since January 2018. In this article, only the results from the companies operating in Poland are presented because the study in Finland is still in progress. In Poland, 18 companies were investigated, representing various sectors and selected among those listed in the ranking published by the Responsible Business Forum (http://odpowiedzialnybiznes.pl). In 2017, there were 62 companies in this ranking.

Since the study was qualitative in nature, the selection of the companies was purposive. Only companies that declared the implementation of CV were selected for this study. Most of them, except two, were Polish subsidiaries of international corporations. First, 18 semi-structured in-depth interviews with managers responsible for CV were conducted. Next, the employees who participated in corporate volunteer programs were interviewed in five companies. Four to eight individual in-depth interviews were conducted in each company. Table 1 presents basic information about the companies selected for the analysis.

Table 1: Companies represented in the data collection

Company code	Sector	Dominant capital	Respondent's position
Assurance.com	Insurance	British	Head of CSR Department
Grout&Co	Production of building materials	Mexican	Specialist in Corporate Communication Department
DriveMe	Automotive industry	Japanese	Senior Specialist in Corporate Communication Department
Delivery4You	Logistics	Dutch	Group CSR and Internal Communication Coordinator
GlobeBank	Bank	Spanish	CEO of corporate foundation
BlueLine	Public transport	Polish	CEO of corporate foundation
SpeedLogistics	Logistics	German	Specialist in CSR Department
Drink4Fun	Brewery	Dutch	Coordinator in press office; Employees
Call3Me	Telecom	French	Coordinator of Volunteering and Internal Communication; Employees
ChairAuto	Automotive industry	German	Employee Department of External Contacts
DraakBank	Bank	Dutch	Expert of Corporate Communication; Employees
HeatHouse	Cooling/heating/powering machinery	Danish	Communication Consultant
Sunflower Bank	Bank	French	CSR Specialist
BiggerDigger	Wholesale of construction machinery	Dutch	Director of Business Development
LoanAdvanced	Home-credit and digital consumer finance	British	CSR Coordinator; Employees
NiceCar	Automotive industry	German	Communications Specialist
AllConsulting	Consulting	French	Corporate Responsibility & Sustainability Manager; Employees
Creditton	Consulting	Polish	CSR Manager

The interviews were conducted in May-June 2018. Each interview took 60-90 minutes and was recorded and transcribed. In order to minimize the research bias during data analysis, generally binding code book was introduced. The transcriptions were independently coded by three researchers from the research team using MAXQDA software and then their results were shared to reach coding consistency.

Results

CV programs are implemented in the examined companies for various reasons. Sometimes they are a result of the general corporate policy, which reflects the expectations of parent companies regarding the implementation of such programs. In other cases it is the idea of managers, or the employees themselves who initiate the volunteer program in their units. Usually, in the latter case, they are people who previously acted as individual volunteers, and want to implant this idea also in their company.

According to the respondents, CV can lead to a number of positive effects for companies and their employees. Taking into account the aim of this paper, the results related to work meaningfulness,

employee competences and interpersonal relationships are presented. Due to the editorial restrictions related to the size of the article, only the selected results of the study are depicted.

Work Meaningfulness

The results show that the employees who are supported and encouraged to do good through CV programs feel pride and a sense of relationship with the company which does important and good things for the society and the environment:

"It is nice to identify with the company that promotes such values. I have not changed this work so far partly because the company supports such activities. And for many people it is also important, they get involved because they want a good company image". (AllConsulting)

The implementation of CV projects is of great value to the employees themselves, strengthening their individual sense of meaningfulness and value. This is because they see and feel their personal participation in solving social or environmental problems:

"This is the sense of doing something meaningful. It is helping yourself in the sense that you just feel good after such actions, after such activities, where you can help someone but also help yourself". (Call3Me)

For the surveyed employees, the sense of work meaningfulness was higher, the more: a) the tasks performed were important, b) the tasks formed a separate unit, c) the employee had a sense of autonomy, d) the employee could use a variety of their skills and e) the employee received feedback. This is how one of the volunteers stated it:

"Here it is certainly important to give a free hand, to trust people and let them prove themselves, because thanks to that they have a pleasant satisfaction and the effect is what we expect". (AllConsulting)

Employee Competences

Participation in CV programs leads also to the development of employee competences. The competences acquired in this way can be divided into categories described below.

Attitudes Towards the Organization - Pride and Loyalty

As it was stated earlier, the activity of the company, perceived by the employees in the field of CSR, gives them a meaning of what they do, which makes them feel more connected with the company and proud of it:

"The added value of the volunteer project is that the employees feel proud that they did something for the local community, and that the company supports it (...). If they support the local community where they live every day, they can say: my company implemented this project". (DriveMe)

Discovering Hidden Talents

Corporate volunteer projects are a great example of freedom at the workplace - the employees decide for themselves what and how they will do. This makes them use their real and natural talents in the way, which the colleagues sometimes do not know about. In addition to getting to know each other in this way, from a slightly different side than everyday professional duties, it allows companies to discover 'hidden diamonds' - candidates for internal promotion:

"Some people paint beautifully or cook well. We can meet colleagues from another side, this is such a value for me! We meet in a completely different situation than 'tie, work, desk, client'. Usually we don't have time to talk about what someone likes, about our passions". (GlobeBank)

Social Sensitivity, Openness, Empathy

Participation in the volunteer program develops awareness of existing social and environmental problems. This is not only an advantage of general social significance - thanks to this, the individual competences of the employees are enriched, influencing their attitude to work and colleagues:

"It changes volunteers, tremendously! Before that, we had predictable work and family life. Now, going beyond this predictable world makes us think: Crap! My problems are not comparable to those of people here at all". (DraakBank)

Leadership Competence, Team Work, Project Management

The projects submitted to corporate volunteer programs are entirely prepared and coordinated by volunteer employees. They must identify the goal of the project, its beneficiaries, calculate the budget, plan activities, organize people and material resources. Along the way, there is a number of problems to be dealt with. There is often a need to handle new social situations. It is a 'priceless school' and employee competence test:

"I think that each of the projects that I do, first of all, strengthens my logistics skills. The second thing is definitely strengthening relationships in the team, because we do not only work on substantive tasks, but we have the opportunity to get to know such projects from another side and get involved, do something together. And it certainly allows me to gain new contacts, because either I contact some external companies or representatives of the given institution, which we are helping at the moment, so surely these contacts are getting bigger and later opportunities for other projects may also be different". (Call3Me)

Positive Interpersonal Relationships at Work

Based on the collected data, it can be stated that positive interpersonal relationships are built through participation in volunteering program. Thanks to them, job satisfaction and general well-being of employees increase. Positive-minded people are more likely to communicate with each other, share knowledge, help each other in their daily duties. A positive climate which arises, releases the potential of team creativity, contributing to the company innovativeness. Creating an organizational climate is favored by various types of integration activities:

"People were integrating on this occasion, they got to know other volunteers too. I know that they exchanged contacts and then more often met each other, even in private". (GlobeBank)

Discussion and Conclusions

This study examines the role of CV in shaping employee behavior. Based on the existing literature it is argued that CV leads to various positive results for companies (Booth et al., 2009; Greening and Turban, 2000) and their employees (Grant, 2012; Rodell, 2013). However, there is still a significant gap regarding knowledge about how and why such programs influence employee behavior (Glavas and Kelly, 2014). To fill this lack of knowledge, the emphasis in this article was placed on such effects of employee involvement in CV, as: work meaningfulness, employee competences and interpersonal relationships at work.

Working for a socially responsible company that, by implementing social and environmental activities, contributes to a higher good, gives employees a sense of purpose and importance of their work (Chaudhary and Akhouri, 2018). Working in the framework of corporate volunteer program is a great example of what is referred to as job crafting, i.e. actions taken by employees to adapt work to their needs, values and skills (Bakker et al., 2012; Nielsen and Abildgaard, 2012; Oldham and Fried, 2016). Therefore, regardless of the origin and nature of volunteer programs, organizations should give the greatest autonomy to employees: in terms of selecting beneficiaries, ways of implementing

the project, and selection of team members. Such a statement results from the job crafting theory described above: work that an employee decides about, giving it meaning in accordance with subjective criteria, is done with much greater commitment. Secondly, autonomy in the selection of goals and means of project implementation allows employees to reveal and develop their talents. This is due to the fact that when designing their volunteer project, they naturally direct their attention and commitment to such activities that they do best, i.e. their talents. Thirdly, it is associated with increased motivation (for volunteer activities, to help other people, to work in general). A contemporary approach to motivation, based on the so-called self-determination theory states that motivation is a derivative of autonomy, competence and social interaction (Grant, 2007). The more people are independent at work, can use and develop their competences in it, as well as make relationships with people they want to, the higher their motivation to work is.

According to the results of the study, most often the employees have complete freedom in creating their volunteer projects. They compete on equal terms in grant competitions in their organization, where the professionalism of project preparation is the most important. The companies definitely less often promote specific goals and beneficiaries associated with them, encouraging their employees to prepare the projects profiled in this way.

The benefits of corporate volunteer programs, in the form of greater pride in a company, integration with colleagues or developing competences, can be elucidated by a sense of serving the local community, i.e. the community in which employees operate on a daily basis. In other words, if volunteering is carried out for the benefit of e.g. a local hospital or orphanage or if the space in the town where the company is located is revitalized, the intra-organizational positive effects of volunteering are much greater. This can be explained by referring to the concept of social capital (Muthuri et al., 2009). By working for the benefit of the local community and helping it solve real social or environmental problems, volunteers express values such as solidarity, responsibility, reciprocity and kindness.

Prosocial motivation, i.e. the desire to help others increases in a situation where the helper has contact with the beneficiary (Grant, 2012). The more frequent, longer and closer interpersonally this contact is, the stronger the motivation to help. This is due to, among others, the fact of the volunteer's emotional involvement in the beneficiary's situation and the sense of work meaningfulness.

Positive interpersonal relationships bring a number of individual and organizational benefits. Thanks to them, job satisfaction and general well-being of employees are raised, because remaining in social relations is among the basic needs of every human being. People involved in positive relationships are more likely to communicate with each other, share knowledge, help each other in daily duties (Glińska-Neweś, 2017). Various integration activities, such as joint events or trips, favor this. Thus, it is not surprising that when talking about the effects of CV, its participants most often mention building relationships in the company.

All in all, the conducted research has brought a very interesting picture of how CV influences employee behavior in the companies operating in Poland. The findings on the positive effects that CV brings to the companies provide strong arguments in favor of business involvement in such programs. Moreover, the aforementioned analyses provide guidelines how such programs should be designed.

Among limitations of the study, it should be noted that its qualitative nature makes the results hard to generalize. The same applies to the fact that empirical study includes only the companies operating in Poland. However, it seems that the results presented in the article can serve as an inspiration for further research, including quantitative study.

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References

• Bakker, A.B., Tims, M. and Derks, D. (2012) 'Proactive personality and job performance: The role of job crafting and work engagement', *Human Relations*, 65, 1359-1378.

• Bartsch, G. (2012) 'Emotional learning: managerial development by corporate volunteering', *Journal of Management Development*, 31(3), 253-262.

• Bellé, N. (2013) 'Leading to make a difference: A field experiment on the performance effects of transformational leadership, perceived social impact, and public service motivation', *Journal of Public Administration Research and Theory*, 24(1), 109-136.

• Bitzer, V. and Glasbergen, P. (2015) 'Business–NGO partnerships in global value chains: part of the solution or part of the problem of sustainable change?', *Current Opinion in Environmental Sustainability*, 12, 35-40.

• Booth, J.E., Park, K.W. and Glomb, T.M. (2009) 'Employer-supported volunteering benefits: Gift exchange among employers, employees, and volunteer organizations', *Human Resource Management*, 48(2), 227-249.

• Boštjančič, E., Antolović, S. and Erčulj, V. (2018) 'Corporate volunteering: Relationship to job resources and work engagement', *Frontiers in Psychology*, 9, 1-10.

• Boyd, B.L. (2003) 'Identifying competencies for volunteer administrators for the coming decade: A national Delphi study', *Journal of Agricultural Education*, 44(4), 47-56.

• Cavalaro, L. (2006) 'Corporate volunteering survey: The extent and nature of corporate volunteering programs in Australia', *Australian Journal on Volunteering*, 11(1), 65-69.

• Chaudhary, R. and Akhouri, A. (2018) 'Linking Corporate Social Responsibility attributions and Creativity: Modeling Work Engagement as a Mediator', *Journal of Cleaner Production*, 190, 809–821.

• Clary, E.G. and Snyder, M. (1999) 'The motivations to volunteer: Theoretical and practical considerations', *Current Directions in Psychological Science*, 8(5), 156-159.

• Cnaan, R.A., Handy, F., and Wadsworth, M. (1996) 'Defining Who is a Volunteer: Conceptual and Empirical Considerations', *Nonprofit and Voluntary Sector Quarterly*, 25(3), 364-383.

• Cohen-Meitar, R., Carmeli, A. and Waldman, D.A. (2009) 'Linking meaningfulness in the workplace to employee creativity: the intervening role of organizational identification and positive psychological experiences', *Creativity Research Journal*, 21(4), 361-375.

• Cook, J. and Burchell, J. (2018) 'Bridging the Gaps in Employee Volunteering: Why the Third Sector Doesn't Always Win', *Nonprofit and Voluntary Sector Quarterly*, 47(1) 165-184.

• De Gilder, D., Schuyt, T.N. and Breedijk, M. (2005) 'Effects of an employee volunteering program on the work force: The ABN-AMRO case', *Journal of Business Ethics*, 61(2), 143-152.

- Doda S. (2015) 'The Importance of Corporate Social Responsibility', *Journal of Sociological Research*, 6(1), 86-91.

- Do Paço, A., Agostinho, D. and Nave, A. (2013) 'Corporate versus non-profit volunteering—do the volunteers' motivations significantly differ?', *International Review on Public and Nonprofit Marketing*, 10(3), 221-233.

- Eccles, R.G., Miller Perkins, K. and Serafeim, G. (2012) 'How to Become a Sustainable Company', *MIT Sloan Management Review*, 53(3), 43-50.

- Glavas, A. and Kelly, K. (2014) 'The effects of perceived corporate social responsibility on employee attitudes', *Business Ethics Quarterly*, 24(2), 165-202.

- Glińska-Neweś, A. (2017) *Pozytywne relacje interpersonalne w zarządzaniu*. Toruń: Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika.

- Glińska-Neweś, A., Brzustewicz, P., Escher, I., Fomina, Y., Józefowicz, B., Katunina, I., Petrykowska, J. and Szostek, D. (2020) 'Company Involvement in Sustainable Development—Proposition of a Theoretical Framework' in Zakrzewska-Bielawska, A. and Staniec, I. (eds.) *Contemporary challenges in cooperation and coopetition in the age of Industry 4.0*. Cham: Springer Proceedings in Business and Economics, 439-451.

- Glińska-Neweś, A. Escher, I., Brzustewicz, P., Szostek, D. and Petrykowska J. (2018) 'Relationship-focused or deal-focused? Building interpersonal bonds within B2B relationships', *Baltic Journal of Management*, 13(4), 508-527.

- Grant, A.M. (2007) 'Relational job design and the motivation to make a prosocial difference', *Academy of Management Review*, 32(2), 393-417.

- Grant, A.M. (2012) 'Giving time, time after time: Work design and sustained employee participation in corporate volunteering', *Academy of Management Review*, 37(4), 589-615.

- Gratton, L. and Ghoshal, S. (2003) 'Managing personal human capital: New ethos for the 'Volunteer' Employee', *European Management Journal*, 21(1), 1-10.

- Greening, D.W. and Turban, D.B. (2000) 'Corporate social performance as a competitive advantage in attracting a quality workforce', *Business and Society*, 39, 254-80.

- Haski-Leventhal D., Kach A. and Pournader M. (2019) 'Employee Need Satisfaction and Positive Workplace Outcomes: The Role of Corporate Volunteering', *Nonprofit and Voluntary Sector Quarterly*, 48 (3), 593-615.

- Heaphy, E.D. and Dutton, J.E. (2008) 'Positive social interactions and the human body at work: Linking organizations and physiology', *Academy of Management Review*, 33(1), 137-162.

- Kahn, W.A. (1990) 'Psychological conditions of personal engagement and disengagement at work', *Academy of Management Journal*, 33(4), 692-724.

- Kanji, G. and Chopra, P. (2010) 'Corporate Social Responsibility in a Global Economy', *Total Quality Management & Business Excellence*, 21, 119-143.

- Lado, A.A. and Wilson, M.C. (1994) 'Human resource systems and sustained competitive advantage: A competency-based perspective', *Academy of Management Review*, 19(4), 699-727.

- Laszlo C. (2008) *Firma zrównoważonego rozwoju*. Warszawa: Wydawnictwo Studio Emka.

- Lavine, M. (2012) 'Exploring the relationship between corporate social performance and work meaningfulness', *Journal of Corporate Citizenship*, 46(2), 53-70.

- Licandro, O. (2017) 'The Relationship Between Corporate Volunteering and Corporate Social Responsibility: Results of an Empirical Study', *Ekonomski Vjesnik*, 30(1), 67-83.

- May, D.R., Gilson, R.L. and Harter, L.M. (2004) 'The psychological conditions of meaningfulness, safety and availability and the engagement of the human spirit at work', *Journal of Occupational and Organizational Psychology*, 77(1), 11-37.

- Mirvis, P. (2012) 'Employee engagement and CSR: Transactional, relational, developmental approaches', *California Management Review*, 54, 93-117.

- Muthuri, J.N., Matten, D. and Moon, J. (2009) 'Employee volunteering and social capital: Contributions to corporate social responsibility', *British Journal of Management*, 20(1), 75-89.

- Nielsen, K. and Abildgaard, J.S. (2012) 'The development and validation of a job crafting measure for use with blue-collar workers', *Work and Stress*, 26, 365-384.

- Oldham, G.R. and Fried, Y. (2016) 'Job design research and theory: past, present and future', *Organizational Behaviour and Human Decision Processes*, 136, 20-35.

- Peterson, D.K. (2004) 'Benefits of participation in corporate volunteer programs: Employees' perceptions', *Personnel Review*, 33(6), 615-627.

- Peyrat-Guillard, D. and Glińska-Neweś, A. (2014) 'I respect you and I help you: Links between positive relationships at work and organizational citizenship behaviour', *Journal of Positive Management*, 5(2), 82-96.

- Ragins, B.R. and Dutton, J.E. (2007) 'Positive relationships at work: An introduction and invitation' in Dutton, J.E. and Ragins, B.R. (eds.) *Exploring positive relationships at work: Building a theoretical and research foundation*. New York: Psychology Press, 3-25.

- Reich, T.C. and Hershcovis, M.S. (2010) 'Interpersonal relationships at work' in: Zedeck, S., (ed.) *APA handbook of Industrial and Organizational Psychology*. Washington: American Psychological Association, 223-248.

- Rodell, J.B. (2013) 'Finding meaning through volunteering: Why do employees volunteer and what does it mean for their jobs?', *Academy of Management Journal*, 56(5), 1274-1294.

- Rosso, B.D., Dekas, K.H. and Wrzesniewski, A. (2010) 'On the meaning of work: A theoretical integration and review', *Research in Organizational Behavior*, 30, 91-127.

- Sundeen, R.A. and Raskoff, S.A. (1994) 'Volunteering among teenagers in the United States', *Nonprofit and Voluntary Sector Quarterly*, 23, 383-403.

- United Nations (2019) *Development Report 2019: The Future is Now – Science for Achieving Sustainable Development*. New York: United Nations.

- Van Huijstee, M. (2010) 'Business and NGOs in interaction. A quest for corporate social responsibility', *Netherlands Geographical Studies*, 393, 1-176.

- Wild, C. (1993) *Corporate Volunteer Programs: Benefits to Business. Report No. 1029*. New York: The Conference Board.

- Wilson, J. (2000) 'Volunteering', *Annual Review of Sociology*, 26(1), 215-240.

- Winterton, J., Delamare-Le Deist, F. and Stringfellow, E. (2005) *Typology of knowledge, skills and competences: clarification of the concept and prototype*. Luxembourg: Office for Official Publications of the European Communities.

- Responsible Business Forum (2017). Available at: http://odpowiedzialnybiznes.pl (Accessed: 15 February, 2018).

Between Hope and Reality: Curriculum 13 (K-13) Implementation in Teacher's Ability to Develop Learning Devices in the Era 4.0

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Abstract

After six years of the launching of the Curriculum 2013 (K-13), it is expected that all schools and teachers have been able to implement the curriculum both in terms of preparation for learning devices as well as in the learning process. However, the reality is far from expectations as the ability of teachers in the preparation of the learning device is still lacking. Detected through learning device compiled from teachers who are following the Professional Teacher Education online, the results were far from expectations posing a big question mark for researchers. For this reason, the researchers tried to explore the issue through a qualitative approach. Although in this study quantitative data also exist, it was just as supportive data to strengthen the argument and conclusion. Sources of data in this study are a physical education, sports and health teachers amounted 123 people. From these studies it was found that K-13 training has not met the need of all teachers reflected in the material is not understood comprehensively by the teachers. Further, in some training, there are instructors who didn't come from the field of physical education, sports and health, but from other fields of study. This fact is of course very worrying as if it remains, the national education goal will never be reached. Therefore, it is necessary to reorder the instructors in accordance with expertise in the field of study as well as evaluating the effectiveness of the program.

Keywords: Curriculum, Device, Teacher, Learning.

Introduction

The task of the teacher in the context of Indonesia is not only to teach, but also to educate, direct, guide, train, assess and evaluate. This is in accordance with Government Regulation No. 74 of 2008. The Teachers and Lecturers Law No. 14 of 2005 emphasizes that professional teachers are obliged to plan, implement quality learning process, assess and evaluate learning.

Learning tool is a weapon for a teacher indicating a sign of readiness to give directions for teachers in teaching. Lesson preparation contained in learning devices such as syllabus, Preparation Plan Learning, Instructional Materials, Media Education, Worksheet Students, and Evaluation Rubric / Assessment. The device can be seen through the readiness of a teacher which has been stated clearly in the ministerial decree No. 22 of 2016. However, regulations are not always in line with the reality on the ground as the teachers seem reluctant in preparing the learning device.

Since the publication of curriculum 2013, it several times experienced improvement and change, but in terms of processes and products for the physical education curriculum, sports and health, the implementation has not met the standards (Setiadi, B., Soegiyanto, M., Rahayu, S., & Setijono, H,

2018). Since the enactment of the curriculum in 2013, the implementation of the curriculum has been uneven across the school. Teachers should have been very understanding about the content of the curriculum, but in fact the teachers still have difficulty understanding basic competencies and core competencies translated into lesson plan as proved by Boleng et al, (2018) that teachers of physical education, sport and health are not yet ready to make a learning device.

After six years running, the expectations of researchers originally have thought that the ability of teachers to prepare learning device, and translate core competence and basic competences in the affective, cognitive and psychomotor already proficient. But the fact that almost 95% of the learning device made by the participants do not meet expectations indicating that the teachers do not understand about the preparation of the learning device. As such, the writers conducted this research in order to determine field problems hampering the ability of the preparation of learning tools for teachers of physical education, sport and health.

Literature Review

In the 2013 national education system law, has been set up on the curriculum. The curriculum gives direction to the educational process, and is a preparation for learning that is designed and implemented individually or in groups, both at school and outside of school. (Lloyd J. Trump and Delmas F. Miller, 1973; Harold B. Albertsycs, 1965; J. Galen Saylor and William M. Alexander, 1956)

The Government through the regulation number 19 of 2005 and No. 32 of 2013 set to eight (8) National Education Standards in the planning, execution, and monitoring of education in order to realize the national education quality. The goal is to ensure the quality of national education according to the Law of the Republic of Indonesia aimed at educating the nation and shape the character and dignified civilization.

Since the enactment of the curriculum in 2013 (K13) in the year 2013/2014, teacher be expected more focused and more prepared to teach. The readiness is shown by the learning device that must be made. Although apparently teachers are burdened with the administration as the readiness of a teacher, learning device is very important for teachers in preparing the learning process. With the learning device that has been prepared properly enabled learning can take place properly. Learning devices are tools or equipment to carry out the process that allows teachers and learners perform the learning activities. Learning tool created as one of support for learning to work well (Zuhdan et al, 2011).

Learning plan stated in culture Education Minister Regulation No. 22 of 2016 on Standards for Primary and Secondary Education Process. The device consists of a syllabus of learning, the Learning Plan (RPP), Instructional Materials, Media Education, Worksheet Students (LKPD), and Evaluation / Assessment. Learning device is made to be able to accommodate a student-centered learning system (Student Center), meaning that it was students who are active in learning steps according to the draft made by the teacher.

In designing the study, teachers of supposedly able to use technology as a teacher professional teacher should be able to master competencies, in addition to the professional teachers must also have a moral quality, cultured, dignified, whose duties with full responsibility, justice, conscience, disciplined, obedient to the rules and discipline (Belinova, NV, Bicheva, IB, Kolesova, OV, Khanova, TG, & Khizhnaya, AV, 2017). In view of the progressive, characteristic changes in society must be accompanied by changes in the culture of the teacher in the learning process. Rapid change requires teachers should prepare themselves to being run over by age, and can occur even exceed the capacity of students teachers, if teachers do not have extensive knowledge.

In this 21st century resources beLajar there are everywhere, books can be replaced technology, however, the presence of permanent teachers is irreplaceable. The ability of teachers to educate in this digital era strengthened on pedagogy Siber on teachers themselves. The teacher's role more as a

facilitator who is able to take advantage of digital technology well to design them to be creative to make learners active and high-level thinking. Therefore, inevitably, it is the teacher's role must be strengthened. Teachers are required able to utilize technology in instructional design. This time learning to use e-learning is no stranger, however, for teachers in areas far from the reach of the Internet have become a matter of course, and also related to the mindset difference where among teachers who were in the city, especially with teachers who come from developed countries. It is associated with dimension and cultural references. (Sarbaini et al, 2019). As a teacher who professional a teacher should be able to master competencies, in addition to the teacher professional also should have the moral quality, cultured, dignified, whose duties with full responsibility, justice, conscience, discipline, abiding by the rules, and discipline (Belinova, NV, Bicheva, IB, Kolesova, OV, Khanova, TG, & Khizhnaya , AV, 2017).

Teachers are very instrumental in developing 21st century skills. Besides, teachers should also be able to adapt to the curriculum, and is capable of imagination to produce high creativity in learning (Guo, 2014; Woon Chia & Goh, 2016; Drake & Reid, 2018). The characteristics of teachers in the 21st century include: *First*, Teachers as well as the facilitator should also be a motivator and inspiration for students.Teacher as facilitator, meaning not make the teacher as a knowledge center (teacher centered), because knowledge can be accessed through a variety of media. The positions of learners in the 21st century become the center of (student center) as well as the demands of the curriculum of 2013. In this case the teacher should be able to position itself as a study partner for learners. Second, teachers must have the ability to read high interest. This is to anticipate the development of quick learners knowledge through digital technology. If not, then there will be a loss of authority of the teacher who of course have an impact on the learning process itself and the progress of the nation. Third, the ability to write. In the 21st century a teacher in addition must have a high interest must also be able to write. Teachers are required capable of expressing ideas through writing idea of thinking as the enrichment of learning delivered to students in improving the quality of learning. Fourth, teachers are also required to be creative and innovative. Learning e-learning system is a necessity or requirement for a teacher in order to maintain the authority of the teacher in front of his students. ICT-based teaching competencies for teachers of the 21st century are an absolute. Fifth, 21st century teachers are required to have the ability to do a cultural transformation. This transformation process termed self-change, from being considered old-fashioned replaced by novelty.

Teachers should have the competence as readiness to teach, besides that it expected to have a high knowledge. Therefore, continuing education for teachers is necessary, as are the existence of cooperation among professional teachers to improve knowledge will have an impact on the quality of learning for students. (Pecheone, RL, & Whittaker, A. 2016; Borko, 2004; Vescio et al., 2008).

Method

This study uses descriptive qualitative study in the form of documents, interviews and questionnaires.Although encountered data is quantitative, it was just as supportive data to reinforce and complement the arguments in drawing conclusions. Subject research is a teacher of Physical Education, Sport and Health in South Kalimantan who are following Professional Teacher Education, numbered 123person. As for thefocus in the study is the ability of physical education teachers in developing learning tools based K13, as well as the problems faced by the teachers in implementing K13 into preparationteaching and learning process. The study was conducted in professional education center teachers in physical education, sports and health, in Banjarbaru, throughout the month of June to December 2019.

Data retrieval is divided into two parts. First, the initial data as a backrest base is a learning device in the form of syllabus, lesson plans, Instructional Materials, Media Education, Worksheet Students, and Evaluation/ Assessment, which has been created by teachers who were studying the teaching profession, at the timelecturesby online. The data is used as a base to explore the problems faced by teachers in preparing a learning device. Second, the data obtained through interviews conducted during face to face lectures / workshops. Some basic questions posed, and then to dig deeper into the

questions were developed by the researchers. The main question posed, among others; 1). Is your school already use K-13; 2) .Would you've been training K-13; 3). Is the material presented has been understood by you indetail? ; 4). Does the personK-13comes from the same field? ; 5). Books or reference what you use as a resource?

Result

Findings from the study documents the manufacture of devices such learning syllabus, lesson plan preparation, teaching materials, media, and evaluations made by teachers of physical education, sports and health, amounting to 123 teachers are still lacking. Preliminary data compiled learning device capabilities are taken during lectures through Online Learning Systems Indonesia (SPADA). The study's findings about the ability to create a learning device per item device (syllabus, lesson plans, Instructional Materials, Media, and Evaluation / Assessment) displayed in Figure 1 below.

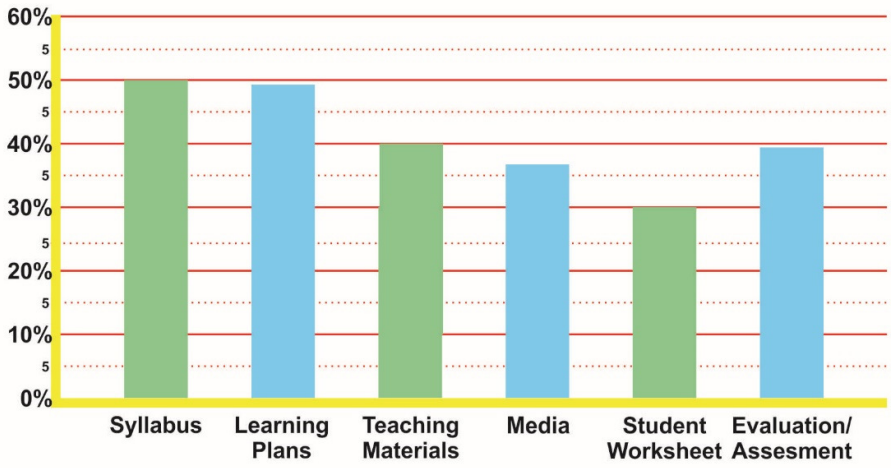

Figure 1: Preparation Capabilities Learning Tool

Once the data found that the ability of teachers to make the learning device is lacking, then subsequently traced the cause. Search cause of the ability of teachers is still lacking is done when teachers PPG PJOK workshop participants. The summary of the principal results of the interview are described in the following table.

Table 1: Causes of Lack of Teacher's Ability to Understand K-13

No.	Statement components	Percentage (%) answers
1	Statement using K-13	40%
2	A statement that he has never attended a K-13 training	60%
3	Understanding of training materials is poorly understood	70%
4	Resource persons from other fields	75%
5	Use of textbooks	80%

From the data in Table 1, it can be argued that the lack of ability of teachers in preparing a learning device caused by, among other things: Dissemination and training K13 has not been evenly distributed throughout the area. Proven 60% of teachers said that they had never received training K13. This is especially true on the teachers who are in the area. As noted A2, one of the teachers, "I have never received a briefing K13, and we still use the school curriculum in 2006 or the so-called Education Unit Level Curriculum.

From interviews, it was stated by the teachers who had attended the training, most said that they did not understand the curriculum material in detail. Regulations underlying minister is not presented in detail. The material in the form of materials Learning Pathways Plan is received in the form of copy and paste, without a detailed explanation of how to plan lessons. Even raised by some teachers who have been trained, the training curriculum delivered by speakers who are not of the fields of study physical education, sports and health, but from other areas of study. As stated by H 35, "we received training K-13, but his sources instead of physical education, sports and health but from other fields, so when we asked they were not able to give a clear answer, and we were only given examples of copy and paste without explanation means ". Such information also strengthened by F 29, "how we can understand the new curriculum, especially that part of Core Competence (KI) and the Basic Competency (KD), if that explains not of the field of Physical Education, Sport and Health, but on the field of study other. And we need a detailed explanation of how to translate KI and KD, KD nature especially skills ". if that explains not of the field of Physical Education, Sport and Health, but from other fields of study. And we need a detailed explanation of how to translate KI and KD, KD nature especially skills ". if that explains not of the field of Physical Education, Sport and Health, but from other fields of study.

Other findings are, teachers in conducting the learning process are only based on textbooks, the contents of which tend to the sports branch without paying attention to the contents of the curriculum and class levels according to curriculum material. A15 stated, "I teach based on textbooks purchased by schools". When the researcher asked again, did the textbook match the demands of the contents of the 2013 curriculum? A15 and others answered, "I don't know, for us the important thing is there is an example, because so far we don't understand how to implement the K13". In addition, in teaching teachers tend to teach sports material as obtained in college, as stated by 54 B, an elementary school teacher, "what we teach is in accordance with what we have received during last lecture. What has been stated by 54 B is clearly not in accordance with the contents of the current curriculum. The teachers stated that they could only understand about K13 after receiving the material during the PPG workshop. As one teacher put it, "We just understood ma'am, we used to teach without a device that became a guide. We always feel we lack material to teach, because what we teach is only the lessons we have received during college, without seeing the curriculum message."

Discussion

The success of a curriculum is applied for socialization and intense training. Before conducting socialization of course prepared human resource tools, namely instructors or speakers who have the ability and the field that will be delivered. If socialization is not conveyed properly then the result will not be as expected. This is evident from the research that proves that the ability of teachers to prepare learning device is still weak, due because not all teachers get the socialization and guidance regarding the application of K13 which is a typical in university when trying to innovate (Abbas et al, 2018). As a result, teachers have not been able to draw up plans well. Learning tool created as one of support for learning to work well. Learning will be effective if teachers are able to design learning well. A good teacher is a teacher who can prepare lesson plans well (Meador, D., 2019; Prasad, ZK, 2011).

Curriculum changes will not give any meaning if it is not accompanied by a clear policy. The low quality of education in Indonesia certainly can not be answered simply by changing the curriculum. Or even replace the education authorities. Quality education can only be answered by the quality of teachers. Teachers who are qualified professionals who guarantee. Without improvement in the

quality of teachers, the quality of education will remain "far from the fire", always be inadequate (Yunus, S, 2017). As good as any curriculum, if the teacher is not equipped with either about how to implement the curriculum will not be able to walk up.

Facts on the field, that the teachers are stuck with textbooks purchased by the school. Come to think of it of course makes it a teacher, but their impact is reducing the creativity of teachers, because teachers are not glued and just had enough with the materials that are already available. Habit of following the book spay and off the creativity of teachers so that the implementation of Curriculum 2013, which has not happened contextually (Koesoema, D, A, 2019). Their book these packages must be revisited. Government in this case the Ministry of Education and Culture must evaluate the content of the books, especially handbooks PJOK learning, whether in accordance with the curriculum.

It is very alarming, when the findings of the study, including the teachers glued to the textbooks, and teaching the lessons of physical education, sports and health based solely on experience when receiving the same lesson when college. Though the content of the curriculum is not the same as the college curriculum, indeed, core competence and basic competences are in between the different levels. For the dominant primary school level with the basic motion, for the junior high school level towards a specific motion, while the middle class has entered the upper level motion analysis to sports. If teachers teach using textbooks and references only having experience in college without learning curriculum well, then the result of the primary school level to the intermediate level will be stuck on learning the sport.

Professional teachers are educated and well-trained and have experience in the field. (Koesoema, D, A, 2019). There are nine competencies that must be mastered by teachers. The field is; philosophical aspects, history, anatomy, kinesiology, physiology, psychology, sociology, development of motion and motion study. This was stated in the ministerial decree No. 16 of 2007, concerning academic standards and qualification of teachers. The competence of the basis is for translating the curriculum into learning. Learning physical education, sports and health care are dominant learning via motion. But in learning to be able to accommodate the affective, cognitive, psychomotor aspects in addition to that is characteristic of physical education lessons. The most alarming of these findings is their socialization curriculum instructors come from other fields. How can teachers be able to absorb the curriculum well, if the instructor does not come from the field of physical education, sports and health ?. This is contrary to the professional principles contained in Law No. 14/2005 on Teachers and Lecturers, the work or activities carried out by someone and become a source of income that life requires skill, expertise or skills that meet certain quality standards or norms as well as the need professional education. This explanation shows that the profession requires expertise in the field of education if wishing to be in compliant with the demand of community in the era of 4.0 (Rajiani & Ismail, 2019).

Conclusion

Curriculum 2013, which has been going for approximately six years, have not been properly socialized. It appears that the desire to change the curriculum is not accompanied with the appropriate human resources to be able to disseminate to all teachers and education personnel. Their instructors out of the same field, is certainly very worrying, because it is contrary to the principles of professionalism. The ability of a teacher in developing learning tools is very important, because these devices gave way to a good learning process. Their required textbooks for schools, on the other hand is pretty good if it is used only as reference material, but if the book into a main handle then it will turn off their creativity in designing learning. Quality education can only be answered by the quality of teachers. If the quality of teachers is not corrected, then no matter how great the curriculum does not guarantee the quality of education. It is suggested, to answer the challenges of our time industrial era 4.0, teachers must be given a lot of skills training related to learning and mastery of IT. If not, then the teacher will be left out of from the ability of the students who are now very technologically savvy. It was also suggested that there is research that examines the ability of teachers to translate into Indicators Basic Competencies and Learning Objectives in accordance with the industrial era 4.0.

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References

• Abbas, E. W., Hadi, S., & Rajiani, I., 2018. The prospective innovator in public university by scrutinizing particular personality traits. *Polish Journal of Management Studies*, *18(1),* 9-19.
• Alberty, Harold.B., Alberty,Elsie.J.,1965.Reorganizing the High-School Curriculum. New York: The Macmillan Company.
• Baihaqi, B; 2017. Rumitnya Kurikulum Pendidikan Indonesia**.** Sabtu, 03/06/2017 http://www.neraca.co.id/article/85671/rumitnya-kurikulum-pendidikan-indonesia
• Belinova, N. V., Bicheva, I. B., Kolesova, O. V., Khanova, T. G. and Khiznaya, A.V., 2017. Features of professional ethics formation of the future teacher. *Revista espacios*, *38*(25).
• Boleng, L.M., Babang, V.M.F. and Louk, M.J., 2018. Analisis Perangkat Pembelajaran Guru Pendidikan Jasmani Olahraga Dan Kesehatan SD Se Kota Kupang. *Jurnal Muara Olahraga*, *1*(1), pp.29-38.
• Borko, H., 2004. Professional development and teacher learning: Mapping the terrain. Educational Researcher, 33(8), 3-15.
• Drake, S.M. and Reid, J.L., 2018. Integrated curriculum as an effective way to teach 21st century capabilities. *Asia Pacific Journal of Educational Research*, *1*(1), pp.31-50.
• Meador, D., 2019. Strategies for Teachers: The Power of Preparation and Planning. In *ThoughtCo.* https://www.thoughtco.com/power-of-preparation-and-planning-3194263
• Guo, L., 2014. Preparing Teachers to Educate for 21St Century Global Citizenship: Envisioning and Enacting. *Journal of Global Citizenship & Equity Education*, *4*(1),1-22.
• J. Lloyd Trump dan Delmas F. Miller.,1973. Secondary school curriculum improvement challenges, humanism, accountability. Allyn and Bacon.
• Koesoema, D, A., 2019. Transformasi Kurikulum Senin 04 November https://mediaindonesia.com/read/detail/269342-transformasi-kurikulum
• Palobo, M., Sianturi, M., Marlissa, I., Purwanty, R., Dadi, O. and Saparuddin, A., 2018, October. Analysis of Teachers' Difficulties on Developing Curriculum 2013 Lesson Plans. In *1st International Conference on Social Sciences (ICSS 2018)*. Atlantis Press.
• Pecheone, R.L. and Whittaker, A., 2016. Well-prepared teachers inspire student learning. *Phi Delta Kappan*, *97*(7), pp.8-13.
• Permendikbud, L., 2016. Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 20 Tahun 2016 Tentang Standar Kompetensi Lulusan Pendidikan Dasar dan Menengah. *Jakarta: Menteri Pendidikan Nasional*.
• Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 21 Tahun 2016 tentangStandar Isi Pendidikan Dasar dan Menengah. *Jakarta: Menteri Pendidikan dan Kebudayaan Republik Indonesia*.
• Peraturan Menteri Pendidikan dan Kebudayaan No 24 Tahun 2016 Tentang Kompetensi Inti dan Kompetensi Dasar Pelajaran pada Kurikulum 2013 pada Pendidikan Dasar dan Pendidikan Menengah. *Jakarta: Kemendikbud*.
• Peraturan Menteri Pendidikan dan Kebudayaan No 37 Tahun 2018 Tenatang Perubahan Peraturan Menteri Pendidikan dan Kebudayaan No 24 Tahun 2016 Tentang Kompetensi Inti dan Kompetensi Dasar dan Menengah
• Prasetyo, Z.K., 2011. Pengembangan perangkat pembelajaran sains terpadu untuk meningkatkan kognitif, keterampilan proses, kreativitas serta menerapkan konsep ilmiah peserta didik SMP. *Program Pascasarjana Universitas Negeri Yogyakarta*.
• Rajiani, I., & Ismail, N. , 2019. Management Innovation in Balancing Technology Innovation to Harness Universities Performance in the Era of Community 4.0. *Polish Journal of Management Studies, 19*(1), 309-321. http://dx.doi.org/10.17512/pjms.2019.19.1.24

- Sarbaini, Jumadi, Abbas E. W., Rajiani, I. , 2019. Managing E-Learning in Public Universities by Investigating the Role of Culture. *Polish Journal of Management Studies, 20*(1), 394-404.
- Saylor, J. Galen.,1956. Curriculum Planning for Better Teaching and Learning / J. Galen Saylor, William M. Alexander. New York : Holt, Rinehart and Winston.
- Setiadi, B., Soegiyanto, M., Rahayu, S. and Setijono, H., 2018, December. Evaluation of the 2013 Curriculum Implemented by Physical Education Teachers. In *2nd Yogyakarta International Seminar on Health, Physical Education, and Sport Science (YISHPESS 2018) and 1st Conference on Interdisciplinary Approach in Sports (CoIS 2018)*. Atlantis Press.
- Vescio, V., Ross, D. and Adams, A., 2008. A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and teacher education*, *24*(1), pp.80-91
- Yunus, S., 2017. Mengkritisi Kompetensi Guru. *Detiknews Jumat*, *14*, p.06. https://news.detik.com/kolom/d-3741162/mengkritisi-kompetensi-guru
- Woon Chia, L., & Goh, C. C., 2016. Teachers' Perceptions, Experience, and Learning. *Asia Pacific Journal of Education*, *36*(S1), 1-4.

Classification of Expenses into the Concept of Maintenance of Capital for the Purposes of Financial Result Management

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Abstract

Based on an assessment of the current cost classification regulations in international practice, including costs that can be incurred through profit, a classification approach has been proposed. The proposed classification can be a component of the development of the theory of preservation of purchasing power of investments and the concept of support of physical capital used in international financial reporting standards. We have concluded that profit is a marker of capital gains that can be reallocated. However, expenses at the expense of profit from which economic benefits are expected can be considered as economically justified investments. However, expenses that do not initially result in economic benefits, but are image-based, should be within the limits of adjusted profit, taking into account the capital maintenance provision

Keywords: Profit, Cost of Capital, Income and Expenses, Cost Classification.

Introduction

The financial result of a commercial organization is always under close supervision of current and potential investors and creditors. Therefore, the indicator of financial result, the trend of its positive dynamics is a priority direction of business management. The profit indicator is formed as a difference between income and expenses. However, profit itself, as an economic category, represents an ambiguous understanding of this term. Perception of profit index for the purposes of tax accounting, accounting, management accounting, for the purposes of financial reporting, understanding of profit in economic theory is one of the most complicated and discussed categories in scientific research.

The order of recognition of income and expenses has a significant influence on the formation of financial result, which in its turn depends on many factors. The legislation of national jurisdictions has a significant impact on the classification of these elements, as well as on categorical or loyal approaches to their recognition. The biggest challenges are faced by multinational companies engaged in export-import operations operating simultaneously in several jurisdictions (Golubtsova, 2019). At the same time, for certain types of accounting - tax, accounting, there are their own rules for the recognition and classification of expenses, within the framework of the legislation of individual jurisdictions (Lehoux, 2019).

Literature Review

Understanding profit is one of the complex and discussed problems in modern economic theory. In scientific research, the concept of profit is ambiguous and the evolution of the understanding of this definition goes deep into the past, when an individual or an economic unit has identified the increase of its capital value. The researchers note that the understanding of profit has both practical, scientific and philosophical connotations, for example, in the works of Plato and Aristotle, where profit was understood as accumulation of money in society (Blank, 2007).

Further unification of the ideas of the development of the definition of "profit" made it possible to unite them by directions and schools. Not setting a task of deep research of directions-schools, we should note that the most significant for the society understanding of profit was brought by scientists - the school of mercantilists, physicists, marginists and others. A.Smith's views as a result of the self-regulating market (Couse, 1977) had the greatest influence on the understanding of the definition of "profit". In today's context, profit is seen as an indicator that is influenced by many existing trends. One of such directions is recombination of the company's financial architecture, where the financial result is dependent on other elements of financial reporting and their ratios (Davidson, 2019). The authors note that the formation of profit margins in the light of increased knowledge about finance and markets, the development of economic theory and other sciences are undergoing significant changes (Domitilla, 2019).

Increasingly influencing the formation of indicators in financial reporting are the needs of external users, as the need to make decisions about the investment of capital and loans (Iron, 2019). Modern financial results practice is characterized by palliative approaches, which come from the concept of business value management with a key EVA indicator (Bennett, 1991). Despite the subjectivity of this indicator, its analytical value for investors is high. This term is also known as economic profit (Penman, 2004). For the management of a company the order of formation of the profit index is of paramount importance, because management of the company's value and profit index are interrelated.

Another important aspect is the ability of the company's management to incur expenses at the expense of net profit and the organization of internal control over its use. Thus, scientific researches emphasize the dependence of the company's capabilities, but also the institutional environment for the necessary activities (Turishcheva, 2019). In author's studies multiple calculations are made on the relationship of indicators, for example, the value of the company, the amount of dividends paid. Or identifying the relationship between net profit and return on company shares paid to shareholders (Tawiah, 2015). Thus, it is possible to confirm the hypothesis that the concept of profit management is large-scale, including both the formation of the financial result and its effective use.

Theoretical Background

The more common rule for many transnational businesses, international business are international financial reporting standards. However, these standards, which also regulate the recognition, classification and presentation in the financial statements of such elements as income and expenses are not applied by all companies. However, the interest of national jurisdictions around the world in international financial reporting standards is unquestionable, leading to a convergence of national and international standards. This is a positive development as the convergence of rules for the recognition of revenues and expenses generally leads to a uniform approach to the preparation of financial statements. The second influencing factor on income and expenditure indicators is internal regulations of an economic agent and its accounting policy. The influence of professional judgment on the internal order of formation of accounting policy, estimation values, creation of reserves, application of estimation models, estimation methods and other components can essentially influence the financial result of the company.

At the same time, there is a trend towards convergence of valuation standards in financial statements and international valuation standards (Morozova, 2019). It can be noted that some businesses, which

are mainly small businesses, find the most rational solution to the issues of recognition of income and expenses in the convergence of accounting and tax accounting.

However, from the point of view of the economic understanding of profit, such convergence of the tax and accounting system may have a negative impact on the comprehensibility and transparency of this indicator for external users. It should be noted that traditionally, for accounting purposes, expenses are classified as expenses by ordinary activities and other expenses.

This approach to classification is classic both for international financial reporting standards and for most national jurisdictions. Analysis of costs by their classification can provide companies with valuable information on optimization of costs, their evaluation, classification and reclassification. Such actions are aimed not only at optimizing the financial result, although this seems to be the baseline. Other direction, closely interconnected with the presented thesis, is management of profit of the company and possibilities of the company on use of profit, that is realization of expenses at the expense of net profit. This direction, in our opinion, is relevant and, accordingly, the purpose of the research can be presented as formation of the company's expenses classification for the purposes of optimization of financial result management.

Research Question and Discussion

In the perimeter of this work will be considered the issues of efficiency of use of the received profit. The profit indicator in accounting and financial reporting can be formed without taking into account adjustments for the inflation factor. In addition, it is necessary to take into account the influence of indirect taxes, which may be included into the calculation of the indicator, i.e. non-refundable taxes (Akhmadeev, 2020) Also, the profit component may be extended by write-offs of capital gains before disposal of revaluated objects, if such order is fixed in the accounting policy (Lehoux, 2020) On this basis, the expenses which may be made at the expense of profit have no marker on the maximum size of its use so that the company does not lose its resource potential. This provision is based on the J.R. Hicks theory about the solvency of an economic subject. Thus, a company can only use the profit to the extent that it can spend while remaining as wealthy as it was before (Hicks, 1946).

This theory implies the influence of internal factors on the amount of profit of a business entity. In addition, external factors may influence the amount of profit, which the company is unable to influence. The adopted accounting policy on formation of production, works, services cost can be referred to internal factors. Thus, approaches can be regulated on achievement of certain business goals of the company. Distribution of expenses by periods, with their classification into constants and variables, can essentially influence the financial result. The Company's income is generally recognized at current prices and measured at fair value, as is the case in certain economic jurisdictions. In some cases, income may also depend on the pricing strategy of the company (Shtefan, 2017). Certain categories of companies are companies in the innovation sector whose products have no equivalent in the market (Korableva, 2018).

At the same time, companies have no influence on external business factors, cannot prevent them, and often do not foresee them. Changes in the company's specialized items may be related to forecasted but unforeseen circumstances related to changes in currency exchange rates, digital assets, significant changes in the value of investments. For example, ups and downs in exchange quotations of investments in company securities or precious metals or bi-currency deposits. Such risks are disclosed in the financial statements.

Companies are also able to present contingencies in the format of events occurring after the reporting date that have a material effect on their financial position. However, the financial statements may be accompanied by other types of corporate reporting in which such risks may also be presented to external users. Companies generally present a methodology for calculating the impact of risks on the company's components, with the presentation of possible components. Such reports may include financial reports, integrated reports, sustainability reports and others (Petrov, 2019). In modern accounting practice, this approach can be implemented by applying capital support concepts (Fig. 1).

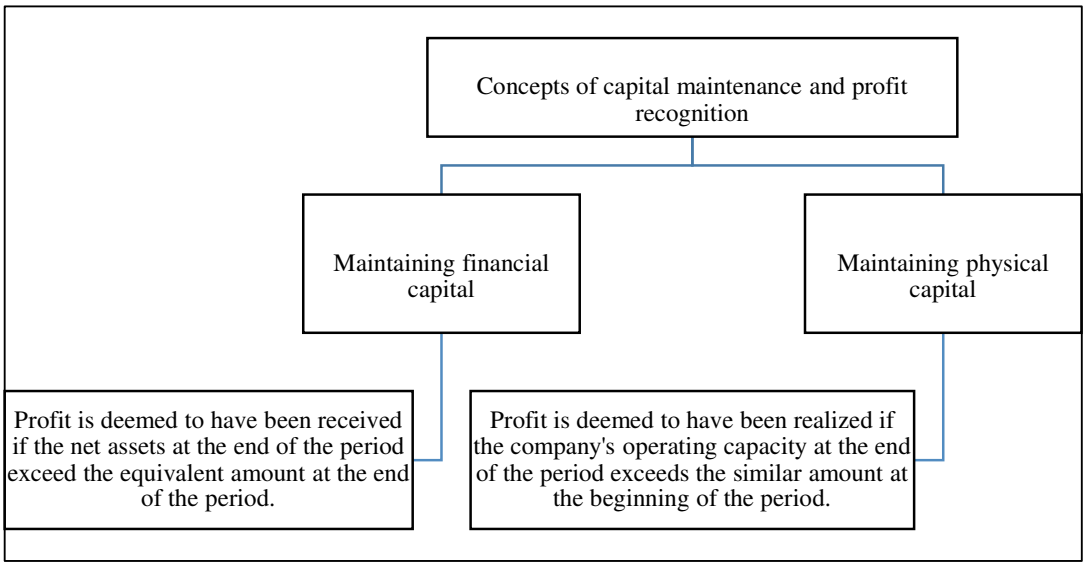

Fig. 1: Concepts of capital support and profit recognition

Assumptions about the certainty that an event may occur in the future are not a factor in its occurrence. Such external circumstances may include inflation, changes in the consumer value of the consumed or produced goods that are specific to the organization. For example, the equipment or materials produced by the company from which the products are made. Risks associated with changing prices for common components consumed or used by the company, such as electricity, fuel, etc., may also have an impact. Changes in the price of such components affect not only the production cycle of the individual or industry company, but the entire consumer and manufacturing market.

Thus, the concept of support for physical capital provides a marker of the volume of profit used in such a way that it is guaranteed that the production potential or the operational capacity of the company is maintained (Kosolapova, 2019). Under this concept, it is necessary to determine the possible costs that can be incurred from profit. For this purpose, we propose that all expenses incurred from profit should be divided into expenses that generate economic benefits, expenses that do not generate economic benefits. (Fig. 2.).

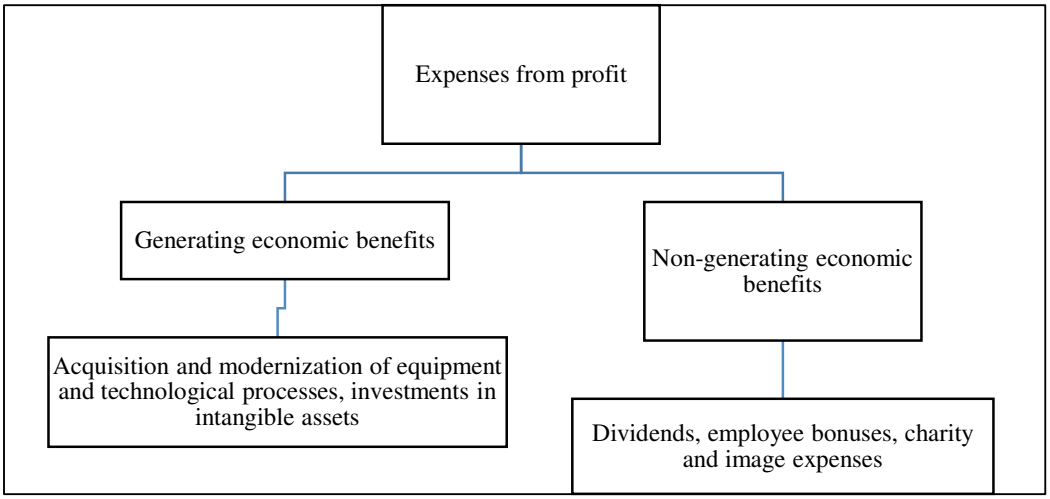

Fig. 2: Classification of expenses incurred at the expense of profit

The first category includes all expenses that can potentially bring economic benefits to the company. Such expenses may include expenses for acquisition of long-term assets, such as fixed assets, investment real estate, intangible assets, as well as acquisition of technological processes, investment in other investments. Costs that do not generate future economic benefits can be considered as incentive and image payments. For example, the payment of dividends to shareholders, bonuses to employees, payments to form a pension fund for employees. A portion of payments made from profits can be considered as image payments. For example, transfers to support social and cultural structures, health care funds, charity funds, transfers to support sports teams and others.

International Financial Reporting Standards do not have a specific methodology for determining the amount of profit that can be used while maintaining a company's operational capability. In practice, companies use multiple methods to calculate this amount, mainly related to the method of calculating the amount of dividends. At the same time, in scientific works, in accounting policies of companies such calculations become more complicated, multiple correction factors are included, resulting in multifactor models and creation of three-dimensional financial matrices for dividend policy management. Such approaches may be based on different theories. For example, the theory of payment of dividends on the residual principle when funds are spent on investments (Modigliani, 1958; Ekimova, 2016). There may also be a theory of priority payment of dividends, which should contribute to the value of the company (Gordon, M.J., 1959). Without questioning the need for the existing methods of dividend policy, we believe that there are simpler and no less effective approaches.

We propose a hypothesis that such a solution may be an approach based on the J. Hicks theory and the concept of supporting physical capital, which may be applied in the framework of international financial reporting standards and the legislation of some national jurisdictions. In order to determine the amount of profit that can be distributed, an organization must choose an indicator that will adjust the amount of profit. This indicator or ratio may be an inflation rate, commodity price index, etc. Thus, the organization will have a certain amount of profit not subject to redistribution, which will serve as a reserve for maintaining capital. At the same time, the full amount of profit can be used as a marker, since investments foresee risks, such as investment, currency, tax, etc. (Akhmadeev, 2019; Petrova, 2019). For example, at 500,000$ revenue, 300,000$ expenses and 10% inflation for the period, the capital support reserve will amount to 30,000$, and the profit, which can be redistributed should not exceed 170,000$. An important condition is the calculation of the profit indicator with adjustments on a continuous basis. It is the value of adjusted profit that will correspond to the amount of profit that can be allocated to expenses that do not generate economic benefits.

Conclusion

Based on the results of the study, it can be concluded that the classification of expenses in the format of the concept of maintenance of capital and recognition of profits for the purposes of the most effective management is a complex economic object that combines both general economic understanding and accounting techniques. We have concluded that profit is a marker of capital appreciation, which can be subject to redistribution. However, expenses at the expense of profit from which economic benefits are expected can be considered as economically justified investments. In this case, the full amount of profit can be used as a marker. However, expenses that initially do not lead to economic benefits, but are image, should be within the limits of adjusted profit, taking into account the capital maintenance reserve. We see further development of this hypothesis in the development of profit adjustment methodology.

References

- Davidson, H. and Giorgo, S. (2019), 'Not All Profits are Created Equal: New Evidence on the Profits-Leverage Puzzle,' *Electronic Journal*. 10.2139/ssrn.3056440

- Golubtsova, E.V. and Zvereva, A.O. (2019),'Expediency of parallel import legalization in Russian Federation. Proceedings', Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 782-787.

- Lehoux, L., Duck, H., Akhmadeev, R., Morozova, T. and Bykanova, O. (2019),'Sustainable development facets: taxation solutions for the energy industry', *Journal of Security and Sustainability Issues,* 9(2), 457-472. http://doi.org/10.9770/jssi.2019.9.2(8)

- Tawiah, V. and Muhaheranwa, B. (2015), 'Predictive Power of Net Profit on Share Returns', *Electronic Journal.* 10.2139/ssrn.2592937

- Morozova, T.V., Akhmadeev, R.G., Bykanova, O.A. and Philippova, N.V. (2019),'Harmonizing the valuation standards of the EEU agricultiral companies', *International Journal of Recent Technology and Engineering*, 8 (1), 2167-2177.

- Blank, I. (2007), 'Profit management form', *Nika-Center*, 768.

- Petrov, A.M., Nikiforova, E.V., Kiseleva, N.P., Grishkina, S.N. and Lihtarova, O.V. (2019),'Creation of the reporting on sustainable development of companies based on socioeconomic measurement statistics,'*International Journal of Recent Technology and Engineering,* 8 (2), 4005-4012.

- Coase, R. H. (1977), 'The Wealth of Nations,' *Economic Inquiry,* 15(3), 323–25

- Shtefan, Y.G., Zimakova, L.A., Vakhrushina, M.A, Chirkova, M.B. and Malitskaya, V.B. (2017),'Stages of economic substantiation analysis and modeling for the meat processing companies' price strategy,'*Espacios*, 38(49), 16-25.

- Domitilla, M. (2019),'Theory of Profit,'*New Perspectives of Profit Smoothing*, 6(2), 1-42.

- Korableva, O. N., Kalimullina, O. V., and Mityakova, V. N. (2018),'Innovation activity data processing and aggregation based on ontological modelling,'Paper presented at the 2018 4th International Conference on Information Management, ICIM 2018, 1-4. doi:10.1109/INFOMAN.2018.8392659

- Iron, R. (2019),'Analyzing and Forecasting Financial Statements,'*The Fundamental Principles of Finance*, 4(21), 136-164.

- Bennett S. (1991), 'The quest for value : a guide for senior managers,' *Harper Bsiness*, 781.

- Turishcheva, T.B., Akhmadeev, R.G. and Chaykovskaya, L.A. (2019),'Institutional environment of internal controls in autonomous establishments,' *International Journal of Innovative Technology and Exploring Engineering,* 8 (12), 2353-2357.

- Akhmadeev, R.G., Bykanova, O.A. and Salomadina, P.S. (2019),'The effect of the VAT change on the final consumer,' Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 765-770.

- Penman, S. (2004), 'Financial Statements Analysis and Security Valuation,' *McGraw-HiL*, 768.

- Lehoux, L., Morozova, T.V., Safonova, E.G., Balashova, A.D. and Protasov, M.V. (2019),'Practical aspects in calculating of impairment of financial assets according to IFRS 9 «Financial instruments»,' Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 6624-6632.

- Hicks, J.R. (1946), 'Value and Capital', *Oxford University Press*, 194.

- Kosolapova, M.V., Muravitskaya, N.K., Tolmachev, M.N., Melnikova, L.A. and Petrov, A.M. (2019),'Technology for solving the problems related to the implementation of the concept of preserving capital in accounting and statistics,'International Journal of Recent Technology and Engineering, 8 (3), 789-792.

- Modigliani, F. and Miller, M. H. (1958), 'The Cost of Capital,' *Corporation Finance and the Theory of Investment,* 24 (2), 261-297.

- Akhmadeev, R., Morozova, T., Voronkova, O. and Sitnov. A. (2019),'Targets determination model for VAT risks mitigation at B2B marketplaces,' *Entrepreneurship and Sustainability Issues, 7*(2), 1197-1216. http://doi.org/10.9770/jesi.2019.7.2(28).

- Petrova, G., Posadneva, E. and Morozova, T. (2019), 'Leading the Labour Market by the Laws of Supply and Demand,' Sustainable Leadership for Entrepreneurs and Academics. Springer Proceedings in Business and Economics. Springer, Cham, 263-271 https://doi.org/10.1007/978-3-030-15495-0_27

- Ekimova, K.V. (2016), 'Improvement of the methods for assessing the value of diversified companies in view of modification of the herfindahl-hirschman model, '*Journal of Internet Banking and Commerce*, 21 (4), 14.

- Gordon, M.J. (1959), 'Dividends, earnings, and stock prices,'*Review of Economics and Statistics,* 41, 99- 105.

The Financial and Economic Strategy Formation at an Enterprise: Its Impact on a Managerial Decision-Making Process

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Abstract

In view of the current paradigm of financial management of sustainable development, the methodological foundations used to form adaptive financial and economic strategies of companies are highlighted. The study identifies the mechanisms of both active and passive adaptation of the strategic financial management system towards the conditions of the market. The identified factors are represented by the characteristics of the relevant facilities and the components of the financial and economic strategy of the company, embracing investment, structural, taxation and credit constituencies. This, in turn, allows revealing the patterns of strategic financial planning to realize the company's financial strategy by applying the proposed mechanism to assess the conformity of the financial and economic strategy and the targets, set by the company, and to exercise a sustainable development of the company. However, the procedure for the formation and implementation of an appropriate financial and economic strategy is viable only when using a combination of tools for managing financial resources of an enterprise. The process of managing the financial and economic strategy itself requires the formation of an effective management system, adapted to the modern business conditions and changes at the micro and macro levels. This process plays the key role in financial activity implementation and contributes to making effective management decisions.

Keywords: Financial Management, Strategic Financial Management, Financial And Economic Strategy, Sustainable Development Of The Enterprise.

Introduction

Practical approaches to the development of a mechanism and the implementation of a financial and economic strategy in modern transformational processes of emerging markets impose new rules on the

strategic management of an enterprise (Acharya, 2005). In this regard, the development of a financial and economic strategy, which is provided by the enterprise management system, determines the following key research objectives:

a) formation and effective use of financial resources (Galariotis, 2015);
b) compliance of financial actions with the economic condition and tangible assets of the enterprise (Golubtsova, 2019);
c) identification of potential sources of threat from competitors (Dagaev, 2019);
d) determination of priority areas for financial actions and maneuvering to gain a crucial competitive advantage (Kalacheva, 2019).

Literature Review

The review of economic literature indicates that the subject of financial and economic strategy formation at an enterprise has been studied by both foreign and Russian authors. In particular, theoretical and methodical aspects of strategic and financial analysis were researched by prominent contemporary researchers, such as Brigham (1989), VanHorne (2005), Hasan (2017) and many others. At the same time, the activity on the development and implementation of the financial and economic strategy of an enterprise represents a kind of management activity (Golubtsova, 2019), which is a combination of actions within an overall financial management system of the company. Both in theory and practice financial management specialists apply matrix modeling methods (name), strategic analysis of the strengths and weaknesses of company performance (name) and financial analysis of the branch of industry (name). Without diminishing the importance and the effective application of certain methodological approaches while choosing a financial and economic strategy, it should be noted that their usage does not allow, in the opinion of (full name), to comprehensively present the procedure for selecting alternatives:

a) formation of an analytical basis for the parameters used to select a financial strategy based on the strategic diagnostic procedure (Deputatova, 2018);
b) optimization of the procedure when choosing an alternative financial and economic strategy (Ivanova, 2018);
c) rationing and justification of limitations of target vectors of strategic alternatives depending on the level of financial equilibrium and changes in financial and economic stability (Lehoux, 2019);
d) modeling net assets and liabilities behavior of an enterprise applying various strategic alternatives (Kandeeva, 2015).

In this regard, the principal goal of the study is to analyze theoretical approaches and determine the essence of “a financial and economic strategy of an enterprise” concept taking into account the development of guidelines on the effective formation of a mechanism used to implement financial and economic strategy employing the enterprise management system.

Theoretical Background

The majority of practical studies tend to determine a long-term goal of the company performance, which should be attained due to an effectively developed financial and economic strategy. Nowadays there is no consensus regarding the definition of this concept. That is why its formulation has become the subject of research conducted by many scientists. The set of definitions of strategies combines the evidence-based aggregate underlying the adoption of developed strategic decisions. We believe that the company’s financial and economic strategy constitutes a long-term financial plan of its development, which is aimed at the determination, usage and realization of strategies to ensure the company’s stability and establish financial relations with counterparties, which a business entity needs to follow to reach the goal. The major

drawback of the definitions under consideration is their fragmentation as well as isolation of the company's financial strategy from its main strategy.

In this regard, it is possible to group certain features of the financial strategy as functioning according to the following classification, which is:

1) an integral part of the financial and economic strategy, allocated for the relevant sphere of economic activity of the enterprise;
2) the chosen economic strategy of the enterprise, aimed at implementing not the whole range of interests of its owners, but serving only its financial interests;
3) the means of origin of the chosen economic strategy which occur due to the effective use of the financial potential of the enterprise;
4) the development of the key guideline of the financial and economic strategy, providing for a quick adaptation of the enterprise to changing conditions of the external financial environment, and directly affecting the financial results of the enterprise.

Considering the identified peculiarities, the key goals of a financial and economic strategy are as follows:

a) determination of methods that can successfully exploit financial opportunities of an enterprise;
b) identifying perspective financial links with non-financial organizations, the state and other institutions;
c) ensuring future trends for financial operational and investment activity;
d) studying economic and financial opportunities of competitors, developing and holding measures to ensure financial stability;
e) working out ways to get out of crisis situations as well as management methods that can be used in crisis situations of enterprises.

Therefore, the process of establishing a financial and economic strategy of an enterprise may include the following principle stages ranging from its development up to the assessment of its effectiveness (fig. 1).

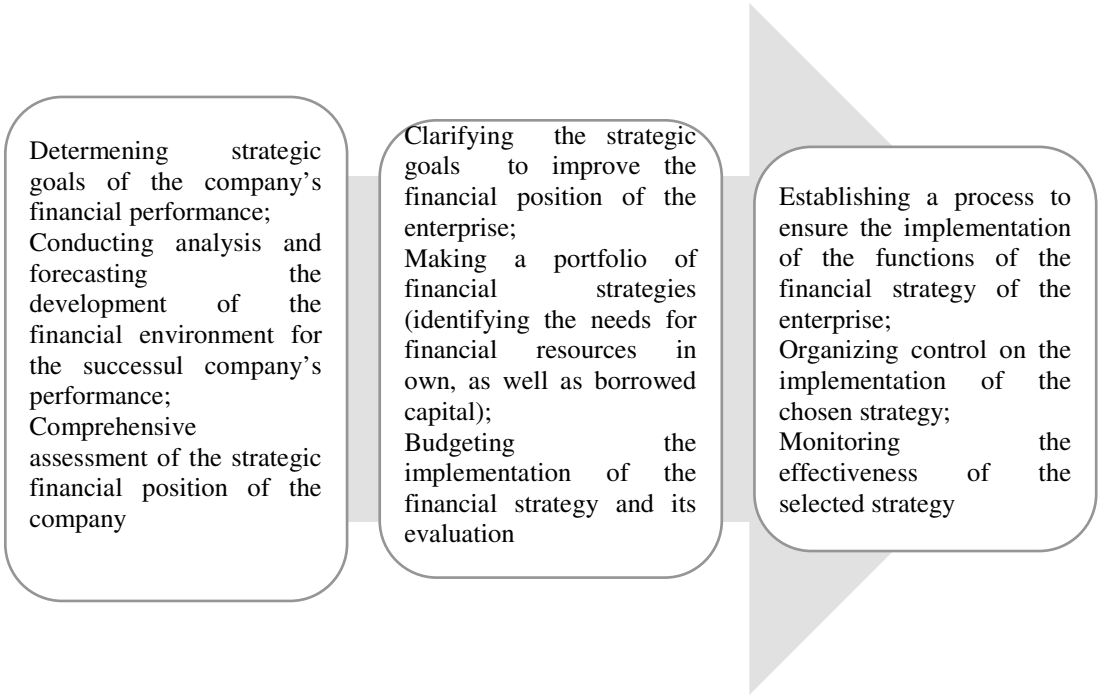

Fig. 1 : The main principle stages of the enterprise's financial and economic strategy development

It should be noted that the degree, to which the factors influence the financial stability of the enterprise, depends not only on the potency of each of them and the correlation between the factors, but also on the stage of the enterprise life cycle at the moment, taking into account the conformity of established management procedures. Considering the implementation of the financial and economic strategy, we should highlight the financial mechanism that forms similar conditions for macro- and microenvironments as well as the factors affecting both the overall strategy of the enterprise and the implementation of the company's financial and economic strategy to develop its own resources, attracted external resources and the like. The development priorities and the objectives of a financial and economic strategy for each element of the value chain are presented in Figure 2.

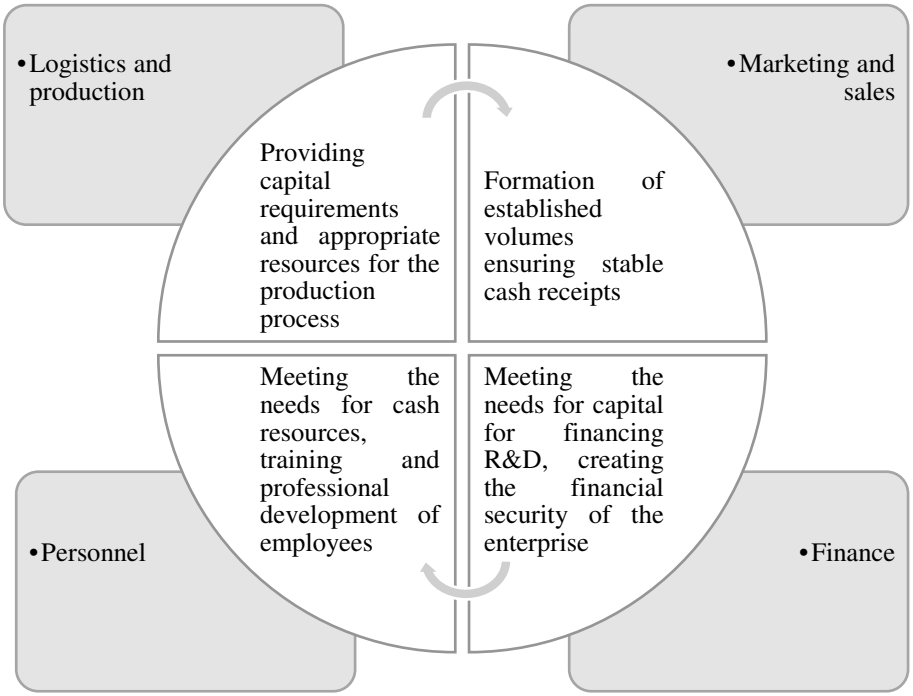

Fig. 2 : The key development priorities and the goals of the financial strategy established for each element of the value chain

Meanwhile, a competently built financial mechanism affects the effectiveness of the financial and economic strategy implementation inside the overall management strategy of the enterprise, which can be achieved with the help of the following factors:

1) the compliance of the designed financial strategy with the overall strategy of an enterprise (Kandeeva, (2015);
2) the degree of coordination of goals, directions and stages of their implementation (Orekhova, 2017);
3) the consistency of the financial and economic strategy of an enterprise with projected changes in the external business environment.

In doing so, the effective financial and economic strategy should consider risks, needs for business plan financing, financial goals of the enterprise and the market business conditions. In vague economic conditions and instability of financial markets, high risks of applying financial instruments, the interdependence of individual economic entities on the fluctuations of the world market, we should consider the elements of financial and economic policy of an enterprise.

Discussion

The current scientific sources determine the following dominant areas of financial development of an enterprise:

a) the financial resources development strategy, which aims at capacity building of enterprise financial resources, sufficient to meet the needs for its development (Korableva, 2019);
b) the investment strategy which, if applied, permits to rationally use the financial resources of an enterprise, allocate them according to the areas and types of investments, taking into account the criteria of the risk and return ratio (Kosov, 2016);
c) the enterprise financial security strategy, which provides the financial stability of the enterprise during its strategic development (Turishcheva, 2019);
d) the strategy which improves the quality of financial management of the enterprise in strategic perspective (Titova, 2019).

Thus, the economic behavior of an enterprise can be determined above all by the choice of sources to finance its performance. Subsequently, a financial and economic strategy should meet the following criteria:

1) to consider the inner financial factors when choosing the sources of financing as they are easier to predict (Glubokova, 2019; Petrov, 2019);

2) to take into account the external financial environmental factors that can be predicted with a certain degree of risk (Kretschmann, 2020);

3) to ensure that a financial and economic strategy should justify the choice of the ratio of the sources of funding;
4) to consider financial risks while choosing an appropriate source of financing.

In addition, a financial and economic strategy characterizes diverse relations of the enterprise in production, credit, investment and financial spheres of activity. It predetermines the company's behavior on the market, its position on the market, the usage of financial resources as well as monetary instruments. Therefore, the financial and economic strategy is aimed first of all at a long-term perspective or at solving key priority tasks in a definite period of time.

Conclusion

In the conducted study, the initial position for the choice of a financial and economic strategy of an enterprise is considered. It is based on the developed concept and principles which determine the formation of the mechanism of a financial and economic strategy at a contemporary enterprise. The process of choosing an alternative to the financial and economic strategy possessing practical value rests on a systematic and scenario-based approaches, the use of which makes it possible to present, on the one hand, the continuity of the selection procedure, and on the other, the use of an integral criterion of the potential for financial and economic stability, which will justify the optimal choice (Porter, 2006). The study highlights the importance of financial and economic strategy determination in various business situations, employing a practical approach, depending on the current financial situation of an enterprise and perspectives of its sustainable development on the basis of building scenario options. Feedback information communication allows comparing the result of the implementation of the financial and economic strategy with the company goals at the entry level and determining the deviations of the real vector of the system

development from the ideal one. It is the deviation of actual parameters from the preset ones that constitutes the essence of the problem.

Management means solving a number of problems. Therefore, when considering the practical approach of decision making, financial decisions tend to be unprogrammed, that is why the process of solving financial problems is endless. The formulation of the problem and its awareness lay the foundation for the identification of a practically applicable financial and economic strategy as well as setting strategic goals. In order to identify real-time strategic goals, it is necessary to meet the effectiveness requirements, namely, to achieve the main goal of a financial and economic strategy, i.e. to maximize the value of the enterprise. At the same time the practicalities of a financial and economic strategy should be developed in such a way that the implementation of one strategic goal should not affect another one.

Consequently, the conducted studies allow us to formulate the following statement. The formation and implementation of the relevant financial and economic strategy in real life is possible when using a combination of tools to manage the financial resources of the company. The process of a financial and economic strategy management itself needs developing an effective system of management, adapted to the current business conditions and changes at the micro and macro levels, and is the most important aspect of financial activity, which allows making effective management decisions in practice.

References

- Acharya, V. V. and Pedersen, L. H. (2005), 'Asset Pricing with Liquidity Risk, ' *Journal of Financial Economics*, 77, 375–410.
- Akhmadeev, R., Redkin, A., Glubokova, N., Bykanova, O., Malakhova, L. and Rogov, A. (2019), 'Agro-industrial cluster: supporting the food security of the developing market economy, ' *Entrepreneurship and Sustainability Issues,* 7(2), 1149-1170.
- Aksenova, A. (2014), 'The mechanism of receiving social subtraction when passing of treatments procedure, at calculation of a tax on the income of individual persons, ' *World of scien*ce, 2.
- Brigham, E.F. (1989), 'Fundamentals of financial management, ' 5th edition. – Chicago.
- Chernysheva, N. A., Perskaya, V.V., Petrov, A.M. and Bakulina, A.A. (2019), 'Green Energy for Belt and Road Initiative: Economic Aspects Today and in the Future, ' *International Journal of Energy Economics and Policy*, 9(5), 178-185.
- Dagaev, A.M., Novikov, A.V., Afonin, M.V., Maximov, D.A. and Golubtsova, E.V. (2019), 'Systems engineering: Tax risk peculiarities in project execution,' *International Journal of Engineering and Advanced Technology*, 8 (5), 2226-2230.
- Deputatova, Y.Yu., Pshenitsyna, Y.I., Ilyashenko, S.B., Baskakov, V.A. and Zvereva, A.O. (2018), 'Consumer behavior in the context of global economic transformations,' *European Research Studies Journal*, 21 (2), 95-109.
- Economou, F., Kostakis, A. and Philippas, N. (2011), 'Cross-country effects in herding behavior: Evidence from four south European markets, ' *Journal of International Financial Markets, Institutions and Money*, 21(3), 443–460.
- Ekimova, K.V. (2015), 'Improvement of the methods for assessing the value of diversified companies in view of modification of the herfindahl-hirschman model, ' *Journal of Internet Banking and Commerce*, 21 (4), 14.
- Galariotis, E., Rong, W. and Spyrou, S. (2015), 'Herding on fundamental information: A comparative study,' *Journal of Banking & Finance*, 50, 589–598.
- Glubokova, N.Y., Egorova, L.I. and Sokur, V.S. (2019), 'Tax control of small enterprises: Russian and foreign experience, ' Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 3354-3358.

- Golubtsova, E.V. and Zvereva, A.O. (2019), 'Expediency of parallel import legalization in Russian Federation,' Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 782-787.
- Hasan, I., Jackowicz, K., Kowalewski, O. and Kozłowski, L. (2017), 'Do local banking market structures matter for SME financing and performance? New evidence from an emerging economy, ' *Journal of Banking & Finance*, 79, 142–158.
- Golubtsova, E.V. and Zvereva, A.O. (2019), 'Development of Tax Attractiveness of Russia's Special Administrative Areas with Fair Tax Competition,' Proceedings of the 34th International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Management of Innovations through Sustainable Economic Competitive Advantage Vision 2025, 2023-2028
- Ivanova, Y., Nikeryasova, V., Balikhina, N. and Savrukov, A. (2018), 'Ways to improve the mineral replacement tax system: Taking the experience of commonwealth of independent states countries,' *International Journal of Energy Economics and Policy*, 8 (5), 97-103.
- Kalacheva, O.N. (2019), 'A Survey of Modern E.U. Approaches towards Amortization Policies,' Proceedings of the 34th International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Management of Innovations through Sustainable Economic Competitive Advantage Vision 2025, 4515-4522.
- Kandeeva, V. (2015), 'Formation mechanism of innovation and investment activities of industrial enterprise, ' Economics: the realities of time, 3 (19), 124-130.
- Korableva, O., Durand, T., Kalimullina, O. and Stepanova, I. (2019), 'Studying user satisfaction with the MOOC platform interfaces using the example of coursera and open education platforms, ' Paper presented at the ACM International Conference Proceeding Series, 26-30.
- Kosov, M.E., Akhmadeev, R.G., Osipov, V.S., Kharakoz, Y.K. and Smotritskaya, I.I. (2016), 'Socio-economic planning of the Economy, ' *Indian Journal of Science and Technology*, 9 (36), 102008.
- Kretschmann, J. (2020), 'Sustainable Change of Coal-Mining Regions,' *Mining, Metallurgy & Exploration,* 37, 167–178.
- Kuznetsov, I.A., Malitskaya, V.B., Sukhova, V.E., Ivanova, V.A. and Proskurina, I.Yu. (2017), 'Innovation activity of Russian business entities and its determinants,' European Research Studies Journal, 20 (3B), 395-402.
- Lehoux, L., Morozova, T.V., Safonova, E.G., Balashova, A.D. and Protasov, M.V. (2019), 'Practical aspects in calculating of impairment of financial assets according to IFRS 9 «Financial instruments»,' Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 6624-6632.
- Petrov, A.M., Putihin, Y.E., Poluleh, M.V., Yurasova, I.O. and Erohina, V.N. (2019), 'Accountant Modeling Technology and Statistics in the Context of the New Educational Concept, *'International Journal of Innovative Technology and Exploring Engineering,* 8 (12), October 2019.
- Porter M. E. and Kramer M. R. (2006), 'Strategy and Society: The Link Between Competitive Advantage and Corporate Social Responsibility, ' *Harvard Business Review*, 06 (18), 78-92.
- Titova, E.V., Subhonberdiev, A.S.H., Malitskaya, V.B. and Safonova, N.M. (2019), 'Strategy for the sustainable development of the timber industry as subsystems of the regional economy,' Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 9119-9125
- Turishcheva, T.B., Ponomareva, D.A. and Luzgina, A.S. (2019), 'Review of the key requirements for the financial statements complying with the international and Russian accounting standards,' Proceedings of the 33rd International Business Information Management Association Conference,

IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 3031-3039.

- VanHorne, J. C. and Wachowicz, J. (2005), 'Fundamentals of Financial Management,' Harlow, London, New York.
- Yukhimov, Ya.I., Kanevskij, G.V. and Yukhimova, Ya.Ya. (2002), 'New taxation of mining enterprises,'Gornyi Zhurnal, 11 (12), 4-9.

Conceptual Aspects of State Regulation of The Russian Economy: Industrial Sector

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Abstract

The authors of the article analyze the conceptual aspects of the industrial policy of Russia. Based on a generalization of the historical experience of developed countries in this area, the urgent problems of Russian industrial policy and ways to solve them are also investigated.

Keywords: Industrial Policy, Institutions, Innovation System, Spatial Development

Introduction

The development of the concept of industrial policy in Russia requires the fullest possible consideration of world experience in this area. Its analysis allows us, in our opinion, to distinguish two models of industrial policy. Industrial policy has been formed for almost two centuries (XIX-XX centuries) and has gone through an evolutionary path from direct state management ("etatist model") to a set of liberal measures ("institutional model").

The etatist model was formed in the era of industrialization in the XIX century, when technological means were considered as the main tool for solving the most important socio-political tasks: ensuring national security, overcoming disparities in territorial development, and resolving social conflicts.

Its central element was engineering projects initiated or supported by the state and of national significance. The success of such projects depended on the state of the entire national economy, and therefore industrial policy claimed the status of a comprehensive economic policy. This is how the us economic development doctrine was developed and implemented at the beginning of the XIX century, the principles of which then formed the basis of the" Meiji revolution " in Japan in the 1860-1870s, as well as the program for building a network of all-German Railways in the first half of the XIX century.

However, not only in the United States, Japan and Germany, industrial policy was used as the main tool of state management of national development. For example, all railway systems in the nineteenth century were planned by national governments (except the British metropolis). The state built Railways or supported private companies by providing lucrative concessions, guarantees, etc. The dominance of the etatist industrial policy lasted from the beginning of the XIX century to the 70s of the XX century.

The revision of the foundations of state industrial policy in economically developed countries was largely due to the technological shift in industry, as well as changes in the corporate organization of its subjects. The scale of the latter and the nature of their decisions led to the fact that there was no economic need for the state as a holder of large engineering projects. Most technical and technological decisions were not made at the state level.

However, there was another factor that played a major role in the reevaluation of industrial policy, namely, globalization, which destroyed the economic autonomy of States. On the one hand, the new way of ensuring security through defense integration has deprived States of incentives for economic protectionism of their own industry. On the other hand, resources began to circulate in world markets

that were no longer subject to individual national States. The state's pre-existing involvement in the design-Finance-production-sales chain has been disrupted.

By the early 1990s, in Europe and the United States, the state began to abandon direct management of engineering infrastructures, privatize the electric power industry, transport and communications, and transfer public utilities to concessions.

Thus, at the end of the XX century, there was a strong belief that industrial policy in its original sense had almost exhausted itself. The etatist industrial policy was replaced by an institutional one. Its goal was to ensure the competitiveness of the national economy in an open market, and as the main tool was used a set of institutional and financial-regulatory measures that indirectly affect the technological development of the economy and literally dissolve in the General economic policy (see Fig. 1 and 2).

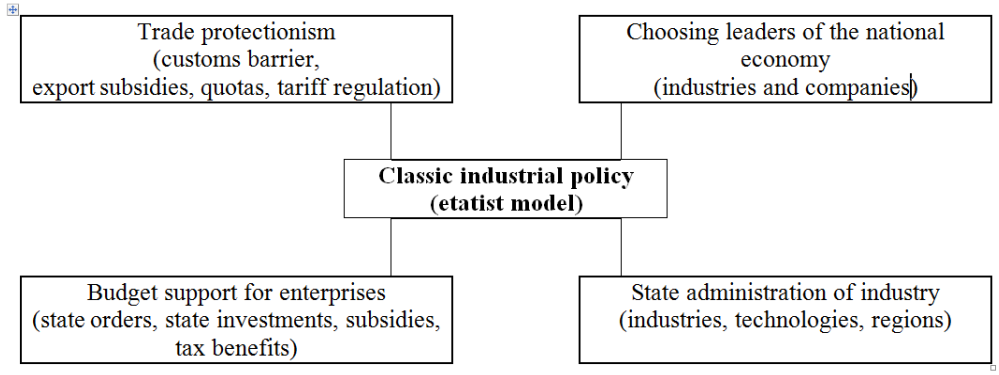

Fig.1. Scheme of the etatist model of classical industrial policy
Source: Compiled by the authors

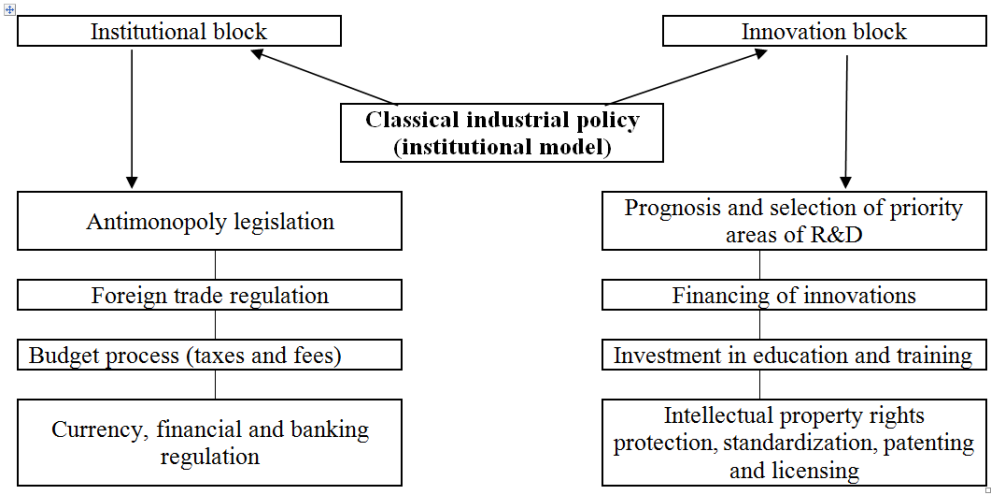

Fig.2: Scheme of the institutional model of classical industrial policy
Source: Compiled by the authors

Materials and Methods

In our view, the Russian specificity is that the main conflict lies in a different plane. This is a contradiction between the local character of most Russian industrial enterprises and the global economy in which they are placed. The weak ruble created preferences for the Russian industry, which allowed it to regain (though not completely) the national market and facilitate the promotion of

certain types of its products on the world market. The old industry, designed for isolation and internal balance of the economy, revived, restored internal connections and claimed resources. However, now the growth reserves of Russian industry, which were provided by a weak ruble and low prices for certain types of resources (raw materials, transport and energy services, labor, etc.) in comparison with the world's domestic prices, have actually been exhausted. Further economic growth should be provided by new factors related to the integration of Russia into the world economy.

Let's make two important marks. First, the asynchronous development of the processes of production, circulation, consumption and turnover of finance can lead to the fact that the integration of the Russian economy into the global market will occur in fragments, and the economy itself will continue to lose its integrity. Therefore, it is necessary to synchronize the pace of development of the main economic processes. Moreover, it may be necessary to synchronize not only by "spurring" production and consumption, financial turnover, but also by keeping the economy from growing too fast.

Secondly, the place of industrial policy that was previously occupied by industry as a complex of technologically related and complementary industries-productions-must now be assigned to a new set of processes that intertwine industrial production and that together ensure its integration into the global market (production, circulation, consumption, financing and regulation). The institutional model of classical industrial policy gets a new tool-project management of the economy.

The project as an industrial policy tool allows you to combine administrative, financial, structural, technological and market resources, as well as to establish targeted control of results at each stage of implementation. Only the creation of a system of priority projects of various scales will help to move industrial development from the dead point.

The analysis of the needs of the Russian economy shows two types of such projects.

The first is infrastructure projects that serve the needs of the economy and the country as a whole: transport, information, educational, scientific and technical, social and communal infrastructure projects. They have a positive effect not only for the investing company, but also for other market participants (for example, capacity port capacity, promotes not only the profits of companies-operators and exporters).

Reforming natural monopolies: the electric power industry, the railway and gas sectors of the economy, as well as housing and utilities-these are the elements of the project approach in industrial policy.

Another key project may be the development of mortgages. Its implementation as the largest investment and construction project will not only revive a huge number of companies, but also give them a significant impetus for intensive growth.

The second type is innovative projects aimed at securing the country in promising niches of the world market. They lead to the creation of national value chains, the output of which is a science - intensive product that is competitive by world standards. An indispensable condition for obtaining such a product is to increase the degree of processing of raw materials (metallurgy, oil and gas and forest complexes), to realize the intellectual potential of the military-industrial complex, and to cooperate between innovative small and medium-sized businesses and integrated industrial groups.

Such projects aimed at creating qualitatively new technologies and production facilities are usually long-term and require unhindered access of companies to long-term credit resources. Both of these conditions are currently absent in Russia. The state is faced with the task of eliminating this negative factor, largely due to its inconsistent economic policy.

Methods Study

In the study, the authors used some methods such as a comparative analysis, synthesis, systematic approach and classification, historical method.

Results

International experience shows that the creation of national value chains with the participation of

small and medium-sized businesses is one of the most important resources for improving competitiveness. And industrial policy is designed to encourage the creation of such national chains.

The goal of innovative projects may also be to integrate Russian companies into global value chains. But as suppliers of high-tech products, not raw materials. This is a recipe for those companies and industries that, for objective reasons, cannot become market leaders, but will find themselves in international cooperation. Examples include projects related to the creation of modern Airliners, the implementation of rocket and space programs, the production of unique medical equipment, or the global partnership of air carriers. Even the rise of the automotive industry can be achieved if, instead of an industry approach, we choose a project for the production of, say, automotive components for modern cars.

Conclusions

Whatever value chains are created – national or global-the strategic priority of improving the competitiveness of domestic products must remain unchanged. The main criterion here is the growth rate of added value. It reflects the evolution of companies from the simplest forms of production (with minimal human capital expenditure and high natural rents) to more complex forms.

Thus, overcoming the economic imbalances that arise as a result of Russia's rapid involvement in the global economy can be facilitated by implementing a series of projects aimed at breaking the most problematic nodes for the national economy tied by globalization. First of all, we are talking about a package of social and management projects-specific corridors for adapting the domestic economic and economic complex and its supporting infrastructure to the global economy: creating a national innovation system; changing the training system; development of consumer lending and mortgages.

Acknowledgment

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References

- Basile A., Germidis D. Investing in Export Processing Zones, 1984, 20
- China’s windows on the world. Review of Business and Technology, # 10, 2001, 32-35.
- Cluster development and BDS promotion”, NY, 2015, 12-14.
- Economic and Social Effects of Multinational Enterprises in Export Processing Zones. UN CTC – ILO, 1988., P.2
- International Seminar of Zones of Joint Interpreneurship in Centrally Planned Economies. Moscow, 1989. Back-ground Paper # 26, P.11.
- Ohmae K. The Invisible Continent. Four Strategic Imperatives of the New Economy. N.Y. 2001. P.25.
- Ryan P.F. The Origin and Growth of the Shannon Free Airport Development Company Ltd.

Industrial Policy in The Context of State Regulation of The Russian Economy

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Abstract

The author of the article analyzes the place and role of industrial policy in the system of state regulation of the Russian economy. The article discusses the basic concepts, principles and options for the implementation of the national industrial policy in the conditions of market transformation of the country's economy.

Keywords: Industrial Policy, State Regulation Of Economy, Market Transformation, Strategic Goals

Introduction

As the experience of many countries of the world confirms, the mechanisms of a market economy sooner or later bring the national economy to an equilibrium state, orient producers to the needs of the market and create the prerequisites for boosting industrial production.

However, hoping for self-regulation and determinism of market processes would be an unforgivable mistake. In order to preserve the industrial potential of Russia, to carry out its structural adjustment, to make it competitive in the world market of industrial goods, active state regulation is necessary. First of all, for successful reform of the national economy requires an active industrial policy.

Industrial policy is the most important component of the socio-economic policy of the state, it is aimed at implementing strategic and tactical goals in the field of industrial production. In other words, this is a policy of supporting and creating the conditions (regime) of the most favored nation-wide industrial producers.

In world literature, the concept of "industrial policy" is unambiguously characterized as the focus of structural transformations. Its content is a system of measures conducive to progressive changes in the ratios and proportions of industrial production in accordance with national goals and priorities.

Transformational transformations in the real sector of the economy relied mainly on macroeconomic levers of regulatory influence. During this period, the need for a focused industrial policy was gradually recognized as the crisis in the industrial sphere worsened. The experience of the destruction of national industry in the phase of adapting the Russian economy to market transformations has led to the widespread recognition that an active industrial policy is necessary for the hastening establishment of a market system and overcoming the crisis in industrial sectors.

Materials and Methods

Distinguish industrial policy in the broad and narrow sense. State industrial policy in the broad sense includes all targeted actions of the state in the tax, price, credit, investment, foreign economic spheres, and measures to reform property relations.

State industrial policy in the narrow sense is understood as a macroeconomic policy in the field of management of individual industries and enterprises. Within its framework, tasks may be set to increase (reduce) the output of a particular product, achieve an industrial structure adequate to the requirements of the economy, mechanize individual industries, create new industries, prevent

inefficient investments or make up for their deficit in individual sectors, develop small and medium enterprises, and save resources environmental safety.

The leading components of industrial policy are highlighted (Fig. 1).

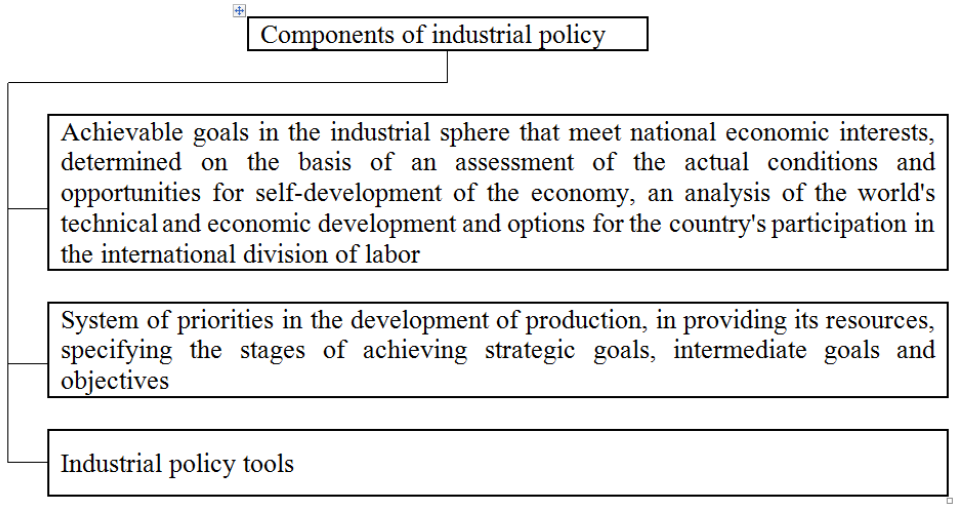

Fig. 1: The components of industrial policy in a market economy

Source: Compiled by the author

The choice of an appropriate industrial policy is associated with factors of its differentiation. In the evolutionary phase of adapting the economy to market transformations, three industrial policy strategies have been identified:

1) support for export-oriented industries, ensuring the accelerated development of exports and the inflow of capital necessary for the country;

2) import substitution as a result of supporting the national manufacturing industry through protectionist measures of protection against external competition;

3) support and development of high-tech industries, regardless of the capacity of the domestic market and the demand for their products.

Variants of modern industrial policy in Russia are aimed at supporting sectors and industries that differ in technological level, real economic mechanisms and prospects for achieving high competitiveness.

Methods Study

In the study, the authors used some methods such as a comparative analysis, synthesis, systematic approach and classification, historical method.

Results

Enterprises involved in the transformation processes in the industrial sphere of the Russian regions are distinguished by the enormous diversity of technologies and equipment and equipment of varying degrees of moral and physical wear and tear applied to them. The content, directions and priorities of industrial policy at all levels must be determined taking into account these characteristics of the real sector of the economy, that is, to differentiate the policy in accordance with the qualitative state of market entities.

This involves the work of the state in two directions. The first of these is associated with the use of methods of direct government influence on market entities in the form of state orders, direct

subsidies, soft loans, customs duties, licenses and quotas. The second direction is associated with the work of the state in the formation and further strengthening of the above elements of market infrastructure, primarily through the development of adequate legal norms and rules.

The laws necessary for the implementation of industrial policy can be divided into three groups. The first includes legislative acts governing: property rights and their management at the state, regional and municipal levels, privatization processes, the bankruptcy of enterprises, the functioning of the real estate market, land tenure and land use relations.

The second is the laws that determine the formation of the capital market, that is, the accumulation and use of financial resources of the state, federal subjects, organizations and individuals. The third group includes laws regulating the functioning of the real sector of the economy, that is, determining free competition, taxation, the functioning of the labor market, pricing, regulation of commodity markets, foreign economic activity, etc.

In the framework of industrial policy, it is necessary to determine a set of macroeconomic measures to stimulate the development of industry in the phase of economic growth (Fig. 2).

Industrial policy is not only capable of eliminating the negative side effects of tough credit and monetary conditions, but also allows you to move away from the debilitating financial system support for weak enterprises, focusing efforts on priority areas of production. The experience of Russian reforms confirms that the transfer of production to market rails, which is not supported by an active structural policy, including a selective approach to individual sectors of the economy, production groups, can lead to the country's loss of existing technological positions.

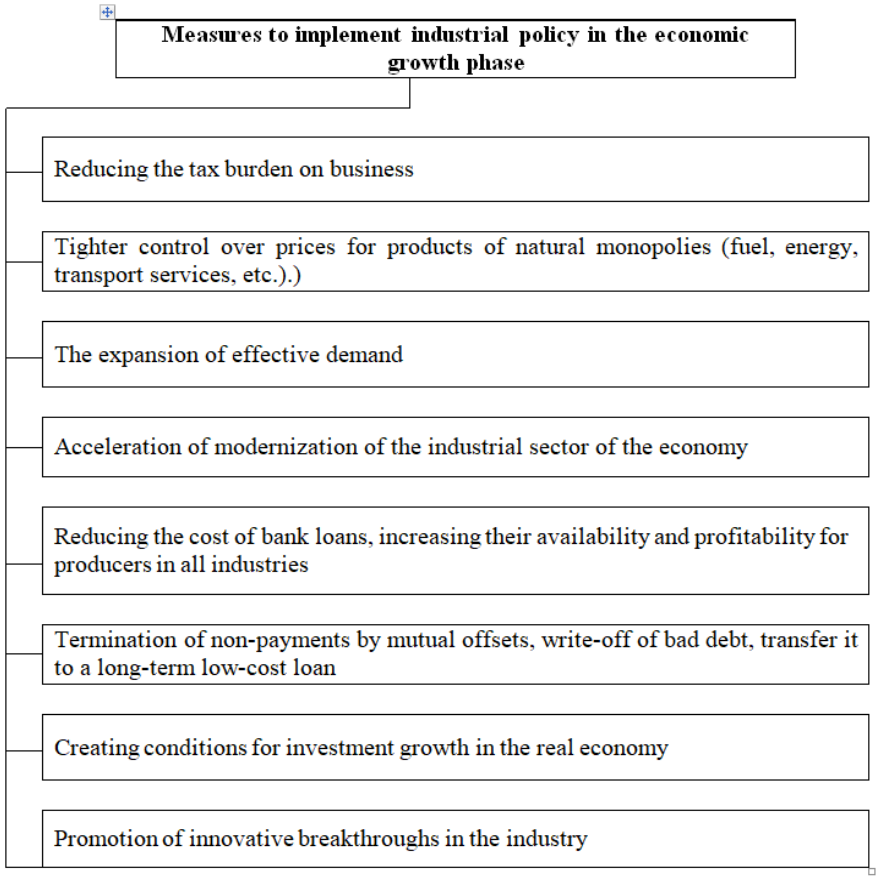

Fig. 2: The system of macroeconomic measures to stimulate the development of industry in the phase of economic growth

Source: Compiled by the author

Conclusions

All these circumstances put industrial policy at the forefront of economic reforms, determine the need for urgent linking with it all economic transformations, including corporatization, privatization, de-monopolization, anti-crisis management, etc. Industrial policy should be considered as a projection of national economic development goals on the industrial sphere, translating them into a system of priorities and distribution of production resources, in the mechanisms for implementing these priorities. The basis for detailed study of industrial policy is intended to serve as a strategy for industrial development, which builds its stage tasks taking into account the state of the country's production base, and trends in the global economic environment.

Industrial policy as an economic term is a complex, multidimensional concept. In our opinion, industrial policy is a set of economic, political and organizational measures at different levels of the national economic system aimed at:

- compensation for market mechanism shortcomings (in terms of quick movement of resources, ecology, infrastructure creation);

- improving the industrial (market) organization (industry structure, placement of production, regulation and promotion of investment and production activities, formation of industrial and financial groups, promotion of small and medium-sized businesses);

- maintaining an optimal competition regime in industries (production quotas, antitrust policy, competition promotion);

- promotion and maintenance of certain sectors of the economy that are important in their socio-economic significance or priority in terms of scientific prospects, high growth potential and competitiveness;

- stimulating the development of export potential and competitiveness of the national economy, taking into account both macro-and micro-economic factors;

- implementation of large-scale national R&D programs.

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References

- Cluster Development and BDS Promotion. N.Y., 2016.
- Granberg A. (2000), Regional Development: The Experience of Russia and the European Union. Economica.
- Johnson Chalmers (1982), MITI and Japanese Miracle. CA: Stanford University Press
- Marshall A. (1890), Principles of Economics – http://www.econlib.org/library/Marshall/marP.html.
- Ohmae Kenichi (2001), The Invisible Continent. N.Y.
- Porter M. (2005), Competition. Williams, 28-29.
- Yakovlev A., Industrial Policy of the Second Generation. Expert, 2004, № 37.
- Yasin Yevgeniy, Perspectives of the Russian Economy: Problems and Factors of Growth. Economic Matters, 2002, № 5.

Development of Export-oriented Supply Chain Management in Agri-food Industries

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Abstract

The preconditions for the successful development of agricultural industries in Ukraine are the favorable geopolitical position, significant production potential, the availability of a skilled labor, and a powerful raw material base. The authors justified the basic goals in Ukraine's agricultural trade policy improvements, including increasing the share of processed foods and improvements of agricultural exports structure; opening new niches in the global market and diversification of export markets; support of small and medium-sized producers in their export efforts; increasing the level of global competitiveness of Ukrainian producers and processors. It is determined that the main scientific and practical task in exporting agricultural products is to build effective supply chain management mechanisms. Export-oriented management of the agri-food supply chain is aimed at achieving not only economic but also social goals – increasing employment in rural areas and improving the standard of living of the population. A promising direction for enhancing agro-export potential may be the use of cooperative forms of business that will be able to realize themselves in the fields of procurement, distribution, transportation and finance.

Keywords: Agri-Food Industries, Supply Chain Management, Export, Global Competitive Advantage.

Introduction

The growth of global economy is accompanied by an increase in the intensity of technologies' flows, movements of goods, services and economic resources across national borders. Globalization is combined with the dynamic processes of increasing the volume of inter- and intra-industry trades, deepening the interdependence of agricultural markets and technologies, enhancing the influence of the world macroeconomic factors. The modern system of global food markets is characterized by dynamic and complex nature.

The economic transformations in the agri-food sector of Ukraine are aimed at ensuring the conditions of a competitive environment and creating the economic mechanism in accordance with the principles of a decentralized system. The agro-industrial complex is an important component of the Ukrainian economy. The country has all prerequisites for gaining global competitive advantage in the agricultural sector. The availability of fertile lands and the orientation to strategic global marketing niches can be mentioned as preconditions for the successful development of agricultural industries.

Ukraine is located near important global markets. The favorable geopolitical position, significant production potential, the availability of a skilled labor, the powerful raw material base in the agricultural sector determine the investment attractiveness of the country. Nowadays, considering the influence of economic and political drivers, a strong recognition of the importance receives the ensuring the competitiveness of domestic agriculture. An urgent problem is the restoration of lost and the maintenance of new export positions. The reduction in in the level of monopolization of the economy, regulatory measures towards the transparency of the economic environment, coordinative improvements of strategies of domestic business entities aimed at achieving competitive positions in world commodity markets can be listed as significant steps towards the solutions of the current problems which continued to have a negative effect on agriculture. As volumes of agri-food exports continue to grow the construction of efficient supply chain management mechanisms is among the important scientific and practical tasks at the moment.

The development of Ukraine’s agriculture in the context of competitiveness

In the conditions of transformation of property rights and changes of forms of management in the agrarian sector of Ukraine, it is necessary to ensure efficient use of production resources and achieve stable economic growth of the economy.

An important element of Ukraine's agricultural policy is the development of the food market system. In current conditions it is necessary to increase the level of production and technological efficiency, to ensure the improvement of national standards of food quality in accordance with international requirements, to stimulate the creation of competitive conditions and to continue carrying out economic reforms.

A sustainable agricultural management mechanism can be provided with an integrated crop and livestock system capable of meeting demands in food and raw materials, most effectively utilizing renewable and non-renewable resources, guaranteeing the balance of natural biological cycles, and supporting businesses efforts to raise the living standard of the population. Growing plants and raising animals are at the origin of the export-oriented food supply chains.

The next forms of competitive behavior may be observed in transitional economies (Wehrheim, et al., 2000].

1. Traditional forms that are common to advanced market economies:
   - price competition;
   - non-price competition;
   - commodity differentiation;
   - application of the system of guaranteeing the quality of products and services;
   - use of sales promotion system.

2. Specific forms inherited from the command and administrative system of governance and planned economy:

   - economic support from governmental bodies at all levels;
   - creating favorable economic conditions for individual entrepreneurs through informal contacts.

3. Specific forms that are combined with the economic crisis:

- delay in making payments;
- the usage of payments in kind.
- 4. Specific forms that that can be observed in the functioning of underdeveloped markets and manifestations of market inefficiency:
- involvement of officially unregistered labor;
- the practice of officially unregistered production;
- tax avoidance.

At the beginning of the economic reform period in the context of the Static World Policy Simulation modeling framework Liefert (1994) predicted an increase in grain exports, a decrease in meat production, and the utilization of most of the stocks of the obsolescent and deprecated equipment in agriculture, emphasizing the lack of competitive advantage in animal production in the newly independent states. Many experts' predictions about the prospects of the domestic agricultural market have come true. The imperfection of regulatory strategy and tactics in the process of reforming Ukraine's agro-industrial complex has led to a decrease in the efficiency of the domestic animal production (Figure 1).

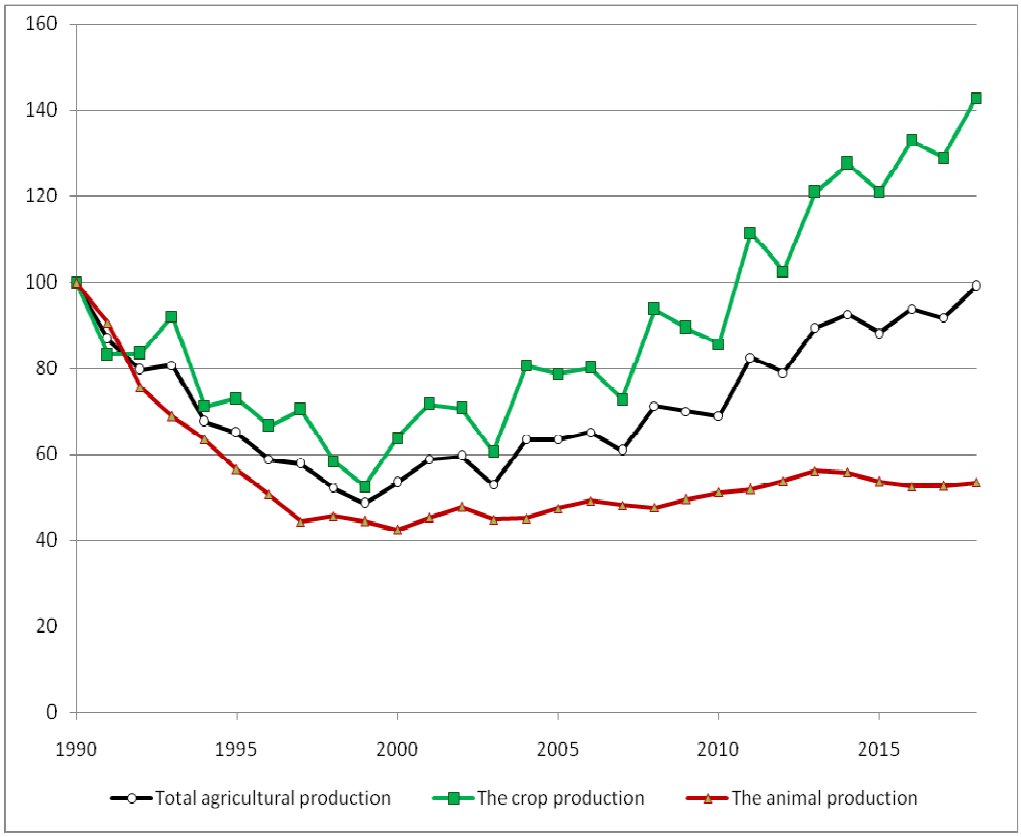

Fig. 1: Indices of agricultural production (1990=100%)

Source: data from the State Statistics Service of Ukraine (2019)

Supply Chain Management in Agri-food Export

Stoke and Lambert (2001), identifying strategic planning tools and analyzing operational practices in key logistics activities, consider the main reasons for the increased interest in logistics management: changes of consumer preferences, reduction in profits due to increased logistics costs, intensification of competition in the field of information technologies, redistribution of market power in supply chains. The conceptual framework by Aramyan *et al.* (2007) states that agri-food supply chain performance is characterized by efficiency (costs, profit, return on investment, inventory), flexibility (customer satisfaction, volume flexibility, the quantity of back orders and lost sales), responsiveness (fill rate, delivery delays, customer response time, lead time, shipping errors, customer complaints), product quality (sensory properties and shelf life, product safety and health, product reliability and convenience), and process quality (production system characteristics, environmental aspects, marketing).

The fall in the terms of trade indexes of meat and meat preparations, fish and crustacean, milk and milk products; eggs; honey, some other animal products, seedings and other trees, eatable fruits and nuts, shellac, sugar and sugar confectionery, cocoa and cocoa preparations, preparations of grains, products of vegetables processing indicates an unfavorable trends (Table 1).

Table 1: Terms of trade indexes for some agri-food commodities in Ukraine, 2018 (per cent)

Product group	2017	2018	One year change, (+,-)
Live animals	102,3	114,9	12,6
Meat and meat preparations	112,5	110,7	-1,8
Fish and crustacea	100,8	97,1	-3,7
Milk and milk products; eggs; honey	108,5	97,4	-11,1
Other animal products	112,9	96,7	-16,2
Seedings and other trees	113,9	104,1	-9,8
Vegetables	94,5	95,2	0,7
Eatable fruits and nuts	146,3	106,6	-39,7
Coffee, tea	85,7	111,2	25,5
Cereals	102,1	105,6	3,5
Flour-grinding products	118,8	127,7	8,9
Oil seeds and fruits	97,9	98,4	0,5
Natural shellac	113,3	94,4	-18,9
Plant materials for producing	84,2	190,5	106,3
Animal or plant fats and oils	92,3	103,0	10,7
Preparations from meat, fish	92,7	99,3	6,6
Sugar and sugar confectionery	97,6	82,6	-15,0
Cocoa and cocoa preparations	111,4	100,0	-11,4
Preparations of grains	104,9	100,6	-4,3
Products of vegetables processing	112,9	107,6	-5,3
Other mixed foodstuffs	93,1	98,3	5,2
Alcoholic and non-alcoholic beverages, vinegar	97,4	108,2	10,8
Remains and wastes of food industry	89,7	112,2	22,5
Tobacco and industrial substitutes of tobacco	93,7	100,2	6,5

Source: data from the State Statistics Service of Ukraine (2019)

The main goals in Ukraine's agricultural trade policy improvements can be seen as:

• increasing the share of processed foods and improvements of agricultural exports structure;
• opening new niches in the global market and diversification of export markets;
• support of small and medium-sized producers in their export efforts;
• increasing the level of global competitiveness of Ukrainian producers and processors (Trofimtseva, 2016).

Supporting the dynamic competitiveness of the agri-food supply chains requires an immediate response to changes in the global food market system. Among the main promising Ukraine's exported agricultural commodities are sunflower oil, maize, wheat, rapeseed, oilcake, soy beans, barley, poultry meat, cigars and cigarettes, sugar; fish, raw tobacco, sunflower seeds, foodstuffs, ethyl alcohol, citrus fruits, animal feedstock, palm oil, bananas and maize prevail among the imported food items (the State Statistics Service of Ukraine, 2019).

The agri-food supply chain management with export orientation centered on reflection of the economic and social objectives is intended to achieving not only economic but also social goals – increasing employment in rural areas and improving living standards of the population (Fig. 2).

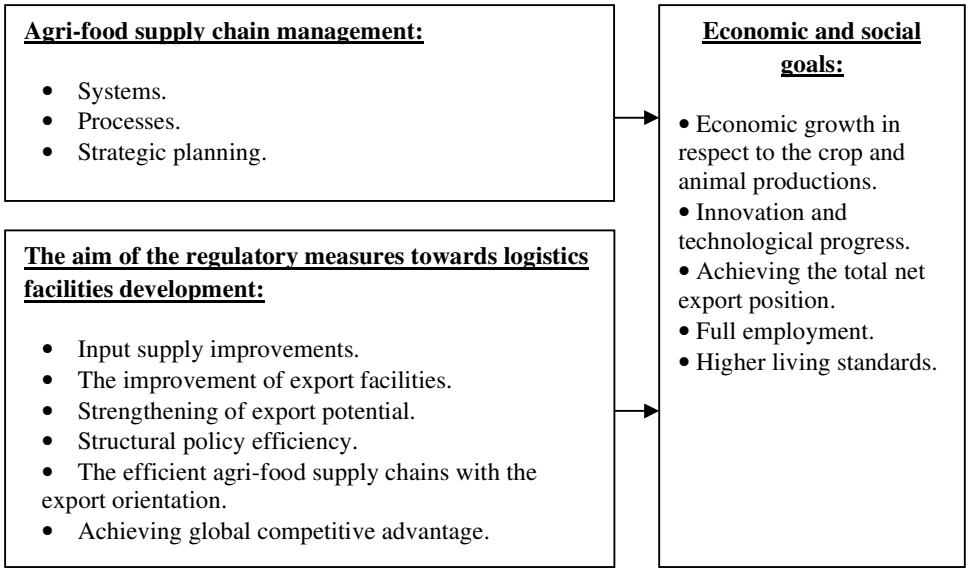

Fig. 2: Achieving economic and social goals through the agri-food supply chain management with export orientation

Strengthening the economic position of domestic agricultural enterprises on the export markets is possible the improvement of government's regulatory policy and development of logistics infrastructure.

A promising direction for enhancing agro-export potential may be the use of cooperative forms of business that will be able to realize themselves in the fields of procurement, distribution, transportation and financing. In this case, manufacturers have the opportunity to form the required set of products for sale and to provide storage through capacity sharing. For the same aim the reflexive and responsive agro-industrial clusters with a global diffusive capacity may be created.

Conclusion

Nowadays, Ukraine is considered as one of the most influential agricultural exporters, which in the conditions of increasing global demand for food gives a chance to win and hold competitive positions in the world food markets.

In such circumstances, the issues of comprehensive studies of logistic processes in agriculture are extremely urgent, the analysis of which is impossible without defining the system characteristics. Identifying these characteristics provides the basis for describing a common criterion for the efficiency of the logistics system, the operation of which is linked to the profit generated by the optimization of agri-supply chains – from the production of raw materials to the production of the final product and export facilities.

References

- Aramyan, L., Oude Lansink, A., van der Vorst, J. and van Kooten, O. (2007), 'Performance measurement in agri-food supply chains: a case study,' *Supply Chain Management,* 12(4), 304-315. https://doi.org/10.1108/13598540710759826

- Liefert, W. M. (1994), 'Economic Reform and Comparative Advantage in Agriculture in the Newly Independent States,' *American Journal of Agricultural Economics,* 76(3), 636–640. https://doi.org/10.2307/1243680

- State Statistics Service of Ukraine (2019). [Online data], [Retrieved December 27, 2019] Available at: http://www.ukrstat.gov.ua

- Stock, J. R. and , Lambert D. M. (2001). Strategic Logistics Management. 4th ed. New York: McGraw-Hill/Irwin.

- Trofimtseva O. Agr-export horizonts 2017 (2016) [Online data], [Retrieved December 19, 2016] Available at:https://agropolit.com/blog/177-agrarni-eksportni-gorizonti-2017

- Wehrheim, P., Frohberg, K., Serova, E. V., and von Braun, J. (Eds). (2000). Russia's Agro-food Sector. Towards Truly Functioning Markets. Boston: Kluwer Academic Publishers.

Measurement, Reporting and Intellectual Capital Management in Polish Enterprises In the Light of Surveys

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Abstract

The main purpose of the article is to present the results of two surveys on identification, measurement, reporting and management of intellectual capital in Polish enterprises. These studies were conducted twice, for the first time in 2003 and repeated in 2017. Their goal was to gain knowledge on how companies operating in Poland approach the issue of intellectual capital accounting in financial and managerial terms, and whether their approach has changed over the period of time studied. Surveys carried out, showed that undertaking the task of introducing intellectual capital accounting to the company would be a beneficial move from the perspective of knowledge-based companies. However, this seems to be a matter of the future in Poland. On the other hand, the implementation of intellectual capital accounting should be preceded by the acquisition of thorough knowledge and familiarization with the internationally used practices in this field.

Keywords: Intellectual capital management, measurement and reporting of intellectual capital

Introduction

This article and the studies it contains were influenced by the interest in the concept of intellectual capital accounting, which has been trying to mark its presence in the accounting system in Poland since the 1990s. This concept focuses on the management, measurement and presentation of this type of capital in an enterprise.

In the world, the concept of intellectual capital accounting has been the subject of research since the second half of the 20th century. It was noticed that there is a difference between a market value and a book value of some companies being sold. Market analysts observe that company market value can be several times higher than its book value. The fact of this difference was the main reason for creating the concept of intellectual capital. Researchers began to be interested in this phenomenon. They focused on finding common reason for the differences in these values. The first observation was that this difference occurs in the case of not all companies but operating in specific industries. The examples are pharmaceutical, IT or consulting related firms. In general, we can call them a service industries area. The second observation which was made was the fact that such firms select their staff very carefully. They pay attention to knowledge, experience and competence of candidates during recruitment processes Thirdly, it has been noted that these companies often generate very spectacular profits. However, based on the analysis of the balance sheet, one might think that these are enterprises with assets of average value, which do not stand out from other organizations.

Based on these facts, scientists have come to the following conclusion: profits and value of a company depend on assets which are not revealed in annual financial reports. These assets have been called intangible assets, because they are not included in balance sheet. Skills, knowledge and experience of employees are examples of these kinds of assets. Looking at these examples we can see it is a very wide category of resources. But all of them have one common characteristic. Their occurrence is only possible when the adequate people are employed in the company. "Adequate" means people who have high competence and extensive knowledge. The conclusion is that financial capital cannot be a source of intangible assets. The source of intangible assets is therefore a completely different type of capital. It has been called intellectual capital because it comes from people. Intellectual capital is the difference between the book value and market value of an enterprise, and its counterpart on the assets side are intangible assets. Another conclusion that has been made in relation to intellectual capital is the fact that although it largely represents the value of some companies, it is not shown anywhere. That is, there is no official financial reporting document on the basis of which its value could be determined. This is not a desirable situation for the company itself or for potential shareholders or investors. First of all, because the picture of the company, its potential possibilities and profits is distorted. Moreover, the lack of information about intangible assets makes it impossible to manage and use such assets.

The main purpose of the article is to present the results of two surveys on identification, measurement, reporting and management of intellectual capital in Polish enterprises. These studies were conducted twice, for the first time in 2003 and repeated in 2017. Their goal was to gain knowledge on how companies operating in Poland approach the issue of intellectual capital accounting in financial and managerial terms, and whether their approach has changed over the period of time studied.

Meaning, measurement and presentation of intellectual capital in the light of literature research

The concept of intellectual capital derives from the so-called Human Resources Accounting, an area that dates back to the 1960s. The theoretical basis in this field was created by the Danish scientist E. Flamholz.

The first definition of intellectual capital was developed by K.E. Sveiby (1989). He distinguished two basic components of this type of capital, namely the intellectual capital assigned to the individual and the intellectual capital assigned to the organization. By the individual capital he meant individual, personal professional competence and social abilities, experience, education and other skills of employees, oriented outwards, towards the company's customers. By the organization capital he meant experience and history of entire organization, documented in handbooks, computer programs and tools; with concepts developed to solve customer problems. T. Stewart (1997) described it as " the sum of everything that everyone in the company knows and what determines competitive advantage". G. Ross and J. Ross (1997) state that „Intellectual capital is the sum of the „hidden" assets of the company, not fully captured in the balance sheet, and thus includes both what is in the minds of organizational members, and what remains in the company when they leave".

Following the example of the precursor of the intellectual capital accounting, K.E. Sveiby (1989), the methods of measuring intellectual capital can be divided into four basic categories:

- Direct Intellectual Capital Methods (DIC): These methods estimate the value of intangible assets expressed in monetary units by identifying and adding up its individual components.
- Market Capitalization Methods (MCM). The calculation is based on the difference between market value and book value.
- Return on Assets methods (ROA). The average pre-tax revenues of a given company for a given period of time are divided by the average value of the company's tangible assets. The result of the above calculation is the ROA, which is then compared with the industry average. The difference obtained is multiplied by the average value of tangible assets in order to calculate the average annual income from intangible assets. By dividing the average income calculated above by the aver-

age cost of capital or by the interest rate, one can estimate the value of intangible assets or intellectual capital.
- Scorecard Methods (SC). Individual intangible assets or intellectual capital are identified and then measured using indicators. The results obtained are then presented in a scorecard or in graphic form. Scorecard methods are similar to direct methods with the difference that they do not estimate the monetary value of intangible assets. Sometimes an aggregate indicator is introduced.

The methods of measuring intellectual capital presented above have both advantages and disadvantages, and the use of such and not another depends directly on the situation, needs and objectives of the analysis. Methods that offer monetary valuation, such as methods based on ROA and market capitalization methods, are useful in the case of mergers and acquisitions and for the valuation of a company for the needs of stock exchange. Their disadvantage is the assumption that everything can be converted into money. In addition, methods based on ROA are very sensitive to changes in the interest rate. In turn, market capitalization methods do not apply to non-profit companies or budgetary entities. It should also be mentioned that methods treating intellectual capital as an indivisible whole have limited cognitive value and are not applicable to intellectual capital management, where the recognition of its structure and value of individual components plays a significant role in the process of using and growing this type of capital.

Direct methods and scorecard methods, in turn, have such advantages as: presenting the overall picture of the company's operation, the ability to be applied at each organizational level, ease of implementation. The need to match your own set of indicators makes it more difficult to make comparisons with competing companies. In addition, due to the fact that they are relatively new, they have opponents among managers and investors who have become accustomed to analyzing data only in the financial perspective. Another disadvantage is receiving a large amount of information that is difficult to analyze and present to recipients.

Precursors in the field of intellectual capital presentation are K. E. Sveiby, L. Edvinsson and M. S. Malone. Sveiby is the creator of the so-called Intangible Assets Monitor, while the other two are the authors of intellectual capital reports for the company AFS Skandia. In total, they developed three models for the presentation of this type of capital (1997). The first and most general model provided only cursory information about intellectual capital itself. It is known as the Skandia Market Value Scheme. The second and best known model is the Navigator. That document consists of five parts, focusing on such areas as: finances, clients, employees, processes as well as renewal and development. Each of these areas is measured using a separate, specific group of indicators and indices that give results in monetary units, percentages or natural units. The latest model is the Intellectual Capital Index. This model is based on the results taken from the Navigator, but its advantage is that it can be used for forecasts, because it presents numerical data in the form of indicators.

On the American continent, in turn, a model for the presentation of intellectual capital was created, whose creators are R. Kaplan and D. Norton (2001). It is called Balanced Scorecard (BCS) and in its form it has many features in common with the Swedish Navigator.

Currently, in the world literature, based on theoretical foundations and ever more complete research results, many publications on intellectual capital are being created. Analyzing them in terms of topics discussed, several distinct areas can be distinguished among them. One of them concerns the concept of identifying components of intellectual capital, e.g. Cabrita and Bontis (2008), Kong, (2008), Al-Zayyat et al. (2010), Fădur et al. (2013), Oyewo Babajide et al. (2014). The issues presented within it relate, among others, to aspects such as knowledge contained in human and organizational resources, customer base or level of innovation. One of the concepts developed in this field is Resource-Based View e.g. Arthurs and Busenitz (2006), Zou (2010). There are also many studies in the literature on methods of measuring intellectual capital e.g. Cater and Cater (2009), Zeghal and Maalooul (2010), Pulic (2004), Bakhsha et al. (2007), Caldas (2012). The measurement is designed to, among other things, enable real valuation of intangible assets, support the construction of an operating strategy adapted to the conditions and making the most appropriate decisions based on reliable information.

Theoretical foundations of the concept of measurement, reporting and management of intellectual capital were transferred to the Polish context, in the works of, among others, Jarugowa and Fijałkowska (2002), Mieczysław Dobija (2002), Dorota Dobija (2003), Strojny (2000), Fazlagić (2002). The publications that appeared in the Polish literature in the following years had a practical dimension, presenting the results of own research. The authors of this type of work include, but are not limited to, such names as Zielińska (2005), Pypłacz and Peter-Bombik (2015), Bombiak (2016), Banaszkiewicz and Makowska (2018).

Methodology of Questionnaire Surveys

The empirical study carried out in 2003 aimed to collect data on the basis of which the following questions could be answered:

- is there a connection between intellectual capital and the amount of profit generated by the company,
- is there a need to measure and manage intellectual capital,
- should the accounting system be modified in such a way that it takes into account the measurement, presentation and monitoring of intellectual capital.

The questionnaire form containing the above questions was sent out in the fourth quarter of 2003. In response, 45 completed surveys from units from the sector of knowledge-based companies, such as, for example, IT, consulting or pharmaceutical companies were sent back. The surveys were completed by owners, directors or chief accountants.

The answers obtained in 2003 showed that intellectual capital accounting in the practice of Polish enterprises is basically not a very popular tool, although on the other hand the results of the survey showed that companies operating in Poland were aware of the importance of intellectual capital as an element contributing to market success. Therefore, the authors of the article, after 14 years decided to repeat the study in this area in order to obtain answers to two research questions. Firstly, how the concept of intellectual capital accounting is perceived by practitioners of Polish economic life recently and, secondly, whether the Polish enterprises' view on this subject has changed since 2003. In order to verify these questions in May 2017, a survey was sent containing a very similar set of questions, like the one from 2003. The questionnaire was sent electronically in the amount of 51 copies. In total, 24 correctly completed surveys were obtained. The data collected shows that a typical respondent, as before, was a company operating in the service industry in northern Poland, employing from 51 to 250 people, with Polish capital only and operating in the market for more than 10 years. Due to the size of the sample, the study was for information purposes only.

The survey questionnaire included questions about research areas such as: identification of intellectual capital, measurement of intellectual capital, intellectual capital management and intellectual capital reporting. The article presents the answers of the respondents to selected questions from the above-mentioned individual issues.

The authors of the publication are aware of the fact that the selection of questions made for the purposes of the article makes it possible to obtain only a general view on the topic under discussion. However, this was a deliberate procedure because it ensured comparability of the results obtained over time. Apart from one question, the other questions discussed were included in the questionnaire in both 2003 and 2017. The survey prepared in 2003 was of a general nature due to the fact that at the beginning of the 20th century the concept of intellectual capital was a new issue for accounting and management practitioners in Poland. Notwithstanding the above, it should also be taken into account that a significant limitation of surveys on intellectual capital is the reluctance of some business entities to participate in such survey and thus disclosure of data on the strategic resource for the company. At the moment, the authors of the publication treat the obtained research material as an introduction to further research, both quantitative (extensive questionnaire) and qualitative (interviews).

Survey Results

The first question that was asked was: What determines success in the industry in which the company operates? There were two answers to choose from: traditional resources and intellectual capital. In the case of this question, all respondents in 2017 showed unanimity indicating intellectual capital as a key element guaranteeing the achievement of success in their industry. Similar results were obtained in the first survey. In 2003, 44 companies from the 45 surveyed indicated intellectual capital. The distribution of the results is presented in Figure 1.

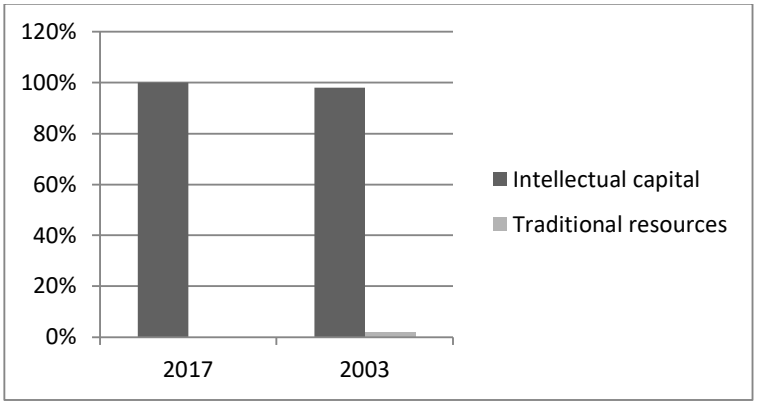

Fig. 1: What determines success in the industry in which the company operates?
Source: own study based on the questionnaire survey.

The next question concerned the share of intangible assets in creating the total value of the surveyed entities. The answers provided indicate that intangible assets, in line with the opinion of the majority of respondents (88%), constitute from 41 to 100% of the value of the enterprise. The remaining part of the surveyed valued intangible assets from 0 to 40% of goodwill. In 2003, the range of 41 - 100% was given by 67% of respondents. Interestingly, that year, the range of 0 - 20% was indicated by about 26% of respondents, while in 2017 such a response was not given by any of them. Answers given by respondents are illustrated in Figure 2.

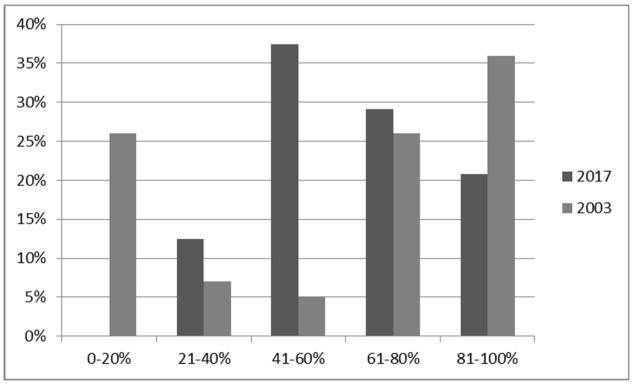

Fig. 2: What percentage of the company's total value would you attribute to intangible assets?
Source: own study based on the questionnaire survey.

When asked whether the departure of 10% of the best specialists from the company would have an impact on reducing its profits, the majority of respondents gave the answer "definitely yes" or "rather yes". In total, 83% of all respondents gave such answers. In the previous study, this indicator was at the level of 75%. Obtained results are graphically presented in the Figure 3.

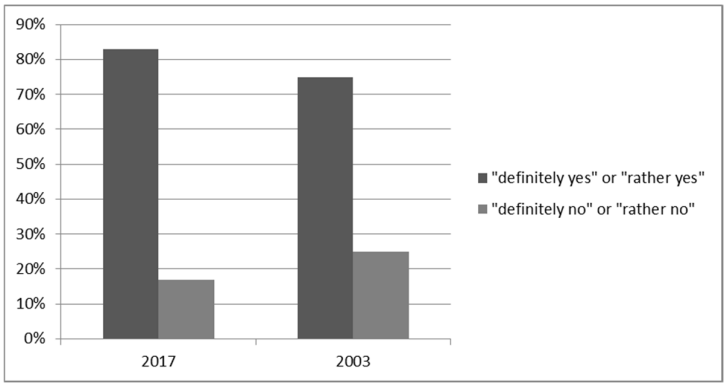

Fig. 3: Will the departure of 10% of the best specialists from your company have an impact on the reduction of its profits?

Source: own study based on the questionnaire survey.

Intangible assets as an income-generating factor should in particular be known and identified. It is difficult to manage something that has not been known or measured.

The results obtained in 2017 showed that the measurement of intellectual capital components is found in 62% of the surveyed companies. The rest of enterprises, i.e. 38%, do not undertake this task, according to respondents. In 2003, the answer "yes" was marked by 42%, which means that the majority of companies, i.e. 58%, did not deal with the issue of identifying and measuring the components of intellectual capital. The distribution of the results is presented in Figure 4.

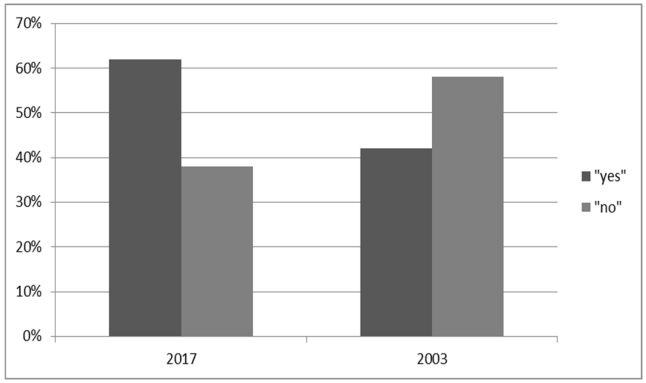

Fig. 4: Does the company measure intellectual capital?

Source: own study based on the questionnaire survey.

Most respondents recognized the usefulness of collecting information necessary to develop measures of intellectual capital. Answering the question in 2017, 63% of the respondents marked the answer "definitely yes" or "rather yes". Other people stated that there was no need to measure intellectual capital in their enterprises, although none of the respondents gave a "definitely not" answer. In 2003, the percentage of people who outlined "definitely yes" or "rather yes" was 45%. Answers given by respondents are presented in Figure 5.

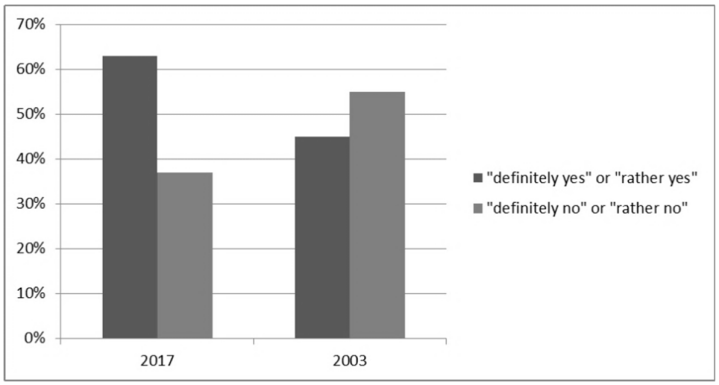

Fig. 5: Is there a need in your company to collect information necessary to develop measures of intellectual capital?

Source: own study based on the questionnaire survey.

In 2017, the question which components of intellectual capital are measured and analyzed was asked. The people participating in the study could mark any number of proposed items and enter their own answer.

According to the respondents, the number of clients is the most frequently measured and / or analyzed intangible element by the surveyed entities. This answer was indicated by 63% of respondents. Marketing was also a frequently highlighted item. In total, 58% of respondents said that their companies measure and / or analyze this component. 54% of the surveyed entities measure and discuss training. The same percentage of respondents indicated "education". 54% of respondents indicated the answer "investments in IT". 46% of surveyed entities measure and / or analyze seniority. 38% of respondents indicated the "brand" position. Obtained results are graphically presented in the Figure 6.

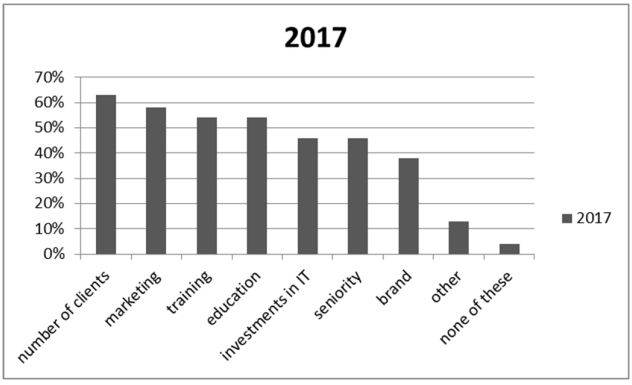

Fig. 6: Which components of intellectual capital are measured and analysed in your company?

Source: own study based on the questionnaire survey.

The next question was to check how many companies prepared a report on the state of intellectual capital.

Based on the answers provided, it can be concluded that intellectual capital reporting is not a well-known issue in the majority of surveyed entities. In 2017, the "no" position was indicated by 75% of the people. Only 25% of the respondents said their company was preparing additional reports on intangible assets. In the previous survey only 3 out of 45 companies that responded to the survey created such documents. As it can be noticed, there has been some improvement here because in the

case of the survey from 2017, six companies from among 24 were preparing reports. The distribution of the results is presented in Figures 7 and 8.

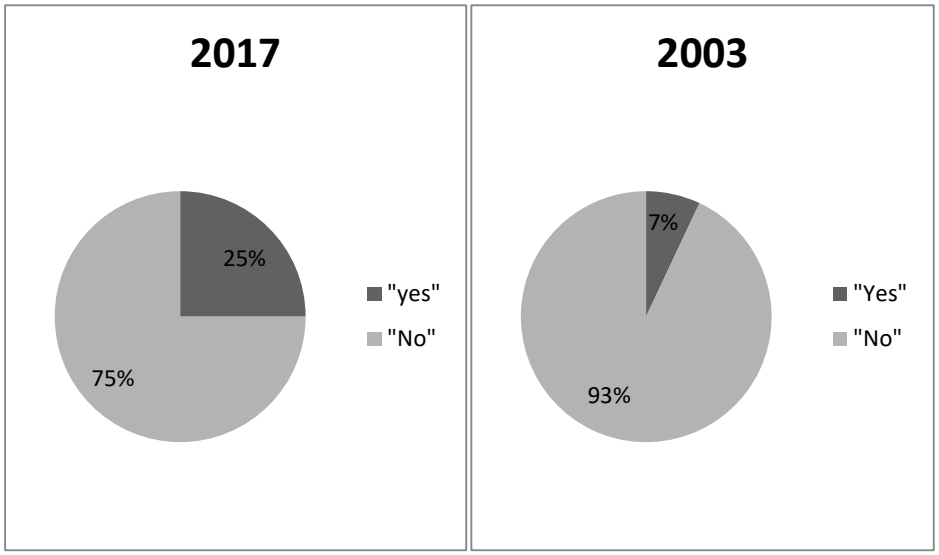

Fig. 7 and 8: Do you prepare a report on the state of intellectual capital?
Source: own study based on the questionnaire survey.

As for the knowledge of methods of presenting intellectual capital, the survey carried out showed that 25% of respondents in 2017 marked the answer "no". One can see here some improvement in relation to the results from 2003, when 52% of the respondents gave such an answer. Answers given by respondents are illustrated in Figures 9 and 10.

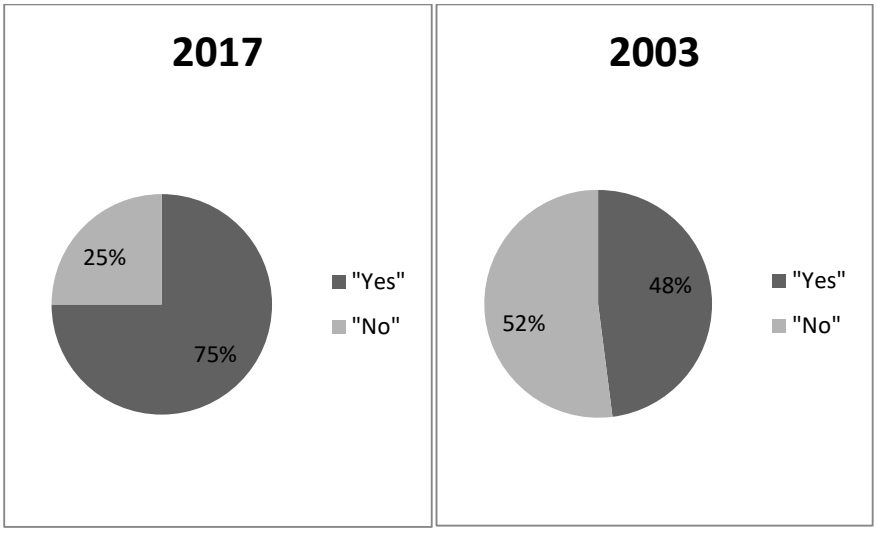

Fig. 9 and 10: Do you know at least one method of presenting intellectual capital?
Source: own study based on the questionnaire survey.

Discussion

The study was aimed at gathering information on the knowledge, insights and opinions of people working in the banking, IT or pharmaceutical sector on intellectual capital. Analyzing the survey's answers, one can first conclude that companies are aware of the fact that knowledge and other intangible assets are an important element contributing to market success. As a result, they see the role of employees in the process of generating profits for the organization. They also admit that a significant percentage of goodwill - especially in service companies - is included in intangible assets. It can be noted that these observations have grown in popularity as evidenced by the percentage increase in respondents providing such answers. The results obtained are consistent with the results of other such surveys. Intellectual capital is presented in them as one of the most important resources of the enterprise, and its effective management becomes the key competence of modern organizations, distinguishing the company from its competitors. They also overlap with theoretical considerations in this field, presented in the literature.

When considering the issue of intellectual capital, it is worth remembering that making sound management and investment decisions in its area requires prior analysis of the state of intangible assets held. Its measurement and valuation is important both from the perspective of financial accounting and management accounting. This was also the approach of people who took part in the survey studies discussed in the article. When analyzing the approach to measuring intellectual capital, one can notice a significant increase in this respect. At present, 62% of the surveyed enterprises deal with the measurement of intellectual capital components, which is 20 percentage points more than in 2003. Therefore, the majority of surveyed entities from the service sector consider that the components of intangible assets should be measured. When measuring the elements of intellectual capital, they focus mainly on the data related to the number of clients, branding or education of employees. Measuring the components of intellectual capital is however not a simple task. The main reason for this is the difficulty of expressing the value of intellectual capital in monetary units. First of all, because it is qualitative and relative in nature, i.e. dependent on the specificity of a given organization. Therefore, assets that are significant in one enterprise may be less important in another. Another limitation is the knowledge deficit in the scope of intangible assets valuation and the variety of methods provided in the literature on the subject, which has not yet developed a coherent concept of its measurement. Regardless of which method is chosen to estimate intellectual capital, it should be remembered that the measurement should be made by persons who are specialists in the field of accounting and additionally have appropriate training in this subject. This is a task for the whole team, not for an individual employee.

As regards the presentation of intellectual capital, based on the information obtained, it can be concluded that the subject of its presentation in financial reporting is better known in the surveyed enterprises as compared to 2003. This is evidenced by the fact that only about a quarter of respondents do not know any of the methods of presentation of intellectual capital. However, still only a small percentage of companies provide reports on the state of this type of capital. Presentation of intellectual capital is not easy due to several important barriers. The most important obstacle is the difficulty of obtaining the data needed to build specific indicators. The reason for this is the imperfection of information systems, which means that some indicators simply have to be abandoned. On the other hand, reporting, especially in knowledge-based companies, limited only to data on the state of tangible and financial assets, gives an incomplete picture of the full state of the enterprise's assets. In a knowledge-based economy, modern accounting should comprehensively reflect the value creation process in the enterprise, both in financial and non-financial terms. The implementation of its primary goal in the form of providing information used in the process of making rational economic decisions requires its mandatory extension with a report on the state of intellectual capital.

Conclusions

Certainly, the implementation of the concept of measuring, reporting and managing intellectual capital in an enterprise is a difficult process that requires not only financial expenses but also appropriate competences and openness to change among employees, managers and owners. Although

this is a complicated issue that may pose difficulties in effective management, it is an extremely valuable asset in competitive struggle. Investments in intellectual capital require managers to incur large expenses. In the long run, however, they can significantly contribute to ensuring that an enterprise generates a high rate of return and increase in value.

To sum up, the conclusion is that introducing the concept of measuring, reporting and managing intellectual capital to the company would be a beneficial move from the perspective of knowledge-based companies. However, this seems to be a matter of the future in Poland. On the other hand, the implementation of intellectual capital accounting should be preceded by the acquisition of thorough knowledge and familiarization with the internationally used practices in this field. In connection with the above, the authors of the article intend to continue scientific research in the field of intellectual capital using such research tools as an extensive questionnaire and interviews.

References

- Al-Zayyat, A., Al-Khaldi, F., Tadros, I. and Al-Edwan, G. (2010), 'The Effect of Knowledge Management Processes on Project Management', *Journal of IBIMA Business Review*, [Online], [Retrieved January 22, 2020], http://www.ibimapublishing.com/journals/IBIMABR/ibimabr.html.

- Arthurs, J.D. and Busenitz, L.W. (2006), 'Dynamic capabilities and venture performance: The effects of venture capitalists', *Journal of Business Venturing*, 21 (2), 195-215.

- Bakhsha, A., Afrazeh, A. and Esfahanipour A. (2017), 'A Criticism on Value Added Intellectual Coefficient (VAIC) Model', *International Journal of Computer Science and Network Security*, 17 (6), 59-71.

- Banaszkiewicz, A. and Makowska E. (2018), 'Selected methods of intellectual capital valuation – comparative analysis', Proceedings of the 12th International Days of Statistics and Economics, 6-8 September 2018, Prague, Czech Republic, 92-101.

- Bombiak, E. (2016), 'Kapitał intelektualny jako specyficzny zasób współczesnej organizacji', *Zeszyty Naukowe Uniwersytetu Przyrodniczo-Humanistycznego w Siedlcach*, 109, 105-119.

- Cabrita, M.R. and Bontis, N. (2008), 'Intellectual capital and business performance in the Portuguese banking industry', *International Journal of Technology Management*, 43 (1-3), 212-237.

- Caldas, R.F. (2012), 'Measuring Knowledge Management: A Strategic Approach to Library Information Services', *Journal of Organizational Knowledge*, [Online], [Retrieved January 22, 2020], Managementhttp://www.ibimapublishing.com/journals/JOKM/jokm.html.

- Cater, T. and Cater, B. (2009), '(In)tangible resources as antecedents of a company's competitive advantage and performance', *Journal of East European Management Studies,* 14 (2), 186-209.

- Dobija, D. (2003), Pomiar i sprawozdawczość kapitału intelektualnego przedsiębiorstwa. Warszawa: Wyd. Wyższej Szkoły Przedsiębiorczości i Zarządzania im. Leona Koźmińskiego.

- Dobija, M. (2002), 'Kapitał ludzki i intelektualny w aspekcie teorii rachunkowości', *Przegląd Organizacji*, 1, 8-13.

- Edvinsson, L. and Malone M. S. (1997), Intellectual Capital: The Proven Way to Establish Your Company's Real Value By Measuring Its Hidden Brainpower, Piatkus, London.

- Fădur, C., Ciotină, D. and Mironiuc, M. (2013), 'Do the Romanian and Spanish Accounting Environments Meet the Challenges Concerning the Acknowledgement of Intangible Elements?', *Journal of Accounting and Auditing: Research & Practice*, [Online], [Retrieved January 22, 2020], http://www.ibimapublishing.com/journals/JAARP/jaarp.html.

- Fazlagić A. (2002), 'Balanced Scorecard – skazani na monopol?', *Controlling i Rachunkowość Zarządcza na Świecie*, 3, 6-13.

- Jarugowa, A. and Fijałkowska, J. (2002), Rachunkowość i zarządzanie kapitałem intelektualnym. Koncepcje i praktyka, Gdańsk, ODiDK.

- Kaplan, R.S. and Norton, D.P. (2001), Strategiczna Karta Wyników, PWN Warszawa.

- Kong, E. (2008) 'The development of strategic management in the non-profit context: Intellectual capital in social service non-profit organizations', *International Journal of Management Reviews*, 10 (3), 281-299.

- Oyewo Babajide M., Faboyede Olusola S. and Fakile Adeniran S., (2014), 'Human Resource Management and Accounting as Strategies for Achieving Global Competitiveness and Vision 2020 in Nigeria', *Journal of South African Business Research*, [Online], [Retrieved January 22, 2020], http://www.ibimapublishing.com/journals/JSABR/jsarb.html.

- Pulic, A. (2000), 'VAIC (TM) - an accounting tool for IC management', *International Journal of technology management*, 20 (5-8), 702-714.

- Pypłacz, P. and Peter-Bombik K. (2015), 'Specyfika zarządzania kapitałem intelektualnym w firmach rodzinnych', *Acta Universitatis Nicolai Copernici*, Zarządzanie XLII-nr 2, 189-197.

- Roos. G. and Ross, J. (1997), 'Measuring your Company's Intellectual Performance', *Long Range Planning*, 30 (3), 413-426.

- Stewart, T.A. (1997), Intellectual Capital: The New Wealth of Organizazations, London, Nicholas Brealey

- Strojny M. (2000), 'Zarządzanie kapitałem intelektualnym – ogólny zarys koncepcji', *Przegląd Organizacji*, 7-8, 11-23.

- Sveiby, K-E. (1989), The Invisible Balansce Sheet: Key indicators for accounting, control and valuation of know – how companies, Stockholm, Affarsvarlden/Ledarskap.

- Zeghal, D. and Maalooul, A. (2010), 'Analysing value added as an indicator of Intellectual capital and its consequences on company performance', *Journal of Intellectual Capital,* 11 (1), 39-60.

- Zielińska, A. (2005), 'Ocena przydatności pomiaru kapitału intelektualnego w świetle badań ankietowych, Standardy edukacyjne rachunkowości – praktyka i stan badań', *Prace Naukowe Akademii Ekonomicznej we Wrocławiu*, 1079, 359-366.

- Zou, H., Chen, X. and Ghauri P. (2010), 'Antecedents and consequences of new venture growth strategy: An empirical study in China', *Asia Pacific Journal of Management,* 27 (3), 393-421.

Eco-Innovative Barriers and Needs of Manufacturing SMEs from the BSR Region

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Abstract

The present paper comprises two parts: cognitive and empirical ones. In the first part the authors have synthetically defined eco-innovations, introduced their division and scope. They have also made an attempt to justify that "the strength and size of the SME sector fosters diffusion of eco-innovations". In the empirical part, based on the secondary research conducted for the European Commission (Flash Eurobarometer 456), the authors have determined the percentage involvement of SMEs in green activity for the BSR countries – partners in the project "Network of Service Providers for Eco-innovations in Manufacturing SMEs (Ecolabnet)". Based on secondary research the authors have indicated and justified the existing differences of green activity" of SMEs in the selected European countries. They have also attempted to justify the research assumption that a higher percentage of SMEs perceive and identify various barriers of "green activity" in the countries characterised by a higher percentage of this activeness. Also, based on own research of the project Partners (including the authors of the present paper) three groups of needs in the scope of eco-innovations have been summarised and evaluated (business, development, technological ones). It has also been indicated that the needs of SMEs regarding eco-innovations depend on their expert knowledge and strategic involvement.

Keywords: Eco-Innovations, Green Activity, SMES, Eco-Innovative Needs and Barriers, Network of Service Providers

Introduction

This paper summarises the determinants of green activity diffusion primarily with relation to small and medium-sized enterprises (SMEs), therefore also selected support mechanisms promoting their active mobilisation. According to this plan the European Union (EU) supports, among others, consortia, organisational networks created by these enterprises with the cooperation of scientific and research units and intermediary entities (Muller et al., 2017; *European Commission*, 2014).

The paper is organised in the following way. In its first part the authors have presented the theoretical background referring to the origins of the term of eco-innovations. The second part concentrates on evaluating the primary areas of green activity and its barriers (based on secondary research - according to Flash Eurobarometer 456 - the research was conducted on a sample N=13, 117). In the third part, based on the own research of the Ecolabnet Partners, the authors have attempted to evaluate the nature of eco-innovation barriers in the investigated SMEs (N=296) from the six partner countries of the Baltic Sea Region (BSR). The underlying objective of the paper was to identify and evaluate the eco-innovative needs of the SMEs from the BSR region, such as: *business, development, technological ones*, which may be supported by the *Network of Service Providers for Eco-innovations in Manufacturing SMEs" – Ecolabnet.* Identifying these barriers has allowed for

determining eco-innovative needs of the investigated SMEs and at the same time categorising them. The final part includes the conclusions and indicates directions of future research in this field.

Theoretical Framework – Eco-Innovation

In the literature on the subject the transformation of innovations into eco-innovations emerged at the end of the past century. Obviously, the foundations for the term of eco-innovations were innovations in the process grasp. One of the first definitions of eco-innovations was introduced by C. Fussler and P. James, who defined eco-innovations as new products and processes that provide the business and customers with added value, simultaneously reducing the impact on the environment (Fussler and James, 1996).

A. Reid, M. Miedzinski (2008) in turn, define eco-innovations as creation of new goods, services or systems at competitive prices, as well as processes and procedures that satisfy human needs and ensure better quality of life simultaneously minimising the consumption of natural resources per one production unit, reducing to a large extent emission of toxic substances.

In the process grasp in the literature on the subject, among others, N.M.P. Bocken, M. Farracho, R. Bosworth, R. Kemp, define eco-innovations as "a significant" improvement of general process of innovation at the enterprise so it can achieve sustainable development of its primary operation (Bocken et al., 2014).

The diversity in defining eco-innovations contributed to the attempts that have been undertaken to unify them. One of them was made by the European Commission in 2009, which defines eco-innovations as all forms of innovations, technical and non-technical ones – that create opportunities for enterprises and are beneficial for the environment, prevent the negative impact of economic activity on the environment, e.g. by optimisation of resource use (*European Commission*). OECD defines eco-innovations as environmental innovations related to development or implementation of new or significantly improved products, processes, but also marketing methods, organisational structures and institutional solutions that lead to an improvement of the natural environment's condition, compared to corresponding alternative solutions (*OECD*, 2009).

Presently, eco-innovations are not limited to product and process ones. According to Oslo Manual 2018 eco-innovations are extended to all business processes, e.g. in: logistics and distribution, marketing and sales, information and communication technology, administration, organisation and management (*OECD*, 2018).

The scope of eco-innovations may go beyond the boundaries of innovations organisation and comprise wider social systems, resulting in changes of the existing social and cultural standards as well as institutional structures. The scope of implemented eco-innovations varies and depends on the adopted attitude to changes, e.g. modification – slight or progressive improvements of products and processes; redesign – significant changes to the existing processes, products, business processes; supplementation – introducing pro-environmental products and services – supplements of products or services available on the markets and "novelty" – developing and introducing completely new products, processes, organisation structures and business procedures.

Therefore, while returning to the terminology of eco-innovations it is worth referring to the definitions that in their discussions introduce A. Triguero, L. Moreno-Mondéjar, M.A. Davia. They perceive eco-innovations as a method for increasing the potential tangible and intangible benefits of enterprises in correlation with an increase in their pro-environmental awareness, but also the awareness of their customers – consumers of created values in three various dimensions: eco-product, eco-process and eco-organisational ones (Triguero, Moreno-Mondéjar and Davia, 2013).

Presently, the common goal of pro-environmentally aware producers and consumers is contributing to more sustainable production and creating consumption patterns. Moreover, high pro-environmental

awareness is reflected in an ability to identify heterogeneous eco-innovative needs, an intense transfer and the ability to develop eco-innovations. This is also justified by the perception of a high correlation between greening and competitiveness.

However, it needs to be stressed here that in the neo-classical grasp the natural environment itself was a burden for enterprises, which was identified through: production costs, administrative costs or restrictive environmental policy. In this approach competitiveness and greening were perceived as opposites (Munch Andersen, 2002). Frequently, this was associated with the perceived barriers of "green activity". Thus, barriers to eco-innovation emerge as a critical factor in either preventing or enabling EU strategies, energy and environmental policy implementation, and "green activities" (Marin, Marzucchi and Zoboli, 2015). The most frequently distinguished in the literature on the subject barriers include legislative and financial ones, but also the ones related to asymmetry of information between the perceived barriers and actual eco-innovative needs of economic entities (Polzin, von Flotow and Klerkx, 2016). In the present paper, with reference to the definition of eco-innovations and their elements, perceived asymmetries between eco-innovations and competitiveness as well as barriers and eco-innovative needs, based on the research conducted within the Ecolabnet project, identifying the barriers allowed the authors to determine and categorise the eco-innovative needs of SMEs in the BSR.

"Green Activity" Areas of the European SME Sector

While concentrating on the defined group of entities – SMEs, based on the secondary research for the European Commission (*European Commission*, 2017), it should be emphasised that 33% of the European SMEs have undertaken and 89% them are planning at least one action that stimulates a decrease in resource intensity, frequently through implementation of eco-innovations: product ones and business processes (including technological, organizational ones in production and logistics). Currently implemented eco-innovations in the scope of resource intensity regard reduction in consumption of various primary and auxiliary materials/resources and also maximised use of source materials. According to Flash Eurobarometer 456 – TNS Political & Social at the request of the European Commission, Directorate-General for Enterprise and Industry (*European Commission*, 2018) the dominant areas of pro-environmental activity of the European sector of micro and small enterprises in 2017 constituted (the research was conducted on a sample N=13. 117): 1. minimising waste - 65% SMEs; 2. energy savings - 63% SMEs; 3. material savings - 57% SMEs; 4. water savings - 47% SMEs; 5. waste recycling and its reuse - 42% SMEs; 6. eco-product development - 25% SMEs; 7. waste material sales - 21% SMEs; 8. RES installation in prosumer models - 14% SME.

While analysing percentage indexes of green activity in particular distinguished areas (European SMEs), it should be indicated that these activities are differentiated (Karaarslan, 2015) in particular countries of the European Union. With reference to the subject matter specified in the title of the present paper, which basically concerns the evaluations of eco-innovative needs of SMEs in the BSR countries, based on secondary research (*European Commission*, 2018) conducted for the European Commission (Flash Eurobarometer 456) the authors have attempted to answer the following partial question: *What is the percentage of SMEs involvement in „green activity", including eco-innovations in the BSR countries involved in the project?*

For this reason, the authors have aggregated in Table 1 the percentage figures of the conducted „green activity" of SMEs in primary areas – in the countries included in the Ecolabnet project (Finland, Lithuania, Estonia, Sweden, Denmark, Poland).

Table 1: Percentage figures of SMEs from the BSR region in the context of conducted "green activity"

Areas of green activity SMEs	EU-28	Finland	Lithuania	Estonia	Sweden	Denmark	Poland
Minimizing waste	**65%**	55%(2)	20%(4)	9%(5)	**76%**(1)	49%(3)	55%(2)
Energy savings	**63%**	51%(3)	42%(4)	21%(5)	57%(1)	55%(2)	57%(1)
Material savings	**57%**	54%(3)	33%(5)	15%(6)	**66%**(1)	52%(4)	**60%**(2)
Water savings	**47%**	27%(4)	36%(3)	8%(5)	36%(3)	40%(2)	**49%**(1)
Waste recycling and its reuse	**42%**	31%(2)	7%(6)	13%(5)	**62%**(1)	29%(3)	24%(4)
Eco-product development	**25%**	23%(3)	7%(5)	5%(6)	**32%**(1)	**26%**(2)	17%(4)
Waste material sales	**21%**	18%(3)	15%(4)	6%(5)	**26%**(1)	**26%**(1)	21%(2)
RES installation in prosumer models	**14%**	14%(2)	4%(4)	4%(4)	**35%**(1) *leader in EU-28*	9%(3)	4%(4)

(1), (2), (3), ... - descending order of percentage figures
Source: Own elaboration on the basis Flash Eurobarometer (European Commission, 2018)

The clear leader of „green activity" among SMEs (including the scope of eco-innovations), in the BSR countries is Sweden. The only exception is the area of *water savings* (36% of Swedish SMEs). In all seven remaining areas of „green activity" distinguished by the European Commission, the percentage figures for Swedish SMEs are higher than figures aggregated for the SMEs in the whole population of EU-28. Swedish enterprises form the SME sector lead in the whole of the EU in *implementation* of RES *installations* (including eco-innovative prosumer solutions). The percentage figures in this area are over twice as high in this area of "green activity" as the aggregated figures for the SMEs in all the EU member states (Sweden 35% - EU-28 – 14%). The lowest in turn percentage figures have been recorded with reference to the distinguished areas of "green activity" of SMEs in such countries as: Lithuania or Estonia. For instance, in case of *minimising waste*, the activity in this area was declared by 9% of Estonian SMEs and 20% of the Lithuanian ones. This far below the value aggregated in the whole group of European SMEs (EU-28). Respectively, the figures are lower by 56% (Estonia) and 45% (Lithuania). While analysing the sample area of green activity of the SMEs – *minimising waste* the difference between the leader, Sweden, and Estonia amounts to 67% and Lithuania 56%. Therefore, it can be justified that the differentiation of percentage figures of the "green activity" area for the SMEs in the BSR, but also in the whole EU-28 is very high. In Poland and Denmark the differences are smaller. In two case the obtained percentage figures of "green activity" of SMEs are higher than in the aggregated total population of the investigated European SMEs. In case of Denmark these are the areas of *eco-product development* – 26% and *waste material sales* – also 26%. In both cases the percentage figures of Danish SMEs are higher than the aggregated figures for the whole sector in EU-28, respectively by 1% and 5%. In turn in case of investigated Polish SMEs the percentage threshold compared to the total research population of EU-28 was exceeded in two areas: *material savings* and *water savings*, respectively by 3% and 2% the percentage figures are higher than the aggregated ones in the SME sector of the whole investigated population of EU-28. Undoubtedly, the disparities in the undertaken „green activities" of SMEs in the BSR countries (partner countries in the Ecolabnet network), occur in all the primary areas. Based on the preliminary research/observations conducted by the authors prior to the Ecolabnet project implementation, it was assumed that in the particular BSR countries (partner ones) these differences

occur primarily due to the following reasons: heterogeneity of the existing social and cultural standards and institutional structures, level of knowledge and eco-innovations transfer, access to external sources of eco-innovative solutions financing (e.g. EU funds, capital venture, preferential loans and credits or business angels) or implementation level of legislative support mechanisms. Detailed results of the research have been aggregated in previous papers of the authors, among others: *Levels of Pro-Environmental Maturity in Micro and Small Enterprises, Environmental Management and Green Attitudes of the European SME Sector, The Influence of Environmental Awareness and Attitudes of Entrepreneurs on the Acceleration of eco-Innovation in Micro and Small Enterprises* (Kuceba, 2019; Kuceba and Zawada, 2019).

However, it needs to be stressed in the present paper that the level of involvement of the SME sector enterprises into the implementation, development and transfer of eco-innovative solutions also depends on the level of their pro-environmental awareness, which reflects their pro-environmental attitudes. For instance, the sector of Swedish SMEs, whose activeness in the investigated BSR countries is the highest (Table 1), is assigned a highly pro-environmental attitude. This sector is characterised by a high level of knowledge, high level of interest in environmental problems, willingness to incur higher environmental costs. This translates into offensive pro-environmental actions, among others, through implementing eco-innovations in the abovementioned, primary areas of "green activity". This is also associated with the abilities (reflected by proper skills and competencies) concerning: designing, elaborating, implementing, developing completely new products and processes, and also organisational structures and business procedures. In the opinion of the authors, high pro-environmental awareness itself reflected in an active attitude of SMEs is just a supply side, which has to be balanced on the demand side – an active pro-environmental attitude of aware consumers. Thus, with reference to the Swedish example and presenting a highly-active pro-environmental attitude of the SME sector, it is important that the maturity regarding green activity occurs both on the supply and demand side.

In the remaining countries that have been subject to analysis the green activity of the SME sector (compared to the product life cycle) is at the stage of "growth", certainly differentiated with respect to the analysed heterogenous areas. In Table 2 the authors have also introduced barriers of "green activity" for SMEs in the investigated BSR countries. They have attempted to identify how barriers of "green activity" affect the percentage figures of SMEs that undertake such an activity.

A "leader" in identifying the barriers in the BSR countries are Polish SMEs. The percentage figures for SMEs in Poland, assigned to all the primary eight barriers of "green activity" are higher than the figures in the aggregated total investigated population of SMEs in EU-28.

However, while analysing the assigned percentage figures of perceiving the barriers by SMES one can observe that especially in case of Lithuania and Estonia, despite a low population of SMEs that implement "green activity", the basic barriers distinguished in Table 2 are also perceived by a small percentage of this sector's entities. In case of Lithuanian and Estonian SMEs the percentage figures regarding all the eight barriers of "green activity" are lower than the aggregated figures of all the SMEs in the investigate population of EU-28. For instance, *difficulty in choosing the right resource efficiency actions for your company* in Estonia (2%) is ten times lower that in the total aggregated population of SMEs in EU-28 (20%).

Table 2: Percentage figures of SMEs from the BSR region in the context of "green activity" barriers

Barriers of green activity SMEs	EU-28	Finland	Lithuania	Estonia	Sweden	Denmark*	Poland*
Complexity of administrative or legal procedures	**33%**	20%(3)	14%(4)	9%(5)	24%(2)	20%(3)	**52%**(1)
Cost of environmental actions	**24%**	18%(3)	4%(4)	9%(5)	**25%**(2)	**27%**(1)	**27%**(1)
Difficulty to adapt environmental legislation to your company	**22%**	12%(3)	8%(4)	7%(5)	7%(5)	14%(2)	**31%**(1)
Lack of specific environmental expertise	**20%**	14%(2)	8%(4)	3%(5)	14%(2)	13%(3)	**28%**(1)
Technical requirements of the legislation not being up to date	**20%**	17%(2)	7%(4)	7%(4)	8%(3)	17%(2)	**24%**(1)
Difficulty in choosing the right resource efficiency actions for your company	**20%**	**26%**(2)	7%(5)	2%(6)	**24%**(3)	15%(4)	**28%**(1)
Lack of demand for resource efficient products or services	**17%**	**18%**(3)	7%(6)	9%(5)	**22%**(1)	**14%**(4)	**21%**(2)
Lack of supply of required materials, parts, products or services	**14%**	**15%**(1)	9%(3)	7%(4)	13%(2)	9%(3)	**15%**(1)

(1), (2), (3), … - descending order of percentage figures

Source: Own elaboration on the basis Flash Eurobarometer 456 (European Commission, 2018)

Paradoxically, the higher percentage of SMES perceive and identify various barriers of "green activity" in the countries characterised by a higher level of growth and at the same time awareness reflected in their „green activities" (Poland, Denmark, Finland, and also Sweden).

Therefore, based on the example of Estonia and Lithuania it is possible to unequivocally adopt a classic postulate (Munch Andersen, 2002), that the low level of „green activity" in the countries of the Baltic Sea Region is conditioned by barriers perceived by the investigated SME sector. Thus, in an inversion to the identified for the European Commission barriers of "green activity", the authors have made an attempt to identify the needs of SMEs, purely eco-innovative ones that stimulate the development of this activity in the BSR countries covered by the Ecolabnet project.

Evaluation of Barriers and Needs to Support Eco-Innovations in the Manufacturing SMEs of the BSR – Research Within the Ecolabnet Project

The research conducted within the Ecolabnet project in the first stage of project implementation (2nd half of 2019) involved identifying, measuring and evaluating the significance of heterogeneous factors that stimulate, but also hinder, the diffusion of eco-innovations of SMEs in the partner countries of the Baltic Sea Region. In particular they pertained to: identifying and classifying consumers of eco-innovations – created or co-created by the manufacturing SMEs, evaluating their knowledge about eco-innovation, categorising eco-innovations, motivators, needs in the scope of developing, implementing and utilising them as well as barriers identified by the investigated group of manufacturing entities in the BSR. The research sample constituted N=296 of entities (in this: Estonia 69 – 23.31%, Poland 57 – 19.26%, Finland 54 – 18.24%, Lithuania 15.88% - 47, Sweden 12.84% - 38, Denmark 10.47% - 31). The research was conducted with the use of the research method CAWI – (Computer-Assisted Web Interview) in the form of a survey questionnaire that included 26 questions. It needs to be stressed that 49.66% - 147 of the SMEs out of the total investigated population identified their primary activity as purely correlated with eco-innovations (including: pro-active attitude of SMEs – working with eco-innovations 25.68% -76, eco-innovations integrated with the company's strategy 1.82% - 35, mission of the SME is based on eco-innovations – 12.16% - 36).

In the first step the authors have attempted to evaluate the significance of eco-innovations barriers, which having been identified allowed for determining the needs of SMEs and simultaneously their categorisation/grouping, not being limited exclusively to financial and technological ones (Table 3).

In order to synthetically evaluate the resultant of particular eco-innovations barriers the authors in each case determined the weighted average (WA). In case of green activity barriers (Table 2) in the aggregated group of entities EU-28 (*European Commission*, 2018), the largest percentage of the investigated SMEs indicate as significant ones - Complexity of administrative or legal procedures. However, in case of own research of the project Partners regarding the barriers of eco-innovations the largest group of the investigated BSR SMEs 31.44% (72) indicate lack of capital as the most significant barrier. Also, the determined weighted average from the evaluations of SMEs is the highest (WA – 3.60), which justifies the continuous fears of this sector pertaining to financing eco-innovations from external sources as well as an increase in the costs of their operations.

However, while analysing the summarised in Table 3 grades assigned to eco-innovations barriers, but in the context of the needs of SMEs, it should be stressed that not only financial barriers are given high grades but also the ones related to access to expert knowledge (e.g. Limited access to external knowledge WA 3.24, Lack of in-house expertise – WA 3.21). In the opinion of the BSR SMEs also the barriers related to development of process and product eco-innovations are significant (e.g. Lack of alternative materials – WA 3.31, Lack of suitable tools and methods - WA 3.26, Lack of proven technologies – WA 3.22) and business ones (e.g. Uncertain demand from the market – WA 3.34, the outcome of which is, among others, their Uncertain return on eco-innovation investment – WA 3.43).

Table 3: Evaluation of eco-innovations barriers in the manufacturing sector of SMEs of the BSR.
(***Likert scale between 1=I totally disagree and 5=I totally agree***)

The barriers relevant for eco - innovation	Weight 1	Weight 2	Weight 3	Weight 4	Weight 5	WEIGHTED AVERAGE (WA)
Lack of capital	10,48% (24)	8,73% (20)	22,71% (52)	26,64%(61)	31,44% (72)	**3,60**
Uncertain return on eco-innovation investment	7,86%(18)	14,85%(34)	22,71%(52)	35,81%(82)	18,78%(43)	**3,43**
Uncertain demand from the market	8,73%(20)	12,66%(29)	31,00%(71)	31,44%(72)	16,16%(37)	**3,34**
Certification costs	10,92%(25)	14,85%(34)	27,51%(63)	24,89%(57)	21,83%(50)	**3,32**
Lack of alternative materials	9,17%(21)	16,16%(37)	28,38%(65)	27,07%(62)	19,21%(44)	**3,31**
Lack of suitable tools and methods	6,99%(16)	20,96%(48)	28,82%(66)	25,76%(59)	17,47%(40)	**3,26**
Limited access to external knowledge	10,48%(24)	21,40%(49)	35,37%(81)	20,96%(48)	11,79%(37)	**3,24**
Lack of proven technologies	8,30%(19)	18,78%(43)	31,00%(71)	26,64%(61)	15,28%(35)	**3,22**
Lack of in-house expertise	9,17%(21)	17,90%(41)	30,57%(70)	27,51%(63)	14,85%(34)	**3,21**
Legislative demands	13,10%(30)	18,78%(43)	28,38%(65)	27,07%(62)	12,66%(29)	**3,07**
Integration into product development proces	14,85%(34)	18,34%(42)	31,44%(72)	24,02%(55)	11,35%(26)	**2,99**
Capability to collect and process data	12,66%(29)	20,09%(46)	35,37%(81)	23,14%(53)	8,73% (20)	**2,95**
Internal resistance in the company	27,95%(64)	26,64%(61)	23,14%(53)	13,54%(31)	8,73% (20)	**2,48**

Total responses N=296, Answered: 229 Skipped: 67
(…) – number of indications
Source: Own elaboration based on the research conducted in the Ecolabnet project

While analysing the needs in the scope of technological eco-innovations of SMEs it should be stressed that they were identified, accepted and aggregated in the survey questionnaire in the first/abovementioned stage, by all the project Partners (including the authors of the present paper). In the survey addressed at the European SMEs the three-level evaluation of the summarised needs was conducted: No needs, Possible needs, Highlighted needs. The results of this research for the total

investigated population of SMEs in the partner countries of the BSR have been summarised in Table 4.

Table 4: Needs of SMEs in the BSR countries in the scope of external support for eco-innovations in the manufacturing sector

Company needs within eco-innovation	Area of needs	No needs	Possible needs	Highlighted needs
Branding and communication	Business	29,72% (63)	34,43% (73)	35,85% (76)
Customer insights		25,94% (55)	41,51% (88)	32,55% (69)
Supplier relations		43,40% (92)	38,68% (82)	17,92% (38)
Business models		34,91% (74)	48,58% (103)	16,51% (35)
Value chain assessment		40,57% (86)	43,87% (93)	15,57% (33)
Financial aspects		31,13% (66)	38,21% (81)	30,66% (65)
Intangible and legal assets (e.g. IPR)		35,38% (75)	40,57% (86)	24,06% (51)
Legislation		36,32% (77)	40,57% (86)	23,11% (49)
Product design	Development	35,38% (75)	32,55% (69)	32,08% (68)
Packaging development		39,15% (83)	37,26% (79)	23,58% (50)
Life-cycle assessment (LCA)		41,98% (89)	38,21% (81)	19,81% (42)
Service design		36,32% (77)	44,34% (94)	19,34% (41)
Biocomposites	Technology / Production	55,66% (118)	31,13% (66)	13,21% (28)
Bioresins		64,15% (136)	26,42% (56)	9,43% (20)
Recycling		34,43% (73)	38,21% (81)	27,36% (58)
Energy optimisation		18,40% (39)	19,81% (42)	61,79% (131)
Material efficiency		37,26% (79)	34,91% (74)	27,83% (59)
Other alternative materials		37,26% (79)	34,91% (74)	27,83% (59)
Certifications		28,30% (60)	44,81% (95)	26,89% (57)
3D printing		55,19% (117)	28,77% (61)	16,04% (34)

Total responses N=296, Answered: 212 Skipped: 84
(…) – number of indications
Source: Own elaboration based on the research conducted in the Ecolabnet project

It should be stressed here that while identifying various categories of barriers during the empirical analysis of external support factors, in particular in the scope of eco-innovations, the authors categorised the needs in a breakdown into: business, development, technological and production ones. Business needs that are particularly noticed by the BSR SMEs in the scope of eco-innovations include support in the scope of: Branding and communication (Highlighted needs 35.85% -76 and possible needs 34.43% - 73), Customer insights (Highlighted needs 32.55% - 69 and possible needs 41.51% - 88), but also Financial aspects (Highlighted needs 30.66% - 65 and possible needs 38.21% - 81). Indication of these needs justifies the fact that the investigated enterprises do not only expect external financial support, but also the one pertaining to carrying out business tasks, among others related to promotion, marketing research or potential customer segmentation. The expected support concerns also: both from other SME sector entrepreneurs, but also from the Ecolabnet-like networks

this regards development of eco-innovative products and services (Highlighted needs 32.08% - 68 and possible needs 32.55% - 69). Interestingly, lower significance was attributed to, for example, Life-cycle assessment (LCA). While analysing the responses of particular SMEs the abovementioned need is perceived only by enterprises in which eco-innovations are in line with the strategy or even the mission of the enterprise. Obviously, this confirms the distinguished barriers related to lack or limited access to expert knowledge, including managerial one, particularly in the scope of environmental management. While referring to the needs of Technology/Production high activeness of European enterprises is confirmed in the scope of Energy Saving (Table 1) (*European Commission*, 2018). In the context of own research, 61.79% (131) of the investigated entities expect support in the scope of Energy optimisation and 19.81% (42) of the investigated SMEs believe that such support in the scope of optimisation is possible. In turn, in case of Biocomposites, Bioresins, or 3D printing, current needs of the BSR SMEs - Table 4) are low. Indications of the abovementioned needs concerned also those enterprises where eco-innovations are consistent with the mission or/and strategy of the enterprise.

Summary

The aggregated in the present paper research results as well as their discussion constitute an attempt of justification that the investigated manufacturing enterprises from the SME sector in the BSR region not only expect support in the form of external financing, but also in the scope of carrying out business actions or development, among others pertaining to promotion or marketing research, potential customer segmentation or product design. Moreover, the expert knowledge as a need of SMEs in the scope of eco-innovations is a foundation and it motivates entrepreneurs to develop pro-environmental attitudes in the processes of planning, designing and scheduling the implementations of eco-innovative solutions, as well as integration of eco-innovations with their strategies and even, which has been stressed, their mission. Obviously, this is possible when SMEs are fully involved in improvement and acceleration of structured practical knowledge as well as through developing competencies and skills in the scope of recognising, evaluating, designing eco-innovative solutions. Thus, identifying the eco-innovative barriers and needs allows for conducting further research pertaining to business models creation and collaboration tools, which are not only a business, organisational or communication platform, but also an accelerator of the created eco-innovative services – a response to actual needs of the investigated SMEs. Also, while referring to the selected and evaluated by the SMEs needs, to address them support is required from experts, R&D units collaborating in the networks of eco-innovative solutions, e.g. *"Network of Service Providers for Eco-innovations in Manufacturing SMEs(Ecolabnet)"*.

References

- Bocken, N.M.P., Farracho, M., Bosworth, R. and Kemp, R. (2014), 'The front-end of eco-innovation for ecoinnovative small and medium sized companies', *Journal of Engineering and Technology Management*, 31 (January-March), 43-57.

- *European Commission*, 'Eco-innovations, the key to Europe's future competitiveness', [Online], [Retrieved January 26, 2020], https://ec.europa.eu/environment/pubs/pdf/factsheets/ecoinnovation/pl.pdf

- *European Commission* (2014), 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Green Action Plan for SMEs Enabling SMEs to Turn Environmental Challenges into Business Opportunities', [Online], [Retrieved January 25, 2020], https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014DC0440; https://ec.europa.eu/growth/smes/business-friendly-environment/green-action-plan_en.

- *European Commission* (2017), 'Annual Report on European SMEs 2016/2017', [Online], [Retrieved January 25, 2020], https://ec.europa.eu/docsroom/documents/26563/attachments/1/translations/en/.../native.

- *European Commission* (2018), 'Directorate-General for Internal Market, SMEs, resource efficiency and green markets', Flash Eurobarometer 456, [Online], [Retrieved January 25, 2020], http://ec.europa.eu/commfrontoffice/publicopinion.

- Fussler, C. and James, T. (1996). Driving Eco-Innovation: A Breakthrough Discipline for Innovation and Sustainability, Pearson Education, London.
- Karaarslan, S. (2015), 'Eco-innovation Competitiveness Inland shipping', Erasmus University Rotterdam.

- Kuceba, R. (2019), Environmental Management and Green Attitudes of the European SME Sector, Advances in Manufacturing II, vol. 2 - Production Engineering and Management, Hamrol, A., Kujawińska, A., Barraza, M. and Francisco Suarez, M. (ed), Springer, 12-25.

- Kuceba, R. and Zawada, M. (2019), 'The Influence of Environmental Awareness and Attitudes of Entrepreneurs on the Acceleration of co-Innovation in Micro and Small Enterprises', *International Journal of Management and Applied Science*, 5 (9).

- Marin, G., Marzucchi, A. and Zoboli, R. (2015), 'SMEs and barriers to Eco-innovation in the EU: exploring different firm profiles', *Journal Evolutionary Economics*, 25 (3), 671-705.

- Muller, P., Julius, J., Herr, D., Koch, L., Peycheva, V. and McKiernan, S. (2017), 'Annual Report on European SMEs 2016/2017 Focus on self-employment', PwC Luxembourg, London Economics, Innova, The University of Manchester, Manchester Institute of Innovation Research, DIW Econ.

- Munch Andersen, M. (2002), 'Eco-innovation–towards a taxonomy and a theory', [Online], [Retrieved January 25, 2020], https://www.researchgate.net/profile/Maj_Andersen/publication/228666208_Eco-innovation-towards_a_taxonomy_and_a_theory/links/0046351b23e208fec8000000/Eco-innovation-towards-a-taxonomy-and-a-theory.pdf

- Reid, A. and Miedzinski, M. (2008), 'Eco-Innovation: Final Report for Sectoral Innovation Watch', Europe Innova, [Online], [Retrieved January 26, 2020], https://www.researchgate.net/profile/Michal_Miedzinski/publication/301520793_Eco-Innovation_Final_Report_for_Sectoral_Innovation_Watch/links/5717510008aefb153f9e18fe.pdf

- *OECD* (2009), 'Sustainable manufacturing and eco-innovation. Framewok, practices and measurement'. Synthesis report, [Online], [Retrieved January 24, 2020], https://www.oecd.org/innovation/inno/43423689.pdf.

- *OECD* (2018), 'Oslo Manual 2018, Guidelines for Collecting, Reporting and Using Data on Innovation', Statistical Office of the European Communities, 4th Edition.

- Polzin, F., von Flotow, P. and Klerkx, L. (2016) 'Addressing barriers to eco-innovation: Exploring thefinancemobilisation functions of institutional innovation intermediaries', *Technological Forecasting & Social Change*, 103 (February), 34-46.

- Triguero, A., Moreno-Mondéjar, L. and Davia, M.A. (2013), 'Drivers of different types of eco-innovation in European SMEs', *Ecological Economics*, 92 (August), 25-33.

Drivers of Developing Eco-Innovations in Manufacturing SMEs from the BSR Region

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Abstract

The present paper presents the analysis of drivers of eco-innovative solutions development in manufacturing SMEs of the Baltic Sea Region. In the first part the authors have addressed the issue regarding the importance of developing eco-innovations in the European SME sector and presented the main premises for eco-innovations and benefit resulting from the cooperation between R&D units and possible partnerships that foster application of eco-innovation in companies. They have also included in it an example of a new project aimed at supporting eco-innovations in the manufacturing enterprises of the BSR - the project "Network of Service Providers for Eco-innovations in Manufacturing SMEs (Ecolabnet)". In the empirical part of the paper, based on the secondary research, but also on the own research of the partners participating in the project (including the authors of the present paper) the authors have presented an analysis pertaining to the results of the survey that was conducted within the Ecolabnet project, which were used in the analysis aimed at identifying the key drivers of eco-innovative initiatives among the investigated SMEs. It has been indicated that the drivers behind eco-innovations in case of European SMEs depend to a large extent on legislative measures and also utilisation of expert knowledge of R&D units.

Keywords: Eco-Innovations, Green Activity, Smes, Eco-Innovative Needs, Network Of Service Providers.

Introduction

The European Commission defines Small and Medium Sized (SMEs) as enterprises that employ less than 250 persons. Also, their annual turnover should amount to up EUR 50 million or their balance sheet should not exceed more than EUR 43 million (Commission Recommendation of 6 May 2003). These definitions regarding the size and annual turnover are of particular importance in the assessment process determining which enterprises may become beneficiaries of financial support offered by the European Union within the funding programmes aimed at promoting SMEs or in relation to certain policies, e.g. SME-specific competition rules. European Commission runs its own policy in relation to SMEs regarding the areas of their operations, which primarily covers the following five priority areas:

- the promotion of entrepreneurship and skills;
- the improvement of SMEs' access to markets;
- cutting red tape;
- the improvement of SMEs' growth potential, and;

- strengthening dialogue and consultation with SME stakeholders (*Small and medium-sized enterprises (SMEs) - Eurostat*, n.d.).

Presently, SMEs may seek for access to new markets or improve their growth potential thanks to the European Union's financial support that is aimed at developing green activity of the European SMEs within specially created programmes such as Horizon 2020 or Interreg. Aimed at promoting introduction and development of environmentally-friendly solutions these programmes, by providing much-wanted by entrepreneurs from the SME sector source of funds, constitute a chance to overcome the barriers of entering the markets for those enterprises that can offer eco-innovative products that are in line with the principles of sustainability. For this reason, it is necessary to recognise whether they are provided with access to RDI units that can support them in the processes of developing, introducing and commercializing eco-innovative products and services and also what are key drivers that stimulate the development of eco-innovative products. Therefore, the underlying objective of the paper is to identify the main drivers behind the eco-innovations development, which can constitute a precious source of knowledge on the actions that need to be undertaken by enterprises (including SMEs) in order to successfully develop and commercialise eco-innovative products and solutions. With this in view the authors have formulated the objective of the present paper – an attempt to answer the following research questions:

RQ1 – Are legislation and state programmes the key drivers for eco-innovations in manufacturing SMEs of the BSR region.

RQ2. Is utilising the potential of RDI units one of the major drivers of eco-innovations development?

The paper constitutes a contribution to the literature in implementing solutions in the scope of eco-innovations development. The paper has the following structure. Chapter 1 discusses briefly the role of the SME sector in the investigated BSR region countries and highlights the importance of the Ecolabnet project for supporting eco-innovations in these countries. Chapter 2 includes a literature review regarding the concept of eco-innovations with a particular stress on the drivers (incentives) for their development. Chapter 3 includes the research results and analyses the main drivers of eco-innovations in the investigated countries and attempts to account for the possible reasons of their differentiation. The last chapter summarises the paper and contains suggestions regarding further research works.

The Need for Eco-Innovations and Ecolabnet Network

Ecolabnet is a project funded by Interreg Baltic Sea Region which aims to create a network of service providers for supporting eco-innovations in manufacturing SMEs of Baltic Sea Region. The areas of competences of the newly-created network include knowledge in additive manufacturing, bio-based materials, product-service system design, eco-branding, value chain assessment, business model development, legislation, customer insights, certifications and life cycle assessment.

The project partners include scientific institutions and R&D ones from six of the Baltic Sea Region countries: Finland – Project Leader, Lithuania, Estonia, Sweden, Denmark and Poland, whose representatives are the authors of the present paper. The consortium of partners develops prototypes to demonstrate capability of Ecolabnet to support manufacturing SMEs when they deal with eco-innovations. The idea for creating such a project consortium that involves actors from the three key areas: SME sector entrepreneurs, intermediary organisations and RDI units can generate numerous benefits for all the stakeholders and prove to be more effective than projects aimed solely at financial support for SMEs. According to the research by Triguero et al, those entrepreneurs who give importance to collaboration with research institutes, agencies and universities, and to the increase of market demand for green products are more active in all types of eco-innovations (their eco-awareness grows) (Triguero et al., 2013). Also, according to another study by Szilagyi et al., the existing premises for eco-innovation and possible partnerships that foster application of eco-innovation in companies include policy changes, and increased cooperation between interested stakeholders from R&D, academia, businesses, clusters and policy makers (Szilagyi et al., 2018).

Thus, the creation of Ecolabnet network may prove effective in bridging the gap between the still low level of innovativeness of SMEs in the European Union (also with regard to eco-innovative products) and lack of expert knowledge and infrastructure which are necessary to unleash their potential in the area of innovations. For instance, according to the data published in 2019 the annual Report on the Condition of Small and Medium-Sized Enterprises in Poland, SMEs from this country are characterised by low innovative activity, which in case of small enterprises reached the level of 12.5% for industrial SMEs and 8.3% for service ones. Their innovative activity was financed in 46% from own funds while 24% of resources came from abroad. The situation seems better in case of medium-sized enterprises where about a third of them was involved in innovative activity, which was financed in 57% from own funds and 10% of the resources came from abroad (including the EU funds) (*2019_07_ROSS.pdf*, n.d.). Also, SMEs rarely conduct R&D activity themselves, which makes it even more important to utilise the expertise resources of scientific units – which is one of the objectives of the Ecolabnet project. According to the estimates in 2017 only about 7% of industrial enterprises in Poland incurred expenditures related to R&D while in case of service ones this percentage was 3.2% (*Małe i średnie przedsiębiorstwa zatrudniają w Polsce ok. 10 mln osób [RAPORT]- Forsal.pl - Biznes, Gospodarka, Świat*, n.d.).

Undoubtedly, the role of SME sector for the economy of EU member states is crucial. It is enough to refer to the statistics to see that in the whole territory of the European Union SMEs account for 99.8% of the total number of enterprises and 66.6% of total EU employment. The sector generated €4,030 billion of value added in 2016, which represents a share of 56.8% of total European value added in that year (*Pwc-europe-monitor-innovation-sme.pdf*, n.d.).

It is worth stressing that as the need for eco-innovation is becoming more widely recognised and perceived as an important issue in a world where the growth **of population is also changing** the patterns of consumption pattern, integration of environmental aspects at an early stage in the process of designing products has the benefit of minimising environmental impacts right from the start. Once product specifications are being made, only minor changes can be introduced (Bocken et al., 2014). Therefore, this is of particular importance that special knowledge and tools which are needed for dealing with environmental issues are implemented at the very initial stage of eco-innovative products development, and this translates into a special role of manufacturing enterprises, which are responsible for designing, developing and introducing to the market such new products. With this in mind, in the present paper the primary focus of the authors pertains to identifying main incentives behind the eco-innovative actions of manufacturing SMEs in the countries of the BSR region that collaborate within the newly created *"Network of Service Providers for Eco-innovations in Manufacturing SMEs – Ecolabnet"*.

Theoretical Framework – Types of Eco-Innovation Drivers

In this part of the paper, based on the literature query, the authors have made an attempt to present the changing approach to defining the concept of eco-innovations, however, their primary focus regarded identify the most significant incentives (drivers) for eco-innovations development in the SME area.

As a result of the conducted literature query it can be concluded that the subject of transforming innovations into eco-innovations dates back to the end of the past century. It was at that time that the foundations for the term of eco-innovations were linked to innovations in the process grasp. One of the first definitions of eco-innovations was introduced by C. Fussler and P. James, who defined eco-innovations as new products and processes that provide the business and customers with added value, simultaneously reducing the impact on the environment (James, 1997). The concept of process-oriented eco-innovations as originating from the process ones has been extended with two other types of eco-innovations: product, and organizational innovations. While eco-innovations that are process-oriented consist in introducing changes to processes that improve a product's environmental performance product innovations pertain to the process of introducing new characteristics or significant improvements to existing goods or services. In developing eco-product innovations enterprises use internal resources (e.g., management and human resource capabilities) or external resources (e.g., collaboration with universities and research centres). Organisational eco-innovations

in turn refer to implementation of managerial activities so as to reduce environmental impacts at the firm level (Afshari et al., 2019).

One of the most frequently cited definitions of eco-innovations was proposed by Rennings, according to which eco-innovations are all measures of relevant actors (firms, politicians, unions, associations, churches, private households) which:

- develop new ideas, behaviour, products and processes, apply or introduce them,
- contribute to a reduction of environmental burdens or to ecologically specified sustainability targets.

Eco-innovations can be developed by firms or non-profit organizations, they can be traded on markets or not. They can be of technological, organizational, social or institutional nature (Rennings, 2000). Eco-innovation, which has been linked to a business strategy, can enhance a firm's capabilities and reduce negative impacts on the environment during the production process. Eco-innovation has generally been accepted by industry and scholars as a method to reduce the environmental issues (Fernando and Wah, 2017). However, it has been observed by a number of researchers that the concept of environmental innovation itself has not been widely discussed in the management literature. Yet, organisations may utilise the potential of external networks as a means of improving firms' performance, which can be treated as a crucial way for the business competitive advantage (Dezi et al., 2019). Another key factor that has not been analysed extensively in the studies is appreciation of the strategic role of knowledge as a measure of open-mindedness, which enhances sustainable organisational performance (Cegarra-Navarro et al., 2019). Thus, it can be stated that presently, it is necessary to stress in the area of sustainable management the importance of combing the actions of the beneficiaries of the created values – enterprises, and also intermediary organisations and scientific units, whose role is growing in importance as contemporary eco-innovations frequently require expert knowledge, which can be only provided by the RDI units. Therefore, it seems to be particularly important, with regard to the subject matter of the present paper, to refer to these concepts of eco-innovations that indicate the elements that play a key role in developing eco-innovative solutions in SME sector enterprises, which can be termed incentives or drivers of eco-innovations. With this in mind, the authors have attempted to find the theoretical framework that would allow them to answer the research question 2 (RQ2) "*Is utilising the potential of RDI units is one of the major drivers of eco-innovations development***.** With this regard an interesting approach to analysing the types of eco-innovations and the drivers behind their successful diffusion was presented Kiefer and al., who applied in their research robust analyses of the equality of averages, in particular, the Welch and Brown-Forsythe tests. As the significance in both tests is always given, this confirms the existence of a significant difference between the centroid values of particular groups of eco-innovations. The researchers distinguished five groups reflecting five eco-innovation types that they had identified: systemic eco-innovations, externally driven eco-innovations, continuous improvement eco-innovations, radical and tech-push initiated eco-innovations, eco-efficient eco-innovations (Kiefer et al., 2019). In an attempt to determine which types of eco-innovations are of particular importance with regard to eco-innovations diffusion in the SME sector and what the main drivers (incentives) of such activities are in case of the SMEs form the investigated BSR countries, the authors have aggregated their most important characteristics in Table 1 below.

Table 1: Types of eco-innovations

Type of eco-innovation	Number	Characteristics
Systemic eco-innovations	37	These eco-innovations pertain to changes in the product/service process with a significant shift from current sales and traditional markets, towards new models of cooperation with suppliers. They also rank high in the area of new products and services and in the area of governance regarding scientific-academic cooperation, cooperation with suppliers, interactions with competitors and industry associations.
Externally driven eco-innovations	20	These eco-innovations scores well below the average in all subdimensions of design, user and product-service. However, they rank very high (highest of all the types of eco-innovations) in the area of cooperation with non-governmental organisations and regulators.
Continuous improvement eco-innovations	20	This type of eco-innovations is very similar to externally driven ones with scores well below the average in all subdimensions of design, user and product-service. Also, in terms of cooperation and the governance dimension, they score below the average in most subdimensions.
Radical and tech-push initiated eco-innovations	76	These eco-innovations score high in the design subdimensions of purely ecological characteristics and rupture with current business models. Also, they score above average in the subdimensions of external and internal clients and intermediaries. Their score is also high with regard to cooperation with research centres, universities and consultants.
Eco-efficient eco-innovations	36	These eco-innovations score high in the subdimension of savings / eco-efficiency, and cooperation with competitors and industrial organizations. The scores in the other subdimensions are relatively low.

Source: own elaboration based on: (Kiefer et al., 2019).

As Table 1 shows three types of eco-innovations demonstrate a particularly strong relationship between eco-innovations diffusion and cooperation with scientific units, and also legislative measures. The type of eco-innovations that ranked the highest in the research are externally driven eco-innovations, which stress the need for cooperation with non-governmental organisations and also regulators, who are in charge of introducing new legislative measures that foster eco-innovations development. Also systemic eco-innovations confirm the significance of developing eco-innovations and collaboration with scientific-academic units as well as industry associations. Finally, radical and tech-push initiated eco-innovations, which regard development and introduction to the market new, eco-innovative solutions scored very high with regard to cooperation with research centres, universities and consultants. Therefore, it can be concluded that that conducted analysis of the theoretical framework provides an answer to the research question 2 (RQ2) and confirms the fact that *utilising the potential of RDI units does constitute one of the major drivers of eco-innovations development*.

Eco-Innovation Drivers in the BSR Countries – Research Results Discussion

The Ecolabnet project will be carried out in the years 2019-2021 and its initial stage involved research aimed at identifying the current level of eco-innovative activity of the said SMEs, main incentives and barriers of eco-innovations implementation and also their level of pro-environmental awareness. The research was conducted with the use of CAWI method in the group of 296 enterprises

located in the six partner countries of project participants and it provided valuable data on the patterns of similarities and differences regarding implementing eco-innovative solutions by the manufacturing SMEs in all six investigated countries. The research sample constituted N=296 of entities (in this: Estonia 69 – 23.31%, Poland 57 – 19.26%, Finland 54 – 18.24%, Lithuania 15.88% - 47, Sweden 12.84% - 38, Denmark 10.47% - 31). In the whole aggregated group of the investigated SMEs small and medium-sized enterprises constituted 69.59%, respectively: 42.23% (125), 27.36% (81). It needs to be stressed that 49.66% - 147 of the SMEs out of the total investigated population identified their primary activity as purely correlated with eco-innovations (including: pro-active attitude of SMEs – working with eco-innovations 25.68% -76, eco-innovations integrated with the company's strategy 1.82% - 35, mission of the SME is based on eco-innovations – 12.16% - 36).

In the first step, so as to evaluate the current level of eco-innovations implementation in the investigated BSR countries (partners in the Ecolabnet project) as well as identify the main drivers of their development, the authors have referred to the tool created by the European Commission - The Eco-Innovation Scoreboard (Eco-IS). Together with the Eco-Innovation Index the tool illustrates performance with regard to eco-innovations across the EU Member States. To demonstrate various aspects of eco-innovations applied in the EU member states the tool applies 16 indicators grouped into five dimensions: eco-innovation inputs, eco-innovation activities, eco-innovation outputs, resource efficiency and socio-economic outcomes. In this way The Eco-Innovation Index presents performance of particular member states in different dimensions of eco-innovation by comparing them to the EU average as well as highlighting their strengths and weaknesses (*The Eco-Innovation Scoreboard and the Eco-Innovation Index*, 2016). In Figure 1 below the authors have aggregated the figures for all the six BSR countries being the subject of the investigation in the present paper.

As it can be observed in Figure 2 the analysed BSR countries belong to the three various groups within the Eco-Innovation Scoreboard. The most numerous group within the investigated countries create Eco-Innovation Leaders: Sweden, Finland and Denmark, whose indexes of eco-innovations are respectively 132, 121, 115. This means that these BSR countries have managed to create an eco-innovation-oriented environment where they combine business eco-related initiatives with research programmes that are aimed at increasing the share of eco-innovative products being introduced to the market and simultaneously increasing the competitiveness of the companies that develop them. Due to the limited length of the present paper its authors have limited the analysis to the leader of the rank – Sweden, with a view to explain its top position in the area of eco-innovativeness. The applied in the analysis data by the European Commission shows that since 2008 Sweden has continued to focus on encouraging innovation and has addressed skills matching through integration and education policy measures. In the years 2015-2017 the proportion of SMEs that adopted resource efficiency measures increased from 88 % to 92 %. Sweden is also one of the best countries in the EU on the percentage of SMEs that offer green products. This has been achieved as a result of implementing various initiatives to promote sustainability concept among companies and support them in developing green solutions. Some of them include:

- Development funds provided by the Swedish Agency for Economic and Regional Growth business to support the internationalisation of SMEs within the cleantech sector.
- An initiative aimed at providing work opportunities for newly arrived migrants and the long-term unemployed, including internships and subsidised employment in the 'green' industry.
- The country has also invested further in promoting solutions for smart and sustainable cities within the 'Smart City Sweden' demonstration platform. The government's export strategy clearly commits to internationalisation and promoting exports by SMEs.

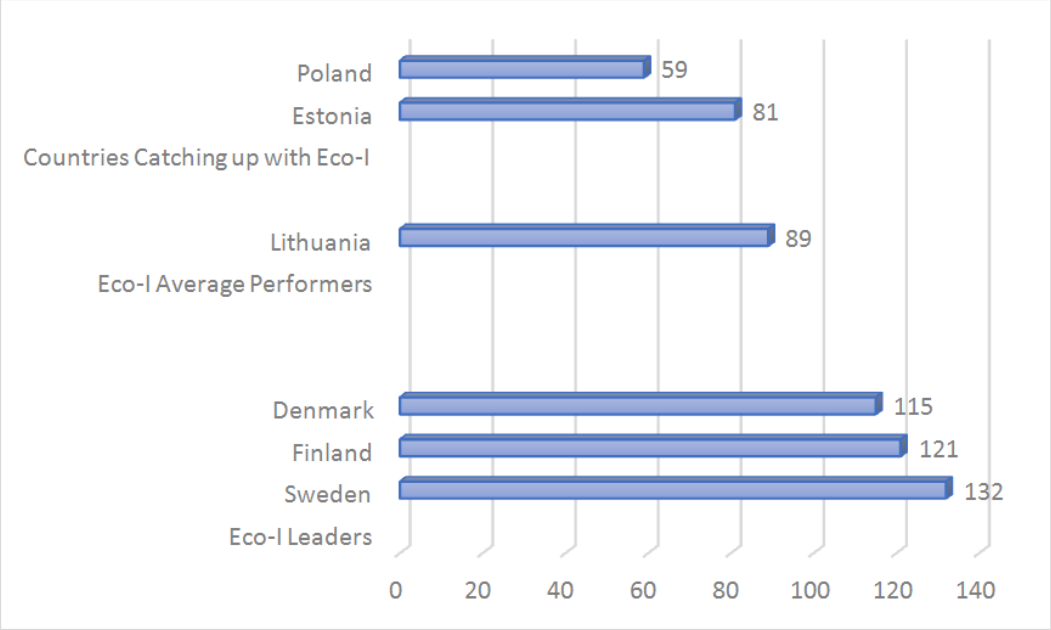

Fig. 1: Eco Index figures for the investigated BSR countries.
Source: own elaboration based on: (The Eco-Innovation Scoreboard and the Eco-Innovation Index, 2016)

Therefore, in an attempt to determine the significance of legislative measures the authors have evaluated the main identified by the investigated enterprises drivers of their eco-innovative activity. To evaluate the distinguished by the BSR entrepreneurs key drivers of their eco-innovative activity the authors have adopted Likert scale from 1 to 5. The results of the analysis have been aggregated in Table 2 below.

As Table 2 demonstrates, the entrepreneurs from the analysed BSR countries regard satisfying customer needs as the primary driver of eco-innovations development (53.19% - 125). The second identified incentive for undertaking eco-innovative actions according to the respondents constitute effective use of resources (50.21% - 118) and the third position in the rank occupies strengthening the brand's image (43.40% - 102). The fourth key driver of eco-innovations development indicated by the research participants is complying with legislation (42.13% - 99), which confirms that legislative measures introduced by the state are of vital importance for undertaking actions aimed at developing eco-innovative solutions in case of the analysed BSR enterprises. The next drivers of eco-innovations development that were evaluated at a high level included: Differentiate from competitors (40% - 94), Reduction of environmental effects on the business operations (38.30% - 90), Cost reduction (37.87% - 89) and Potential business opportunities (37.02% - 87). Attracting competent employees, Meeting stakeholder expectations and Increasing transparency were recognised to be less significant drivers of eco-innovations development receiving respectively 25.11% - 59, 24.68% - 58 and 22.98% - 54 of indications. The least valued incentive for developing eco-innovations in the opinion of the investigated BSR enterprises constituted Attracting capital investments, which received 18.72% - 44.

Table 2: Key drivers of eco-innovative drivers in the SMEs of the Baltic Sea Region
(Likert scale where 1= I totally disagree and 5= I totally agree)

Driver	Weight 1	Weight 2	Weight 3	Weight 4	Weight 5	Weighted average
To satisfy customer needs	1.28% 3	4.26% 10	12.77% 30	28.51% 67	53.19% 125	4.28
Efficient use of resources	1.28% 3	2.98% 7	8.09% 19	37.45% 88	50.21% 118	4.32
Strengthening corporate brand image	2.98% 7	4.68% 11	13.19% 31	35.74% 84	43.40% 102	4.11
To comply with legislation	4.68% 11	4.26% 10	15.74% 37	33.19% 78	42.13% 99	4.03
Differentiate from competitors	2.98% 7	7.66% 18	14.47% 34	34.89% 82	40.00% 94	4.01
Reduction of environmental effects on the business operations	5.11% 12	5.11% 12	20.85% 49	30.64% 72	38.30% 90	3.91
Cost reduction	2.55% 6	11.49% 27	16.17% 38	31.91% 75	37.87% 89	3.91
Potential business opportunities	5.53% 13	8.09% 19	14.89% 35	34.47% 81	37.02% 87	3.89
Attracting competent employees	6.38% 15	10.64% 25	29.36% 69	28.51% 67	25.11% 59	3.55
Meeting stakeholder expectations	6.38% 15	12.34% 29	25.11% 59	31.49% 74	24.68% 58	3.42
To increase transparency	7.23% 17	13.62% 32	31.49% 74	24.68% 58	22.98% 54	3.42
Attracting capital investments	17.45% 41	18.30% 43	24.26% 57	21.28% 50	18.72% 44	3.05

Total responses N=296, Answered: 229 Skipped: 67
(…) – number of indications
Source: Own elaboration based on the research conducted in the Ecolabnet project

Within the conducted research the investigated BSR SMEs were also asked to evaluate their attitude towards developing eco-innovations within the enterprise. Their responses to this survey question have been aggregated in Table 3 below.

Table 3: Attitudes of BSR SMEs towards development of eco-innovations

Answer choices	Number of responses	
A minimum of attention towards eco-innovation except from legal demands.	17.53%	44
React on external stimuli either from legislative or other interest groups e.g. customers, suppliers or NGOs. Eco-innovation initiatives are considered as an extra cost.	23.90%	60
Is pro-active and working with eco-innovation. Considers eco-innovative initiatives in the company as cost reducers or improving of the competitive advantages. Takes place primarily internally in the company. Tries to be ahead of the legislation.	30.28%	76
Eco-innovation is fully integrated in the company's strategy and involve all functions in the company. The eco-innovative activities lead to new market opportunities. The development activities can be product-, organisational- or process-oriented. Can be in cooperation with external partners.	13.94%	35
The entire company and its basic mission are based on eco-innovation. The fundamental business model includes environmental, social and economic variables. It contributes to an eco-innovative development for markets and society.	14.34%	36

Total responses N=296, Answered: 251 Skipped: 45
(…) – number of indications
*Source: Own elaboration based on the research conducted in the Ecolabnet projec*t

As Table 3 demonstrates despite being considered as an extra cost an incentive for eco-innovations development constitute stimuli from legislative groups, which confirms their significant role among all the drivers for undertaking eco-innovative actions among the investigated SMEs of the BSR. It is also worth stressing that with reference to the high position attributed to legislative measures by the BSR sector entrepreneurs their special role has also been confirmed in the research conducted by Hojnik and Ruzzier, who also found out that regulations remain a dominating driving force compared to other factors for different eco-innovation types (product, process and organizational eco-innovation, environmental technology and, environmental R&D); they play a role in both stages of eco-innovation (development and diffusion) and prevail over economic incentive instruments (Hojnik and Ruzzier, 2016). Therefore, the results of the conducted analysis regarding the level of eco-innovations development in the investigated BSR countries (Eco-Index) as well as research results allow for providing a positive answer to the research question 1 (RQ1) confirming the fact the *legislation and state programmes are the key drivers for eco-innovations in manufacturing SMEs of the BSR region.*

Summary

The presented in the paper result of the literature review and also the results of own research conducted within the Ecolabnet project confirm the crucial role of SME sector for the economy of EU member states and also its significance for developing and implementing eco-innovative solutions, which are perceived as an important aspect of sustainable development in line with the adopted by the EU principles of limiting the environmental impact of man's activity on the natural environment. The results of the analysis included in the paper prove the significance of state's legislative measures as well as collaboration with scientific units in the process of eco-innovations development in the SME sector of the European Union. This is convergent with opinion of other researchers in this domain (e.g. Hojnik and Ruzzier, Kiefer et al.). The present paper confirms that there exists a particular need in the analysed sector that pertains to expert knowledge that can be provided by the R&D units to the SME sector entrepreneurs, which can support them in developing pro-environmental attitudes and implementing eco-innovative solutions. Thus, especially created for such a purpose networks that combine the expertise of scientific units with the practical needs of SMEs may help enterprises from the SME sector in improving their business performance, which

can lead to winning the business competitive advantage. One of such networks is "*Network of Service Providers for Eco-innovations in Manufacturing SMEs (Ecolabnet)"*. The research conducted in the BSR region of SMEs confirms that such a cooperation may prove beneficial for all the actors involved in such networks, and more importantly for the reduced negative impact of the SME sector's operations on the natural environment. However, the research presented in the paper was conducted among manufacturing SMEs only, which may constitute its limitation. Yet, this provides an excellent opportunity to compare the obtained results with future research conducted in other areas of SMEs operations.

References

- *2019_07_ROSS.pdf*. (n.d.). [Online], [Retrieved January 25, 2020], https://www.parp.gov.pl/storage/publications/pdf/2019_07_ROSS.pdf

- Bocken, N. M. P., Farracho, M., Bosworth, R. and Kemp, R. (2014). 'The front-end of eco-innovation for eco-innovative small and medium sized companies', *Journal of Engineering and Technology Management*, 31, 43-57.

- Cegarra-Navarro, J. G., Papa, A., Garcia-Perez, A. and Fiano, F. (2019). 'An open-minded strategy towards eco-innovation: A key to sustainable growth in a global enterprise', *Technological Forecasting and Social Change*, 148, article number: 119727.

- Dezi, L., Ferraris, A., Papa, A. and Vrontis, D. (2019). 'The Role of External Embeddedness and Knowledge Management as Antecedents of Ambidexterity and Performances in Italian SMEs', *IEEE Transactions on Engineering Management*, 1-10.

- Fernando, Y. and Wah, W. X. (2017). 'The impact of eco-innovation drivers on environmental performance: Empirical results from the green technology sector in Malaysia', *Sustainable Production and Consumption*, 12, 27-43.

- Hojnik, J. and Ruzzier, M. (2016). 'What drives eco-innovation? A review of an emerging literature', *Environmental Innovation and Societal Transitions*, 19, 31-41.

- James, P. (1997). 'The sustainability circle: A new tool for product development and design', *Journal of Sustainable Product Design*, 2, 52–57.

- Kiefer, C. P., Carrillo-Hermosilla, J. and Del Río, P. (2019). 'Building a taxonomy of eco-innovation types in firms. A quantitative perspective', *Resources, Conservation and Recycling*, 145, 339-348.

- *Małe i średnie przedsiębiorstwa zatrudniają w Polsce ok. 10 mln osób [RAPORT] - Forsal.pl - Biznes, Gospodarka, Świat*. (n.d.), [Online], [Retrieved January 26, 2020], https://forsal.pl/artykuly/1420702,male-i-srednie-przedsiebiorstwa-zatrudniaja-w-polsce-ok-10-mln-osob-raport.html

- *Pwc-europe-monitor-innovation-sme.pdf*. (n.d.), [Online], [Retrieved January 26, 2020], https://www.pwc.nl/nl/assets/documents/pwc-europe-monitor-innovation-sme.pdf

- *Small and medium-sized enterprises (SMEs) - Eurostat.* (n.d.), [Online], [Retrieved January 25, 2020], https://ec.europa.eu/eurostat/web/structural-business-statistics/structural-business-statistics/sme

- Szilagyi, A., Mocan, M., Verniquet, A., Churican, A. and Rochat, D. (2018). 'Eco-innovation, a Business Approach towards Sustainable Processes, Products and Services', *Procedia - Social and Behavioral Sciences*, 238, 475-484.

• *The Eco-Innovation Scoreboard and the Eco-Innovation Index*. (2016, June 16). [Text]. Eco-Innovation Action Plan - European Commission, [Online], [Retrieved January 20, 2020], https://ec.europa.eu/environment/ecoap/indicators/index_en

• Triguero, A., Moreno-Mondéjar, L. and Davia, M. A. (2013). 'Drivers of different types of eco-innovation in European SMEs', *Ecological Economics*, 92, 25-33.

The Internet in Management of the Promotion of Selected Health-Promoting Factors of the Lifestyles of the Inhabitants of Kuyavian-Pomeranian Voivodeship

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Abstract

The aim of the article is to recognize the opinion of the inhabitants of Kuyavian-Pomeranian Voivodeship on a health-promoting lifestyle and significance of the internet in its promotion. During the tests there have been selected some factors impacting health-promoting lifestyles of the inhabitants, i.e. factors related to nutrition, physical activeness, sleep, medical surveillance. In particular, attention was paid to consuming organic food by the inhabitants as those of greater nutritional value, however, not always considered as a health-promoting factor. They were deemed to be one of multiple factors. The necessity of promoting actions, including the Internet actions, were evaluated. The obtained test results including recommendations for selected factors impacting health-promoting lifestyle, proposed by i.e. World Health Organization, in compliance with local and EU regulations. The research hypothesis presumed that the majority of surveyed inhabitants has, as for the majority of the factors, health-promoting lifestyles (it has been confirmed). However, people consuming organic food are in the minority, they seldom purchase and are hardly ever interested in buying organic products via the internet. There is significant connection between the sex and purchasing organic food on the Internet (women more). Health-promoting attitudes rmainly referred to consuming balanced meals, taking up general physical activeness, proper duration of sleep. Antihealth-promoting attitudes mainly referrend to consuming sweets, lack of control of taken fat, lack of exercise to keep one's balance, helping to avoid falls, which is particularly significant for the elderly. The inhabitants, however, indicate a further demand in those terms, including using the Internet.

Keywords: Marketing, Management, Healthier Lifestyle, Organic Food, Internet

Introduction

Public health is a significant aspect of social and economical environment of the country. It was presumed that a lifestyle is one of the significant factors impacting tchem (Szczepanek, Prus, Knapowski 2018). Widespreading health-promoting attitudes among the inhabitants requires planning efficient promotional actions (Korporowicz 2005; Chomątowska 2011; Kitajewska, Szeląg, Kopański 2014; Hulewska, 2016; Golinowska 2017; Promocja 2017; Puchalski, Korzeniowska 2017; Zadarko-Domaradzka, Zadarko 2017; Puchalski, Korzeniowska, 2019; Didkowska, Wojciechowska, Mańczuk, Łobaszewski, Sanitarny, Beręsewicz, Kształcenia 2019; Syper-Jędrzejak, M 2019). The starting point to those actions is to identify the current lifestyle of the inhabitants. The research connected with this concept have been performed throughout many years (Siciński 1978; Ponczek, Olszowy, 2012; Thees, Gobel , Jose , Bohrhardt , Esch 2012; Lipka, Janiszewski, Walentukiewicz, Łysak, Wilk 2013; Woynarowska-Soldan, Tabak 2013; Musiałek, Dłużniewski 2015; Woźniak, Brukwicka, Kopański, Kollár, Kollárová, Bajger 2015; Błaszczuk 2016; Kotarska, Drohomirecka, Wilk, 2016; Szalonka, Witek 2016; Hanus 2017; Kaczmarek 2017; Malińska 2017; Ucieklak-Jeż, Bem 2017; Gawlik 2018; Hildt-Ciupińska 2018; Światowy, Szalonka, 2018; Zmuda-Palka, Siwek 2018; Dąbrowska, Janoś-Kresło, Lubowiecki-Vikuk, 2019; Gardocka-Jałowiec, Szalonka 2019; Korporowicz 2019; Pochwała, 2019). It seems that the changes in these terms prove the need of

constant monitoring and further actions. This article is a continuation of previous research of the author of the article (Ferenc, Koreleska 2017, 2018, Koreleska, Kuczyńska 2015).

Method

The aim of the article is to recognize the opinion of the inhabitants of Kuyavian-Pomeranian Voivodeship on a health-promoting lifestyle and significance of the internet in its promotion. The inhabitants assessed themselves in those terms. During the tests there have been selected some factors impacting health-promoting lifestyles of the inhabitants, i.e. factors related to nutrition, physical activeness, sleep, medical surveillance. In particular, attention was paid to consuming organic food by the inhabitants as those of greater nutritional value, however, not always considered as a health-promoting factor. They were deemed to be one of multiple factors. The necessity of promoting actions, including the Internet actions, were evaluated.

The obtained test results including recommendations for selected factors impacting health-promoting lifestyle, proposed by i.e. World Health Organization (WHO), in compliance with local and EU regulations.

The research hypothesis presumed that the majority of surveyed inhabitants has, as for the majority of the factors, health-promoting lifestyles

The research was performed in 2019 via the method of the direct survey in Kuyavian and Pomeranian Voivodeship. Initially, the researchers presumed the minimal value of the sample suggested for the range researches, with their regional nature (N=600 inhabitants). The choice of the sample was not random, they adapted the method of quota sampling. The researchers used geographical criteria, which is commonly selected in this method of selection of the sampling and the sex. They used the Central Statistical Office for Kuyavian and Pomeranian Voivodeship.

The obtained data were a subject to an analysis using the methods of mathematical statistics. There has been used the Pearson test of the feature independence.

The statictics form is shown in this formula (Sagan, Mynarski 2002):

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{k}\frac{(n_{ij} - n_{ij}^{'})^2}{n_{ij}^{'}}$$

where:

n_{ij} - there have been observed numbers in i - this line and j - this column,

$n_{ij}^{'}$ - expected numbers in i - this line and j - this column.

Results

Health-promoting attitudes of the inhabitants of Kuyavian and Pomeranian Voivodeship compared to the own research

The first assessed element was physical activeness. According to the WHO recommendations the adult in the age range of 18-65 should take up physical activeness including moderate physical effort (> 150 min./week), intensive (75 min./week) or the equivalent of previously mentioned moderate and intensive effort combinations (World Health Organization… 2010). The majority of the region inhabitants meets the requirements these requirements (64%). Another recommendation of WHO in the terms of physical activeness enhancing strength and toughness of muscles ≥2 days/week. The majority of the surveyed do not perform them (53%). To compare this group to the people above 65 years old it is particularly significant the balance exercises are particularly prominent and they help to avoid collapsing (≥ 3 days/week). It was presumed that in this age group only 20% of the people

meet the reccommendation. It is concerning since among all the surveyed in the region the number was even higher and it was 25%.

Another criteria is nutrition (Bortnowska 2014; Mickiewicz A., Mickiewicz B., Prus, Wawrzyniak 2015; Roman, Prus, Ramczykowska 2017; Szczepanek, Prus, Knapowski 2018). Most people meet the recommendations and consume balanced meals, including possible products, from all the groups in every meal (78%). Apart from this, the number of meals is from 4 to 5, which is compliable with the adapted recommendation (55%). Unfortunately, the people who eat at regular times are the minority (48%).

In accordance with nutrition recommendations of WHO and FAO for European inhabitants it is indicated to consume fruit and vegetables, particularly and of local origin, in the amount of at least 400 g., several times a day. Most of the surveyed inhabitants, 63%, meets the requirements. Only 1% of the surveyed did not answer the question.

Unfortunately, most of the surveyed do not control the amount of consumed fat (56%). An enormous number of the surveyed say they eat sweets (75%). Consuming excessively much sugar and too many sweets might lead to multiple illnesses, including dental caries and arteriosclerosis (Wieczorek 1978).

Another assessed element of healthy lifestyle is duration of sleep a day. Most of the surveyed inhabitants (65%) sleep a proper number of hours a day as, according to the recommendation, it should be 7-9h (National Sleep…). 28% of the surveyed say they sleep one hour less, making it 6 h and the other surveyed say they spend even less time sleeping. Only one person said they slept 10 h and the other 2 did not answer the question.

The research shows that most of the surveyed inhabitants say they do not smoke (83%)as . Different results have been obtained as for alcohol consumption. Over 60 % (63%) say they drink alcohol, however most of them drink alcohol occassionally.

Most of the inhabitants of the region (62%) say they take part in the medical surveillance. It is a genuinely positive phenomenon. It is worth noticing that preventional actions are one of the main targets of the National Health Program in 2016-2020.

The opportunities of purchasing and promoting organic food on the Internet in the opinion of the inhabitants of the region

The conducted research shows that most of the surveyed do not consume organic food (63%). Other surveyed said they quite differentiated as for consumption of organic food. (fig 1.).

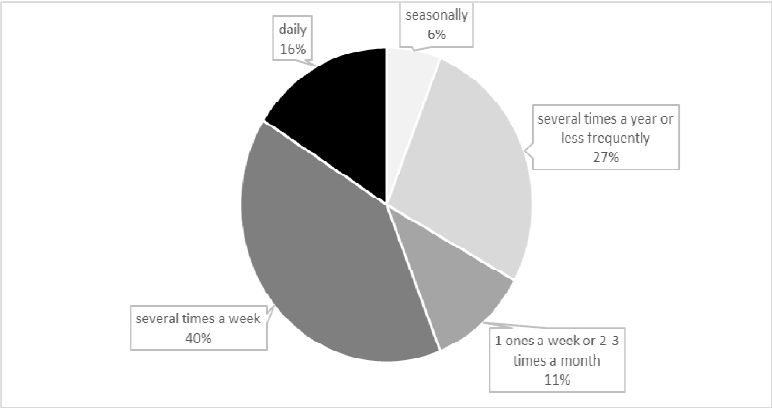

Fig. 1: Frequency of consumption of organic food among the inhabitants declaring its purchase

Source: own research

What impacts the purchase of organic products, in the opinion of the surveyed, is the price, quality and taste.

At this point it is also worth noting that consumers who decide to buy organic food should be sure that these products are of the highest quality and meet all standards. It is therefore important that control systems function effectively, i. e. institutions controlling and certifying organic food (Mickiewicz A., Mickiewicz B., Prus, Wawrzyniak 2015).

The inhabitants seldom buy organic products on the Internet (6%) (fig. 2). There is significant connection between the sex and purchasing organic food on the Internet. Women more often than men declared buying organic food over the Internet. (The compliance test value is 15,219 and exceeds the critical values $\lambda 0{,}01 = 6{,}635$). Only 7% of the surveyed say this is the most expected venue to purchase organic goods (fig. 3).

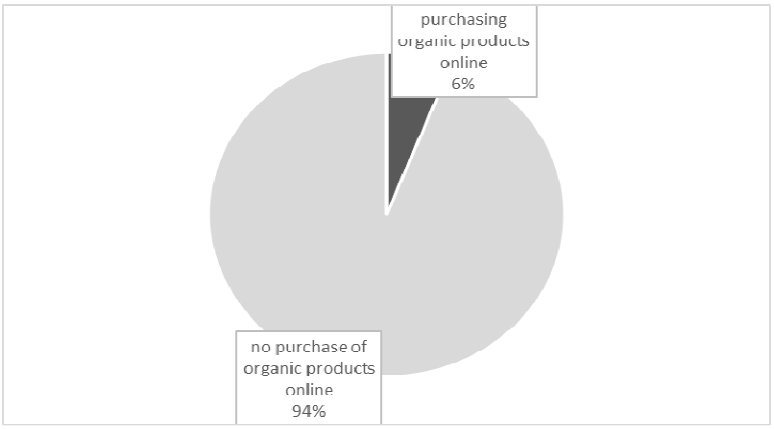

Fig. 2: The Internet as the purchase venue of organic food according to the inhabitants of the region

Source: own research

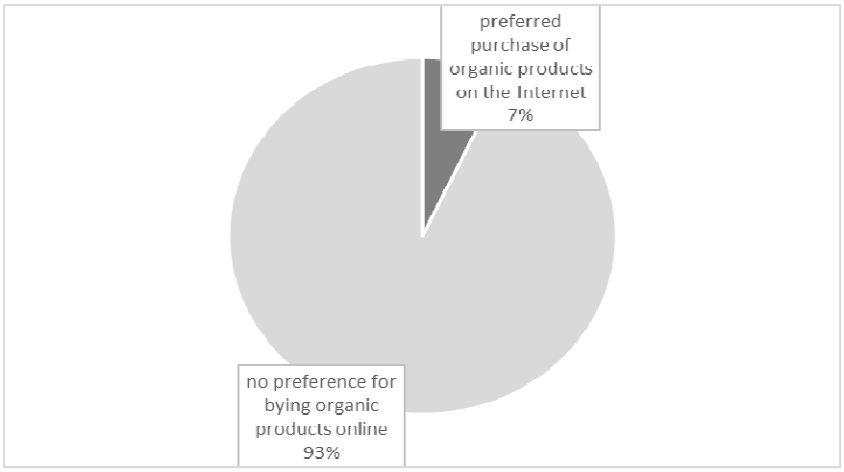

Fig. 3: The Internet as the most expected venue of purchasing organic food according to the inhabitants of the region

Source: own research

The survey showed that the inhabitants of the region find it necessary to have promotional actions in terms of healthy lifestyle taken up.

Conclusions

The performed analysis confirmed the presumed research analysis and it showed that the most of the inhabitants have as for the most factors, health-promoting lifestyles. Health-promoting attitudes rmainly referred to consuming balanced meals, taking up general physical activeness, proper duration of sleep. Antihealth-promoting attitudes as for the majority of the surveyed inhabitants mainly to consuming sweets, lack of control of taken fat, lack of exercise to keep one's balance, helping to avoid falls, which is particularly significant for the elderly. The inhabitants claim it is necessary to perform further promotional actions in terms of promoting healthy lifestyles, also with use of the Internet. The obtained results might be an indication to the institutions and organizations when forming health programmed as well as promoting and managing them.

References

- Błaszczuk, K. (2016), 'Opieka zdrowotna i promocja zdrowia w Rzeszowie. Kontekst opieki medycznej i zachowań zdrowotnych mieszkańców Rzeszowa' [Online]. Publisher. [Retrieved February 10, 2020], http://repozytorium.ur.edu.pl/handle/item/2199

- Bortnowska, G. (2014) 'Promowanie żywności tradycyjnej–bioróżnorodność–symbolem prozdrowotnego stylu życia', *Probl. Hig. Epidemiol*, *95*(4), 831-836.

- Chomątowska, B. (2011) 'Promocja zdrowia w miejscu pracy', *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, (223), 99-106.

- Dąbrowska, A., Janoś-Kresło, M., & Lubowiecki-Vikuk, A. (2019), Styl życia wellness a zachowania osób starszych na rynku usług prozdrowotnych, Zdrowie i style życia: wyzwania ekonomiczne i społeczne. Nowak W., Szalonka K. (red.), Wydawca = "E-wydawnictwo. Prawnicza i ekonomiczna biblioteka cyfrowa. Wydział Prawa, Administracji i Ekonomii Uniwersytetu Wrocławskiego.

- Didkowska, J., Wojciechowska, U., Mańczuk, M., Łobaszewski, J., Sanitarny, G. I., Beręsewicz, A., & Kształcenia, C. M. (2019), Propagowanie rekreacyjnej aktywności fizycznej jako wyzwanie dla promocji zdrowia ukierunkowanej na społeczność lokalną, na przykładzie populacji Wrocławia, Zdrowy styl życia jako kapitał xxi wieku, Borcuch A., Knefel M., Krzysztofek A. (red.),. Laboratorium Wiedzy Artur Borcuch, 53-62, Kielce.

- Ferenc, A., & Koreleska, E. (2017), 'Der gesundheitsorientierte Lebensstil in der Meinung der Studenten von der Universitäten in der Woiwodschaft Kujawien-Pommern', *Journal of Research and Applications in Agricultural Engineering*, *62*(3).

- Ferenc, A., & Koreleska, E. (2018), 'Die Bedeutung von Non-Profit-Organisationen bei der Förderung einer Gesundheitsorientierten Lebensstil der ländlichen Bevölkerung', *Journal of Research and Applications in Agricultural Engineering*, *63*(2).

- Gardocka-Jałowiec, A., & Szalonka, K. (2019), Wybrane aspekty stylu życia w perspektywie odpowiedzialności za zdrowie, Zdrowie i style życia: wyzwania ekonomiczne i społeczne. Nowak W., Szalonka K. (red.), Wydawca "E-wydawnictwo. Prawnicza i ekonomiczna biblioteka cyfrowa. Wydział Prawa, Administracji i Ekonomii Uniwersytetu Wrocławskiego.
- Gawlik, D. (2018) 'Diagnoza zachowań zdrowotnych mieszkańców województwa śląskiego (na podstawie badania Inwentarzem Zachowań Zdrowotnych Z. Juczyńskiego)', *Chowanna*, (51 (2)), 99-117.

- Golinowska, S. (2017) ,Dyskusja panelowa: Kierunki zmian w ustawie o zdrowiu publicznym w celu wzmocnienia promocji zdrowia', *Zdrowie Publiczne i Zarządzanie*, *15*(4), 354-360.

- Hanus, G. (2017) 'Prozdrowotne zachowania konsumentów na światowym rynku żywieniowym', *Studia Ekonomiczne*, *326*, 75-88.

- Hildt-Ciupińska, K. (2018), 'Samoocena zdrowia oraz dbałości o nie aktywnych zawodowo mężczyzn–wstępne wyniki badań', *Bezpieczeństwo Pracy. Nauka i Praktyka*, *558*(03), 20-23.

- Hulewska, A. (2016) 'Promocja zdrowia w social media–komunikowanie tradycyjne i nowomedialne, T*eorie komunikacji i mediów, 9*, 343.

- Kaczmarek, Ż. (2017) 'Zachowania prozdrowotne studentów Uniwersytetu Trzeciego Wieku w Uniwersytecie Medycznym we Wrocławiu. Wyniki badań i rekomendacje', *Rocznik Andragogiczny*, *24*, 189-200.

- Kitajewska, W., Szeląg, W., & Kopański, Z. (2014), 'Dzialania na rzecz promocji zdrowia oraz profilaktyki chorób cywilizacyjnych w ocenie personelu medycznego', *J. Clin. Healthcare*, *1*(1).

- Koreleska, E., & Kuczynska, B. (2015), 'Ocena stron internetowych przedsiębiorstw ekologicznych', *Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu*, *17*(6).

- Korporowicz, V. (2005) 'Zdrowie i jego promocja: kształtowanie przyszłości', *Monografie i Opracowania/Szkoła Główna Handlowa*, (538).

- Korporowicz, V. (2019) 'Przestrzenne zróżnicowania zachowań zdrowotnych dorosłej młodzieży w województwie mazowieckim', *Studia z Polityki Publicznej*, *22*(2), 9-25.

- Kotarska, K., Drohomirecka, A., & Wilk, K. (2016), 'Ocena aktywności fizycznej i stylu życia osób po 50. roku życia', *Handel Wewnętrzny*, 6 (365), 465-485.

- Lipka, A., Janiszewski, M., Musiałek, M., & Dłużniewski, M. (2015), 'Studenci medycyny a zdrowy styl życia' *Pedagogika Społeczna*, *2*, 189-203.

- Malińska, M. (2017), Styl życia i zachowania prozdrowotne polskich pracowników budowlanych–wyniki badań własnych, *Bezpieczeństwo Pracy. Nauka i Praktyka*, *555*(12), 13-17.

- Mickiewicz A., Mickiewicz B., Prus P., Wawrzyniak B. M. (2015), 'Miejsce i rola jednostek certyfikujących oraz inspektorów w systemie rolnictwa ekologicznego w Polsce', *Zagadnienia Doradztwa Rolniczego*, 3, 42-61.

- Muszyński, J., Żółtańska, J., Michalczak, W., & Sebzda, T. (2016), 'Analiza stylu życia dorosłych mieszkańców Dolnego Śląska w aspekcie zapobiegania chorobom sercowo-naczyniowym', *Family Medicine & Primary Care Review*, (1), 33-38.

- National Sleep Foundation recommends New Steep times. [Online]. Publisher. [Retriever February 1, 2010], https://sleepfoundation.org/press-release/national-sleep-foundation-recommends-new-sleep-times/page/0/1

- Nawrocka, A., Prończuk, A., Mynarski, W., & Garbaciak, W. (2012), 'Aktywność fizyczna menadżerów wyższych szczebli zarządzania w kontekście zaleceń prozdrowotnych', *Medycyna Pracy*, *63*(3), 271-279.

- Pochwała, M. (2019), 'Prozdrowotny styl życia polskich studentów', *Studenckie Prace Prawnicze, Administratywistyczne i Ekonomiczne*, *27*, 49-59.

- Ponczek, D. and Olszowy, I. (2012), 'Styl życia młodzieży i jego wpływ na zdrowie', *Problemy higieny i epidemiologii*, 93 (2), 260-268.
- Promocja, Instytut Medycyny Pracy Krajowe Centrum. "Zarządzanie zdrowiem w zakładach pracy: aktywność fizyczna i zdrowe odżywianie się." (2017).
- Puchalski, K., & Korzeniowska, E. (2017) 'Promocja zdrowia w zakladach pracy w Polsce w 2015 r.-diagnoza na podstawie reprezentatywnego badania firm zatrudniajacych powyzej 50 pracownikow', *Medycyna Pracy*, 68(2), 229–246.
- Puchalski, K., & Korzeniowska, E. (2019), 'Promocja zdrowia w średnich i dużych firmach w Polsce w 2017 r.-rozpowszechnienie, realizacja, efekty i trudności, *Medycyna pracy*, *70*(3), 275-294.
- Roman M., Prus P., Ramczykowska A. (2017), 'Agritourism as a form of income diversification on farms in Kościerski District', *Roczniki Naukowe SERiA*, Tom XIX, Zeszyt 1, 151-157. (doi:10.5604/01.3001.0009.8357)
- Romanowska-Tołłoczko A. (2011) 'Styl życia studentów oceniany w kontekście zachowań zdrowotnych', *Hygeia Public Health*, 46 (1), 89-93.
- Rozporządzenie Rady Ministrów z dnia 4 sierpnia 2016 r. w sprawie Narodowego Programu Zdrowia na lata 2016-2020.
- Sagan A., Mynarski S. (2002) Analiza danych ankietowych. Materiał kursowy. Statsoft Polska, Kraków.
- Siciński A. (1978) (red.) Styl życia. Przemiany we współczesnej Polsce, PWE, Warszawa.
- Światowy, G., & Szalonka, K. (2018), 'Zachowania zdrowotne w stylach życia-ujęcie modelowe w kontekście zrównoważonego rozwoju', *Marketing i Rynek*, (4 (CD)), 539-549.
- Syper-Jędrzejak, M. (2019) 'Promocja sportu i aktywności fizycznej w budowaniu dobrostanu pracowników-na przykładzie działań podejmowanych w wybranym uniwersytecie publicznym', *Przedsiębiorczość i Zarządzanie*, *20* (6, cz. 2 Zmiany w myśleniu marketingowym), 229-242.
- Szalonka, K., & Witek, L. (2016), ‚Postawy i zachowania prozdrowotne pokolenia Z w świetle badań pierwotnych', *Marketing i Zarządzanie*, *44*, 189-196.
- Szczepanek M., Prus P., Knapowski T. (2018), 'The Assessment of Market Demand for Products Obtained from Primary Wheat Forms with Increased Nutritional Value', Proceedings of the 27th International Scientific Conference Agrarian Perspectives XXVII "Food Safety – Food Security", Czech University of Life Sciences Prague, Faculty of Economics and Management, 381-387. ISBN 978-80-213-2890-7; ISSN 2464-4781 (Online); ISSN 1213-7960 (Print); ISSN 1213-7979 (CD-ROM).
- Thees S., Gobel J., Jose G., Bohrhardt R., Esch T. (2012), 'Die Gesundheit vom Studierenden im Bologna-Prozess. Prävention und Gesundheitsförderung' 3, Springer Verlag, 196-202.
- Ucieklak-Jeż, P., & Bem, A. (2017), 'Aktywność fizyczna determinantą zdrowia populacji', *Acta Universitatis Wratislaviensis* , *Ekonomia — Wroclaw Economic Review* 23/4, 3823.
- Walentukiewicz A. , Łysak A., Wilk B. (2013), 'Styl życia studentek kierunków medycznych', *Hygeia Public Health*, 94 (2), 247-252.

- Wieczorek – Chełmińska Z. (1987) Zasady żywienia i dietetyki stosowanej. Podręcznik dla wydziałów dietetyki medycznych studiów zaocznych, Warszawa, PZWL, s.22.

- World Health Organization. Global recommendations on physical activity for health. Genewa: World Health Organization, 2010.[Online]. Publisher. [Retrieved, November 10, 2019], http://apps.who.int/iris/bitstream/10665/44399/1/9789241599979_eng.pdf

- Woynarowska-Soldan, M., & Tabak, I. (2013), 'Zachowania prozdrowotne nauczycieli i innych pracowników szkoly/health enhancing behaviors of teachers and other school staff', *Medycyna pracy*, *64*(5), 659.

- Woźniak M. Brukwicka I., Kopański Z, Kollár R., Kollárová M., Bajger B. (2015), 'Związki stylu życia ze zdrowiem', *Journal of Clinical Healthcare*, 4, s. 4.

- Zadarko-Domaradzka, M., & Zadarko, E. (2017), 'Nowe media jako narzędzie edukacji zdrowotnej i modelowania zachowań współczesnego społeczeństwa', *Edukacja – Technika – Informatyka*, 1(19), Wydawnictwo Uniwersytetu Rzeszowskiego, [Online] Publisher. [Retrieved December 18, 2019], http://repozytorium.ur.edu.pl/handle/item/2974

- Zmuda-Palka, M., & Siwek, M. (2018), Uczestnictwo w fitness klubach i siłowniach jako jeden z elementów zdrowego stylu życia mieszkańców Krakowa', *Sport i Turystyka. Środkowoeuropejskie Czasopismo Naukowe*, *1*(2), 67-78.

Selected Aspects of The Enterprises' Marketing

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Abstract

The aim of the research was to present and assess the performed marketing activity in selected enterprises. The criteria of this choice was the location in Kuyavian and Pomeranian Voivodeship. The research was performed in fifty enterprises via the direct survey method in 2019 in Kuyavian and Pomeranian Voivodeship. In the research there has been used a survey verified in pilot studies. The researchers paid attention to such components as conducting marketing researches, formulating marketing targets and their connection with marketing instruments and particular marketing tools in the concept of 7P. During the process, the researchers noticed some new trends, i.e. the opportunity of performing ecology-promoting activities in the enterprises and their significance for the marketing activity. The performed analysis confirmed the presumed research hypothesis stating that in the most of enterprises, the marketing activity is performed in a satisfactory manner. As for the product and material evidence there were no negative reviews, which stands for a positive phenomenon and marketing research. The most of the negative reviews referred to such marketing tools as promotion, people and marketing research. In these areas it is highly recommended to implement corrective actions. Simultaneously, most enterprises are interested in introducing ecology-promoting solutions and using them in marketing activities.

Keywords: Marketing, Management, Ecological Marketing, Enterprises

Introduction

According to the Encyclopaedia of Management, "performing the rules of modern marketing stands for being recipient-oriented instead of being product-oriented. Problem of marketing orientation is frequently a subject of research (Kramer 1995; Kędzior 1997; Fonfara 1999; Rawski 200; Kotler, Armstrong, Saunders, Wong 2002; Kłeczek 2003; Szulc 2007; Oniszczuk-Jastrząbek 2011; Kotler, Lane 2012; Nowotarska-Romaniak 2012; Escher 2014; Kozielski 2015; Panasiuk 2017; Sawińska 2017; Janczewska 2018). Such understanding of marketing requirers the enterpreneurs to perform marketing research, identify the recipients' needs, define the precise and measurable targets as well as properly adjusting marketing instruments, control, etc.

Among the contemporary consumers there is a growing interest in product and ecology-promoting activities [Zaremba 2002; Żakowska-Biemans 2011; Zaremba-Warnke 2011; Niezgoda 2012; Zalejski, Faszczewska 2012; Żółkowski 2013; Pukas 2014; Sobczyk 2014; Escher, Petrykowska 2015; Sajdakowska, Żakowska-Biemans, Gutkowska 2015; Żakowska-Biemans 2015; Pawlak-Kołodziejska 2016; Sobczyk-Kolbuch 2016; Zaremba-Warnke 2016, Koreleska 2016; Koreleska, Ferenc 2017, Sobczyk 2018; Kozłowski, Rutkowska, 2018; Ropuszyńska-Surma, Węglarz 2018). The situation is similar in some companies (Soboń 2003, Wilk 2011, Koreleska, 2009; Olejniczak 2014; Wiśniewska 2014, Kalińska-Kula 2016; Wilk 2018). It raises a question if the enterprises in Kuyavian and Pomeranian Voivodeship can see the trends and if they are interested in implementing and fitting them into the marketing activity. This thesis aims at answering the question.

The main aim of the research was to present and assess the performed marketing activity in selected enterprises. The performed analysis confirmed the presumed research hypothesis stating that in the most of enterprises, the marketing activity is performed in a satisfactory manner.

Method

The research was performed in fifty enterprises via the direct survey method in 2019 in Kuyavian and Pomeranian Voivodeship. The criteria of this choice was the location in Kuyavian and Pomeranian Voivodeship. In the research there has been used a survey verified in pilot studies. The researchers paid attention to such components as conducting marketing researches, formulating marketing targets and their connection with marketing instruments and particular marketing tools in the concept of 7P. In the literature, there are many supporters of extending the 4P concept) (Kramer 1997; Payne 1997; Roza 2009; Garbarski, Rutkowski, Wrzosek 2001). Taking into consideration lack of access to particular enterprises and their latency, the researchers conducted the assessment in the indirect manner, via the direct survey method with the owner or employees of enterprises. In relation to that factor, the obtained assessment might be of slightly inflated nature. However, indicating the factors, which are the best and worst assessed might be some kind of indication to optimize the marketing activity. During the process, the researchers noticed some new trends, i.e. the opportunity of performing ecology-promoting activities in the enterprises and their significance for the marketing activity.

Results

The first evaluated marketing instrument in the enterprise was the Product. It was presumed that in the assessment of enterprises it gained the best reviews as a marketing tool. There were no negative reviews. The special role of the product (in the marketing-mix concept) is indicated by some authors (McDonald, Wilson 2012). Meffert (1991) points to problems with the choice of marketing-mix combination.

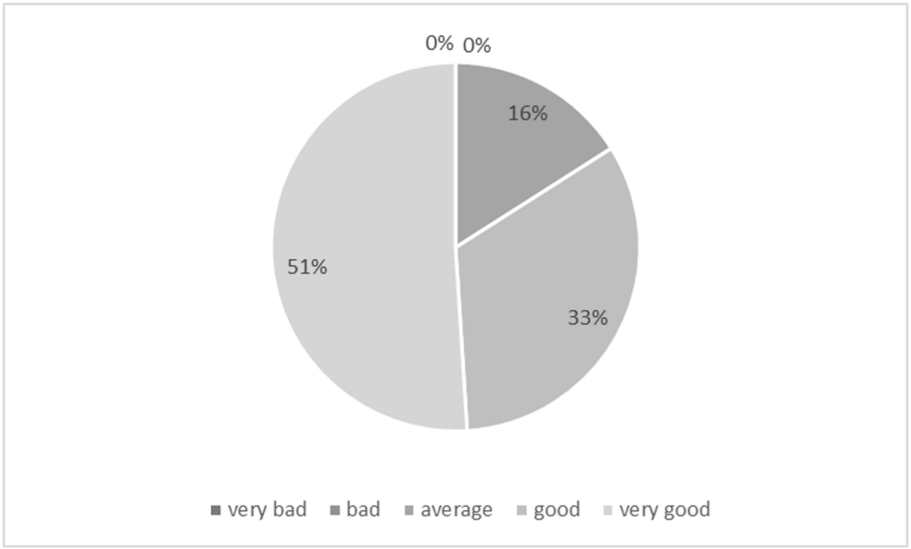

Chart 1 : Assessment of the product policy performed by the enterprises in Kuyavian and Pomeranian Voivodeship.

Source: own research

Promotion performed in the enterprises gained the most negative reviews as the marketing element. There were some problems indicated, which referred to internal PR, Internet activities (websites, social network), slogans of advertising campaignes changing too rarely etc.

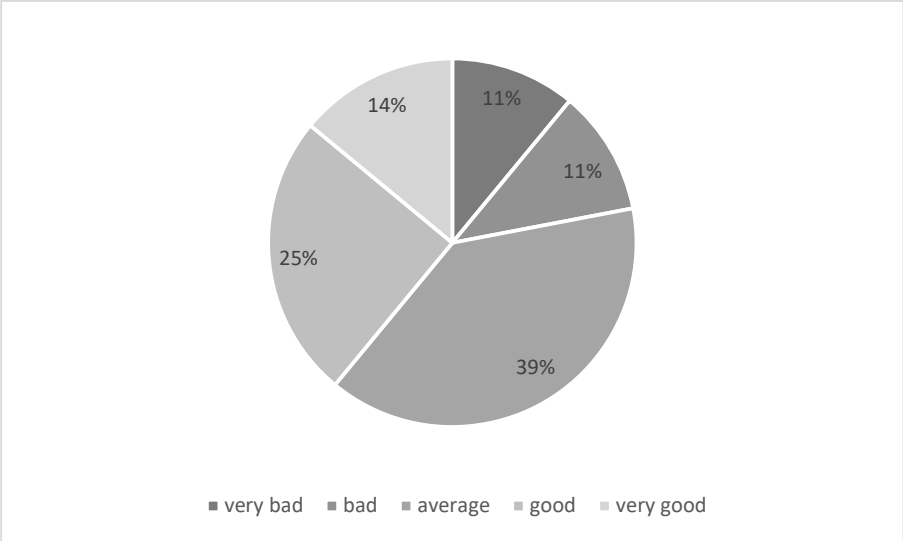

Chart 2 : The assessment of the policy of promoting performed by the enterprises in Kuyavian and Pomeranian Voivodeship

Source: own research

Another assessed element was the price The price is a significant element in the consumer decisions. Companies consider price to be a basic and effective means of communication with the customer (Andruszkiewicz 2007). The assessment of price policy was presented on the chart no. 3

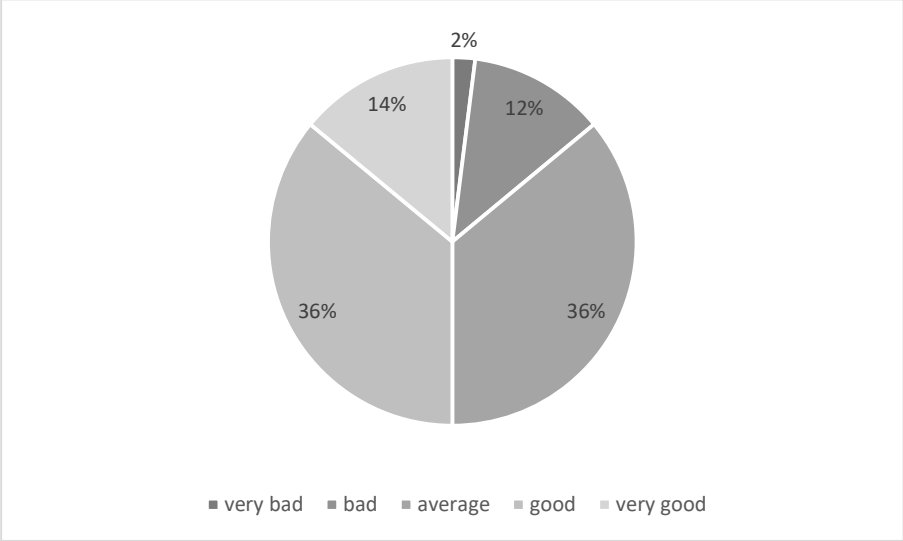

Chart 3: The assessment of policy of price performed by the enterprises in Kuyavian and Pomeranian Voivodeship.

Source: own research

Providing the product in the convenient venue and time is a significant element of a marketing activity. The assessment is presented on the chart no. 4.

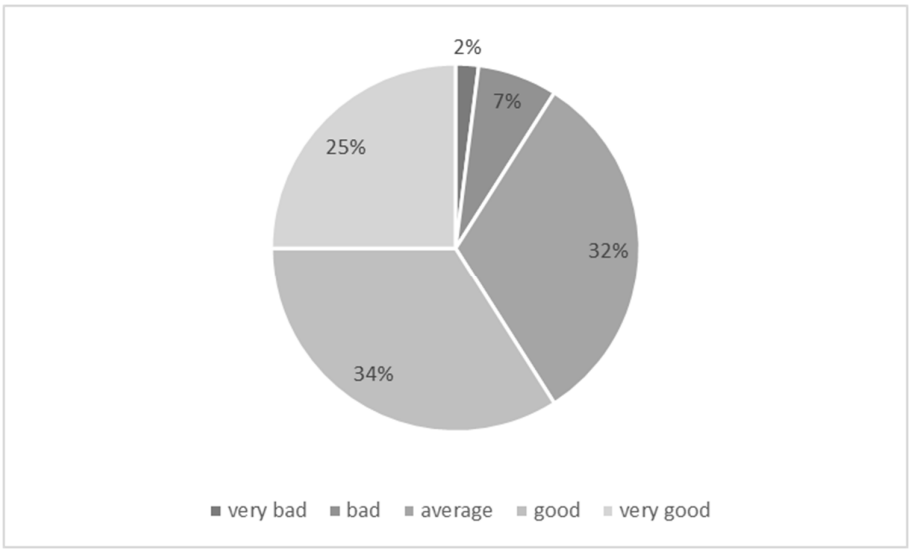

Chart 4 : The assessment of policy of distribution performed by enterprises in Kuyavian and Pomeranian Voivodeship

Source: own research

Another element subject to an analysis was the personnel, their marketing competences, benevolence and the ability to advise. The chart no. 5 presents the results. The need to increase the marketing competence of the employees was indicated by, among others Thomas (1999); Wasiak (2011); Bombol, Sikora (2014), Alejziak (2014), Molenda, Kruhlaya (2018).

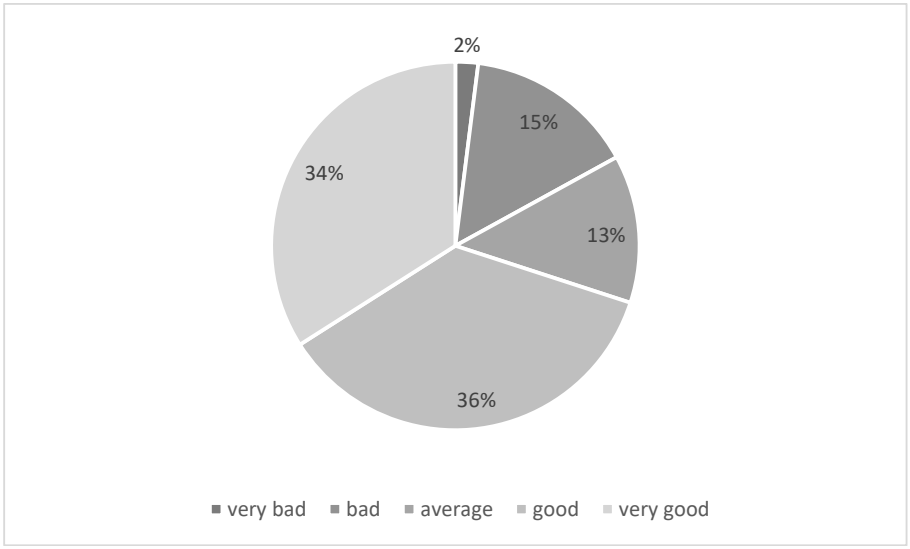

Chart 5 : The assessment of personnel in the enterprises in Kuyavian and Pomeranian Voivodeship

Source: own research

The process includes a series of actions from selecting the product, through purchasing it and the possibility of making a complaint. The results of the assessment are presented on the chart no. 6. Some

companies pointed out the need to hire specialists in the field of marketing, employee training in this area

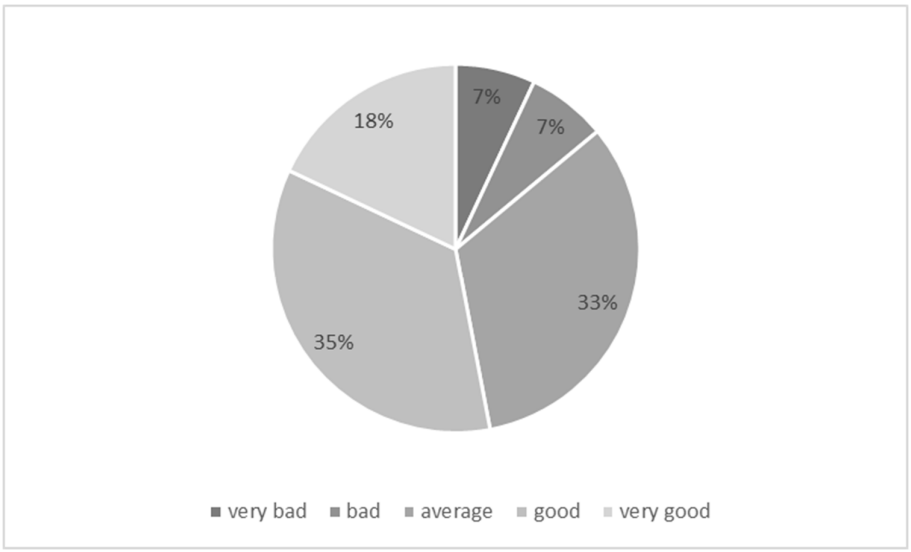

Chart 6: The assessment of policy of the process performed by the enterprises in Kuyavian and Pomeranian Voivodeship

Source: own research

The tangible evidence was assessed in a highly positive or satisfactory manner by all the enterprises, there were no negative reviews and it can be presumed that the enterprises provided the client with outstanding conditions through creating a proper company image, appearance and equipping of the building, parking areas, etc.

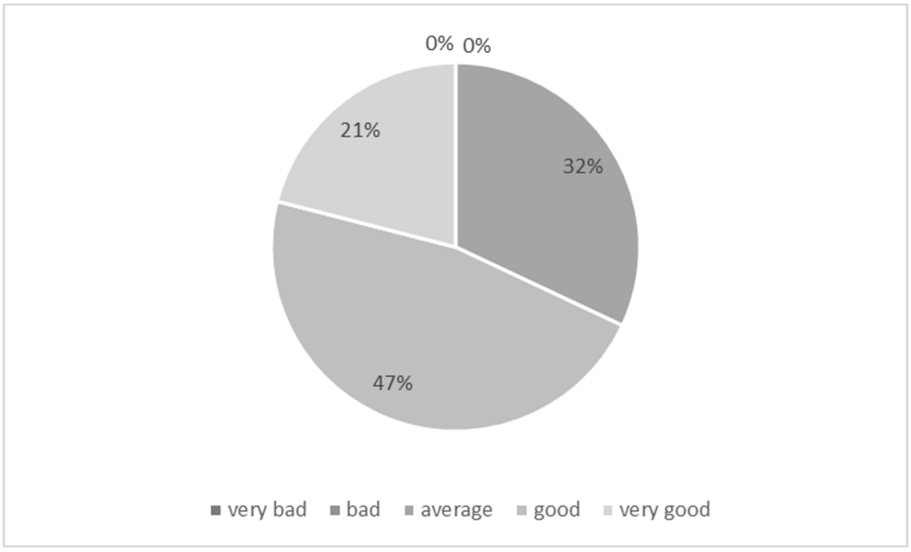

Chart 7 : The assessment of the policy of the tangible evidence performed by the enterprises in Kuyavian and Pomeranian Voivodeship

Source: own research

The total marketing activity was assessed on average, well and very well by the vast majority of companies (chart 8). The majority of companies declared that their marketing objectives were properly formulated and linked to their business objectives and mission.

Among the problems indicated by entrepreneurs were mainly the lack of sufficient funds for marketing activities, the need to hire specialists for marketing, employee training in this area, insufficient promotional activities, including on the Internet.

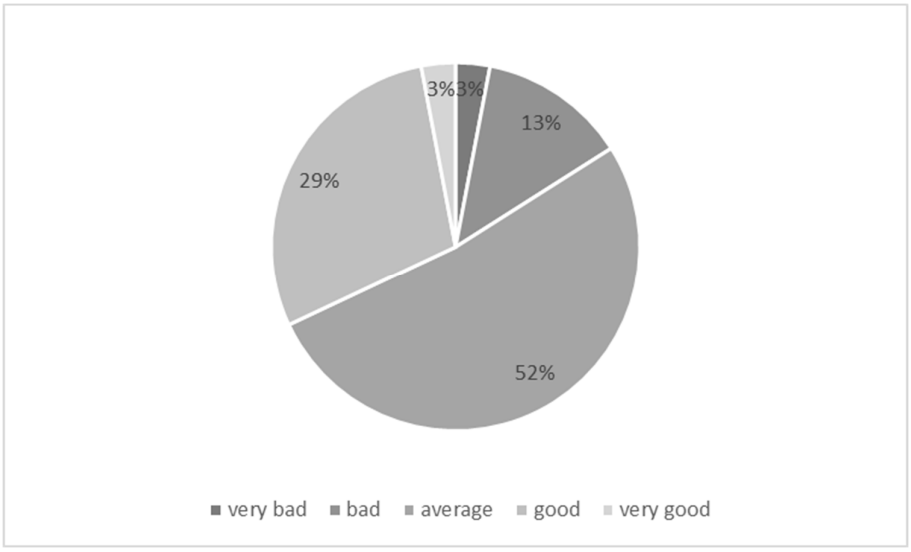

Chart 8 : General assesment of marketing activities by the enterprises in Kuyavian and Pomeranian Voivodeship

Source: own research

By skillful and systematic use of marketing research, decision-makers reduce the risk of making decisions (Kaczmarczyk 2007). The implementation of marketing research was assessed slightly less well in comparison to other elements of marketing activity (chart 9). Problems with the implementation of the concept of marketing orientation in companies, of which marketing research is a fundamental element, are indicated in earlier publications (Szostek 2012, Szulc 2014).

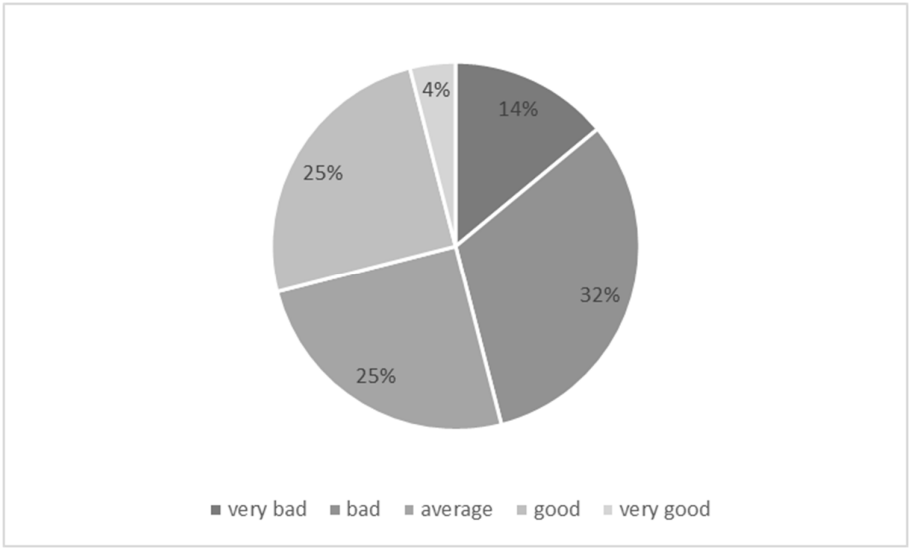

Chart 9 : Evaluation of marketing research conducted by the enterprises in Kuyavian and Pomeranian Voivodeship

Source: own research

Most of the surveyed (63%) said they were interested in implementing ecology-promoting actions. 28% of them showed no interest in the activities. 8% did not express their opinions.

Most of the surveyed enterprises, i.e. 58% are planning to use the implementation of ecology-promoting solutions in the marketing actions and company image actions. Every fourth enterprise says they are not planning to take up those activities, and the other enterprises did not express their opinion on it. It can be presumed that not all enterprises are planning to widespread the information on ecology-promoting activity, which is an error in terms of marketing activities - in the area of promotion - of public relations.

Summary

The performed analysis confirmed the presumed research hypothesis stating that in the most of enterprises, the marketing activity is performed in a satisfactory manner. As for the product and material evidence there were no negative reviews, which stands for a positive phenomenon. The most of the negative reviews referred to such marketing tools as promotion, people and marketing research. In these areas it is highly recommended to implement corrective actions. Simultaneously, most enterprises are interested in introducing ecology-promoting solutions and using them in marketing activities.

References

- Alejziak, B. (2014), 'Kwalifikacje i kompetencje pracowników turystyki. Próba diagnozy turystycznego rynku pracy', *Folia Turistica*, *32*, 117-144.

- Andruszkiewicz K. (2007) Strategiczne zarządzanie marketingowe w polskich przedsiębiorstwach w warunkach kryzysu. Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika, Toruń.

- Bombol, M. and Sikora, W. (2014), 'Analiza kompetencji świadomości biznesowej wśród pracowników działów sprzedaży na rynku FMCG w Polsce-wstęp do badań', *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, (337 Badania marketingowe-kontekst funkcjonowania przedsiębiorstw i sieci organizacyjnych), 150-161.

- Encyclopedia of Management. [Online] [Retrieved February 5, 2020] https://mfiles.pl/pl
- Escher, I. (2014) 'Marketingowa i rynkowa reorientacja organizacji oraz jej związek z procesem adaptacji organizacji'. *Acta Universitatis Nicolai Copernici Zarządzanie* XL, zeszyt 413, Toruń.
- Escher, I., & Petrykowska, J. (2015), 'Proekologiczne zachowania młodych polskich konsumentów', *Handel Wewnętrzny*, (2 (355)), 128-141.
- Foltynowicz, Z., & Urbaniak, M. (1998), 'Ochrona środowiska w marketingowej orientacji przedsiębiorstw na polskim rynku dóbr przemysłowych', *Problemy Ekologii*, *2*, 156-159.
- Fonfara, K. (1999) 'Dylematy wdrażania orientacji marketingowej przez polskie przedsiębiorstwa',[w:] J. *Altkorn (red.), Kierunki rozwoju zarządzania marketingowego w Polsce. Raport z badań, Wydawnictwo AE w Krakowie, Kraków*.
- Garbarski L., Rutkowski I., Wrzosek W. (2001) Marketing punkt zwrotny nowoczesnej firmy, PWE.
- Janczewska, D. (2018), 'Orientacja marketingowa jako kierunek wsparcia konkurencyjności mikroprzedsiębiorstwa', *Przedsiębiorczość i Zarządzanie*, *19*(6.3), 9-21.
- Kaczmarczyk S. (2007), Zastosowanie badań marketingowych. Zarządzanie marketingowe i otoczenie przedsiębiorstwa. PWN, Warszawa.
- Kalińska-Kula, M. (2016) 'Marketing produktów ekologicznych–możliwości budowania przewagi konkurencyjnej', *Marketing i Zarządzanie*, *44*(3), 41-50.
- Kędzior Z. (1997) 'Orientacja marketingowa w przedsiębiorstwach (próba identyfikacji)', *Marketing i Rynek* 1997, nr 7, 20.
- Kłeczek R. (2003) Orientacja rynkowa w przedsiębiorstwie – podejście metodologiczne i kierunki rozwoju badań, Wydawnictwo Akademii Ekonomicznej im. Oskara Langego we Wrocławiu, Wrocław.
- Koreleska, E. (2009) 'Kształtowanie produktu w koncepcji marketingu ekologicznego', *Acta Scientiarum Polonorum, Oeconomia*, *8*(4), 79-86.
- Koreleska, E. (2016). 'Zachowania niemieckich konsumentów na rynku ekologicznych produktów żywnościowych', *Konsumpcja i rozwój*, *16*(3), 45.
- Koreleska, E. and Ferenc, A. (2017), 'Functioning of "Organics Cluster" in the French National and Regional Market of Organic Food', *Problems of World Agriculture/Problemy Rolnictwa Światowego*, *17*(1827-2018-104), 151-160.
- Kotler Ph., Armstrong G.., Saunders J., Wong W. (2002),Marketing, PWE, Warszawa 2002.
- KotlerPh., Lane K. (2012), Marketing, Dom Wydawniczy Rebis, Poznań, Pilarczyk B., Mruk H. (red.).
- Kozielski, R. (2015) ;Możliwości biznesowe a orientacja marketingowa przedsiębiorstw; *Studia Ekonomiczne*, (233), 148-158.
- Kozłowski, W., & Rutkowska, A. (2018), 'Megatrendy w konsumpcji żywności a marketing społecznie zaangażowany', *Handel Wewnętrzny*, (2 (373)), 261-269.
- Kramer T. (1995), 'Orientacja marketingowa przedsiębiorstw polskich: wyzwania i zagrożenia', w: *Zarządzanie marketingowe przedsiębiorstwami w realiach gospodarki polskiej*, red. L.

Żabiński, AE/PTE Katowice, Katowice, [w:] Nowotarska-Romaniak, B. (2012), Wdrażanie orientacji marketingowej w firmach ubezpieczeniowych. *Zeszyty Naukowe Uniwersytetu Szczecińskiego. Ekonomiczne Problemy Usług*, (96 Usługi w Polsce 2012: usługi publiczne-usługi komercyjne), 153-165.

- Kramer T. (1997) Podstawy marketingu, PWE, Warszawa.
- McDonald M., Wilson H. (2012) Plany marketingowe, Oficyna Wolters Kluwer, Warszawa.
- Meffert H. (1991), Marketing. Grudlagen der Absatzpolitik. Lehrbuch. Gablerverlag , Wiesbaden.
- Molenda, M., & Kruhlaya, M. (2018), 'Personel jako najważniejszy element marketingu mix w przedsiębiorstwie turystycznym', *Angelika Ciżyńska Zasadność istnienia Trybunału Stanu w systemie organów państwa Rzeczypospolitej Polskiej| 9 Jakub Kozłowski Zasada pierwszeństwa prawa Unii Europejskiej jako strukturalna podstawa systemu prawa unijnego| 29*, 321.
- Niezgoda, A. (2012) 'Moda na zachowania proekologiczne w turystyce–uwarunkowania i problemy', *Kowalczyk-Anioł J., Makowska-Iskierka M.,(red.), Turystyka. Moda na sukces, Warsztaty z Geografii Turyzmu, tom 2, Wydawnictwo Uniwersytetu Łódzkiego, Łódź*.
- Nowotarska-Romaniak, B. (2012) 'Wdrażanie orientacji marketingowej w firmach ubezpieczeniowych', *Zeszyty Naukowe Uniwersytetu Szczecińskiego. Ekonomiczne Problemy Usług*, (96 Usługi w Polsce 2012: usługi publiczne-usługi komercyjne), 153-165.
- Olejniczak, K. (2014) 'Zielony marketing jako wyraz odpowiedzialności współczesnego przedsiębiorstwa', *Marketing i Rynek*, (8 (CD)), 139-144.
- Oniszczuk-Jastrząbek, A. (2011) 'Globalizacja a orientacja marketingowa przedsiębiorstw', *Współczesna Gospodarka*, *2*(2), 21-29.
- Panasiuk, A. (2017). ,Koncepcja orientacji marketingowej touroperatorów', *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, (473), 399-409.
- Pawlak-Kołodziejska, K. (2016) 'Ekologizacja konsumpcji, jej uwarunkowania i przejawy na rynku żywnościowym', *Przedsiębiorczość i Zarządzanie*, *17*(4, cz. 3 Nowe trendy w zarządzaniu-perspektywa marketingowa i personalna), 145-160.
- Payne A. (1997) Marketing usług, PWE, Warszawa.
- Pukas, A. (2014) 'Produkty ekologiczne i społecznie odpowiedzialne - nowe trendy w konsumpcji i ich marketingowe konsekwencje', *Marketing i Rynek*, (8 (CD)), 1229-1235.
- Rawski, M. (2001) 'Orientacja marketingowa a rozumienie strategii marketingowej', *Zeszyt Naukowy/Wyższa Szkoła Ekonomii i Administracji w Kielcach*, (4 Prace z zakresu ekonomii i politologii), 67-77.
- Ropuszyńska-Surma, E., & Węglarz, M. (2018), 'Proekologiczne i prooszczędnościowe zachowania gospodarstw domowych jako konsumentów energii'.
- Rosa G. (2009) (red.) Marketing w handlu, Wydawnictwo Naukowe Uniwersytetu Szczecińskiego. Szczecin.
- Sajdakowska, M., Żakowska-Biemans, S., & Gutkowska, K. (2015). 'Symptomy ekologizacji konsumpcji w zachowaniach konsumentów na rynku żywności pochodzenia zwierzęcego', *Journal of Agribusiness and Rural Development*, (3 [37]).

- Sawińska, A. (2017) 'Orientacja marketingowa biur podróży w Polsce', *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, (473), 507-518.
- Schulz, M. (2014) 'Determinanty prowadzenia badań marketingowych przez przedsiębiorstwa regionu kujawsko-pomorskiego na tle innych regionów Polski, *Marketing i Rynek*, (10 (CD)), 176-182.
- Sobczyk, G. (2014) 'Współczesna konsumpcja–nowe trendy na polskim rynku', *Zeszyty Naukowe WSEI seria: Ekonomia*, *9*(2).
- Sobczyk, G. (2018) 'Zachowania konsumentów wobec nowych trendów konsumpcji–wyniki badań', *Annales Universitatis Mariae Curie-Skłodowska, Sectio H Oeconomia*, *52*(1), 171-180.
- Sobczyk-Kolbuch, A. (2016), 'Proekologiczne zachowania młodych konsumentów jako styl życia współczesnego pokolenia Europejczyków (na podstawie wyników badań bezpośrednich w wybranych krajach UE)', In *Style życia w perspektywie zrównoważonego rozwoju* (pp. 73-88). Wydawnictwo Uniwersytetu Śląskiego.
- Soboń, M. (2003). 'Współczesna koncepcja marketingu-nowa zasada działania przedsiębiorstwa', *Przegląd Organizacji*, (7-8), 54-56.
- Szostek, D. (2012) 'Stan i rozwój marketingu w przedsiębiorstwach funkcjonujących na terenie Polski', *Marketing i Rynek*, (1), 2-9.
- Szulc, R. (2007) 'Stan orientacji marketingowej w małych i średnich przedsiębiorstwach', *Marketing i Rynek*, (6), 21-26.
- Thomas M.J. (1999), Podręcznik marketingu, Wydawnictwo naukowe PWE, Warszawa.
- Wasiak, B. (2011), 'Znaczenie szkolenia pracowników marketingu w banku', *Funkcjonowanie i rozwój przedsiębiorstw w gospodarce rynkowej*, 97.
- Wilk, I. (2011) Społeczna odpowiedzialność biznesu a proekologiczna działalność przedsiębiorstwa na rynku. *Zeszyty Naukowe Uniwersytetu Szczecińskiego. Ekonomiczne Problemy Usług*, (74 Marketing przyszłości: trendy, strategie, instrumenty: marketing w działalności podmiotów rynkowych), 743-757.
- Wilk, I. (2018) 'Istota marketingu ekologicznego w warunkach zrównoważonego rozwoju', *Zeszyty Naukowe. Organizacja i Zarządzanie/Politechnika Śląska*.
- Wiśniewska, A. (2014. 'Strategie proekologiczne w zarządzaniu przedsiębiorstwem', *Problemy Ekologii Krajobrazu*, *13*(13).
- Zalejski, J., & Faszczewska, K. (2012). 'Zachowania polskich konsumentów wobec produktów ekologicznych', *Ekonomia i Zarządzanie*, *4*, 92-104.
- Zaremba, S. (2002), 'Marketing ekologiczny - odpowiedź na proekologiczne potrzeby konsumentów', *Prace Naukowe Akademii Ekonomicznej we Wrocławiu*, *21*(936 Aspekty makro- i mikroekonomiczne), 151-162.
- Zaremba-Warnke, S. (2011) ,Orientacja na potrzeby proekologicznego konsumenta', *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, (151), 741-754.
- Zaremba-Warnke, S. (2016) 'Marketing zrównoważony vs. niezrównoważona konsumpcja', *Studia Ekonomiczne*, (255), 92-101.

- Ziółkowski, M. (2013) 'Postawy proekologiczne konsumentów oraz ich wpływ na działalność Przedsiębiorstw', *Wiedza i bogactwo narodów*, *Kapitał ludzki, globalizacja i regulacja w skali światowej,* Ekonomia i Finanse, Bartkowiak R., Wachowiak P.(red.), Oficyna Wydawnicza Szkoła główna Handlowa w Warszawie, Warszawa,45-54.

- Żakowska-Biemans, S. (2011) 'Ekologizacja konsumpcji i jej przejawy w zachowaniach konsumentów na rynku żywności-praca przeglądowa', *Zeszyty Naukowe/Uniwersytet Ekonomiczny w Poznaniu*, (206), 217-225.

- Żakowska-Biemans, S. (2015), 'Troska o środowisko i jej implikacje dla zachowań konsumentów w sferze żywności i żywienia;. *Journal of Agribusiness and Rural Development*, *2015*(1644-2016-135393).

Organizational and Economic Aspects of Increasing the Sustainability of Farms in Ukraine

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Abstract

It is substantiated that modern farms have both the features of peasant farms and the properties of "Western-type" farms. Modern farms are characterized by multifunctionality, in particular, the combination of economic and socio-cultural functions in the economic activity. Economic include: production of agricultural products; satisfaction of consumer demand for quality products; creating a competitive environment; contribution to food security in the country; profit and profit sharing; increasing the level of business activity in the region; increasing budget revenues at different levels.
The main features of a farm in Ukraine: it is based on an individual, small-group, mainly family form of work organization; the means of production, including land, are privately owned by the peasants, although some of them may be in another form of ownership or use; the farm may or may not have legal personality; completely independent in making economic decisions, managing the created product and income; its production is commodity; is fully responsible for the management results.
It is established that in 2017 compared to 2016 there was a slight increase in the number of farms. During 2008–2017, the number of smallholder farms decreased by 21.1%, while the medium and large ones increased, mainly due to the merger of bankrupt small FHs and owners of land units united by family ties. The necessity to concentrate state support for the development of small farms is justified, and to exclude medium and large farms from the list of entities that are provided by the state in the framework of financing agriculture. The results of the cluster analysis of small farms indicate that it is advisable to direct state support to the development of farms in which revenues are generated from the sale of crop products, as well as from other crop products - "niche" products and livestock. The feasibility of state support for beginning farmers on the basis of a grant for the creation of a family livestock farm has been proved.

Keywords*: farms, small farms, large and medium sized, niche crops, government support.*

Introduction

The formation of a multifaceted economy has led to the mass creation of small forms of farming in agriculture and the development of an organizational form such as farming, whose role is significant in ensuring employment in the countryside, raising the incomes of the rural population and shaping the commodity supply of certain types of agricultural products. Farms have proved their high viability due to their inherent economic isolation and freedom, family basis, high adaptability to external conditions of operation, which creates the motivation for high-performance work. However, the low level of development of their material and technical base, the predominance of extensive agricultural production technologies and the high labor costs significantly reduce their competitiveness in highly competitive agricultural markets, limit the opportunities for development and increase of human capital in rural areas. In such circumstances, there is an objective need to create a favorable environment for the functioning of farms, focused on improving their competitiveness in the context of European integration and ensuring the sustainable development of rural areas within the framework of forming a balanced agrarian structure of the economy.

Farmers in a short period of time have passed the stage of their emergence, a difficult period of formation and strengthening of positions in the production of certain types of agricultural products, and now have entered the stage of development in the new conditions of European integration, globalization climate change, decentralization of power and unification of rural communities. In addition, the issues of scientific substantiation of effective organizational and economic levers and practical approaches to the creation of favorable organizational and economic conditions for the development of farms, which provide effective instruments of state support, regulation of uncertainty of the status of farms, establishment of full-fledged advisory, are still poorly understood. and integration ties in agricultural development, and other stimulating factors idvyschennya efficiency.

Literature

In the Law of Ukraine "On Farming" this legal act states: "Farming is a form of entrepreneurial activity of citizens who have expressed a desire to produce commodity agricultural products, to carry out its processing and sale in order to profit on the land plots given to them in the property and / or use, including for rent, for farming, commodity farming, personal farming in accordance with the law "[1].

The study of the features of small forms of farming in agriculture allowed us to establish their dual character, which is already embedded in the phrase - farming, since it focuses primarily on the market nature of modern farming in developed countries, it is necessary to remember the historical specificity of the domestic peasantry. We believe that the most important features of the systematization of the features of the peasant farms were offered by O.V. Chayanov, who named two main criteria for this form of farming: its marketability and the absence of hired (alienated) labor. At the same time, he characterized the peasant family farms as "farms built in the vast majority of the work done by them on the work of household members, without the involvement of hired labor…; in its purest form - farms do not attract hired labor at all and are not hired themselves "[2].

We share the position of domestic researcher N.M. Onyshchenko regarding the fact that farming is a form of commodity production, and its activity should be based not only on the personal labor participation of the farmer, members of his household and employees, but also organized entirely on wage labor [3]. At the same time, on the approach of L. Hnatyshyn, on the contrary, it is emphasized that a farm is an agricultural enterprise that is established on an individual, family and collective basis with the right of a legal entity and carries on its activity without the use of hired labor [4].

Well-known scientist V. P. Horovyi emphasizes that it is an entity created by a group of persons who have experience in agriculture, qualification of specialists of agricultural profile or have undergone special training, function on the principle of independence, jointly carried out with the direct participation of each member of the economy production, processing, sale of agricultural products that have jointly owned or leased land area of more than one hectare, equipment (when performing

activities in plant), working and productive livestock or poultry (in the production of livestock products) and other property [5]. Contrary to the above, M. H. Shulskyi believes that it is a subject in the field of agricultural production and food, which should embody mainly all moral, spiritual, socio-cultural traditions [6].

We believe that the comparison of the domestic peasant economy of the past and the beginning of this century with the currently operating economic entities is not correct. First of all, the higher potential of the material and technical base, innovative conditions of production, legal status, motivation to work give grounds to believe that the concept of "farmer" is more consistent with modern conditions, but we do not deny the deep traits of the farmer. From our point of view, the term "peasant" has a more pronounced social meaning than economic.

The author's approach to the definition of the concept of farming boils down to the fact that it is an agricultural producer based on private ownership of means of production and land and in his activity uses the work of members of the household and part-time workers, and the purpose of his activity is the production and sale of agricultural products and food. Therefore, the peculiarity of the functioning of the peasant farms is that they are both a production and a consumer unit, and therefore they combine two goals - production (maximizing income) and consumer (increasing the welfare of all household members).

The efficiency of the farm is provided by its peculiar features and advantages: lack of hired labor; high level of utilization of work of members of the agricultural household; lack of external control over the production process; the particular motivation of the activity, which is not in the generation of income, but in the consumption and reproduction of the resource potential. Strengthening the position of farms in the current conditions is possible with the acquisition of new knowledge, increasing the level of education of peasants and the widespread use of modern technology and innovative technologies, as well as deepening cooperative and integration ties, which requires comprehensive research on their functioning and development of reasonable proposals effective levers of organizational and economic support for their activities.

Research Methodology

The purpose of the study is to conduct a comprehensive analysis of the results of production activities and to develop sound proposals for the formation of organizational and economic conditions for the development of farms, as well as to determine the levers of their adaptation, taking into account changes in their environment.

The study was based on the use of the following methods: statistical analysis to determine the dynamics, structure and performance of farms; grouping - to determine the impact of various factors on the level of production efficiency of crop and livestock products by groups - small, medium and large farms; comparative - to compare economic processes in agricultural production at different time periods in order to identiPF cause and effect. The algorithm of intragroup averages, that is, the clustering method, which involves the ordering of multiple objects into relatively homogeneous groups, is selected for classification.

The output is given as a matrix having n columns and t rows (Table 9), where Xi is a vector column (i = 1,2, ..., n), Yj is a vector row (j = 1, 2, m). In this case, columns are the name of the metrics, and the rows are their values.

The algorithm, based on the calculation of K intragroup averages, involves 4 steps.

Step 1. Select the initial centers of clusters Z_1 (1), Z_2 (1),…, Z_k (1). This choice is made arbitrarily, usually the first K results of a given set of images are used as the center of the source centers.

Step 2. At the k-th step of the iteration, the set of images {x} is distributed over K clusters by the following rule: X belongs to S_j (k) if $\| x - z_j (k) \| < \| x - z_i (k) \|$ for all i = 1, 2, ..., K, $i \neq j$, where S_j *(k)*

is the set of images included in the cluster centered zj (k). In the case of equality, the decision is made arbitrarily.

Step 3. According to preliminary results (step 2), the new centers of the clusters z_j (k + 1), j = 1, 2, ..., K are determined, on the assumption that the sum of squares of distances between all images belonging to the set S_j(k), and the new cluster center should be minimal. That is, new centers of clusters z_j (k + 1) are chosen in such a way as to minimize the quality index:

$$I_j = \sum_{x \in S_j^{(k)}} \left\| x - x_j(k+1) \right\|^2, \text{ j =1,2,..., K.} \quad (1)$$

$$\text{Center } z_j(k+1) = \frac{1}{N_j} \sum_{x \in S_j(k)} x, \text{ j =1,2,..., K,} \quad (2)$$

where N_j – is the number of sample images included in the set Sj (k).

It is obvious that the name of the algorithm "K intragroup averages" is determined by the method used to consistently correct the definition of cluster centers.

Step 4. The equality $z_j(k+1) = z_j(k)$ at j = 1, 2, K is a condition of convergence of the algorithm, and upon its achievement the algorithm ends. Otherwise, the algorithm is repeated from step 2.

The accuracy of algorithms based on the calculation of K intragroup averages depends on the number of cluster centers selected, on the choice of source cluster centers, and, accordingly, on the features of the data.

Research Results

Farming as a form of professional activity determines the degree of responsibility of the employee for the effective performance of work responsibilities, his lifestyle influences the socialization of the individual, its inclusion in the system of public relations. On the basis of socio-economic relations, a system of moral and cultural values of the farmer's professional activity is formed, which is influenced by the national peculiarities of agricultural production, as well as the experience and traditions gained. It is established that due to imperfect current legislation, insufficient attention from the state to the needs of agriculture and their poor social protection in Ukraine in recent years there is a tendency to decrease the number of farms (Fig. 1). However, this category of agricultural producers holds the largest share among the corporate entities in the agricultural sector. Therefore, in 2017 compared to 2016, there is a slight increase in the number of farms. This circumstance is primarily due to the formation of favorable conditions for the production activities of newly established farms, mainly family type.

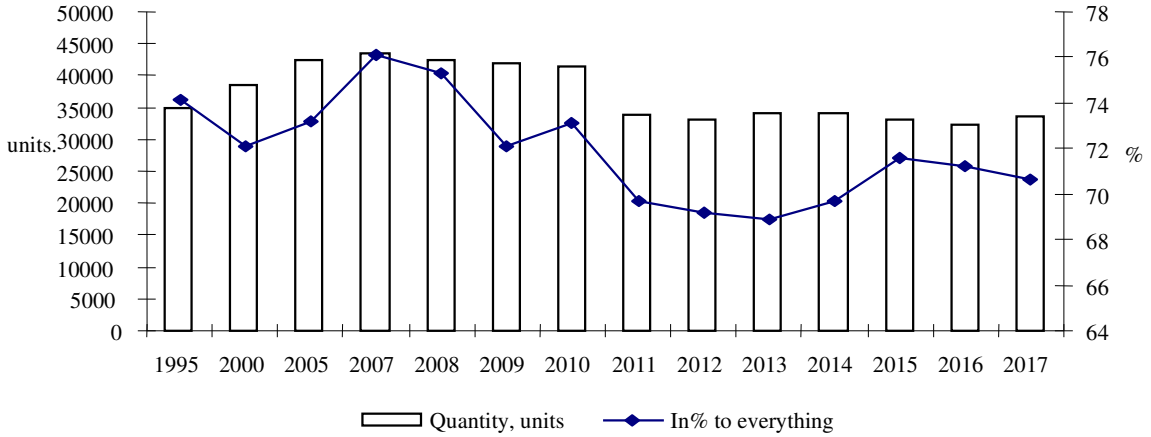

Figure 1: Dynamics of the number of farms and their share in the total structure of agricultural producers

Source: Compiled according to the State Statistics Service of Ukraine.

It is established that the dynamics clearly show two stages of change in the number of farms: the first (1995-2007) - the growth of the agricultural sector of the agrarian economy, which is caused primarily by significant financial investments that came as state support; the second - (2008 to date) - a decrease in the number of farms due to a number of objective and subjective reasons.

It has been established that the overall downward trend in the number of farms is due to a number of circumstances. First, there is a lack of effective financial and credit mechanisms and risk insurance mechanisms. Difficult access to financial resources, unreliable system of crediting of farms significantly reduce the entrepreneurial activity of the rural population, do not contribute to the formation and development of agricultural business entities of the above-mentioned organizational and legal form of management [7].

When developing agro-finance programs for small and medium-sized farms, financial institutions are confronted with the situation that some farmers are in no hurry to take advantage of bank loan offers. Moreover, the rather high market rates of financing at that time can not be considered as the primary cause of this situation. Too often, agricultural producers have been reluctant to risk borrowing, arguing their decision to have a volatile economic situation in the country, so they have the intention of saving on fertilizers, plant protection products, repair or upgrading of machinery. That is, they have not only invested in expanding their own production, but also in improving the quality and increasing the yields [8].

Among the reasons for the slow development of lending to small agricultural producers in Ukraine are, first of all, the difficulty in lending quickly due to the bank's territorial remoteness from farms, the manifestation of bureaucracy in the work of financial institutions that require too much documentation to satisPF the intention of the farmer to take credit. It should be noted that in agribusiness, long processes of making credit decisions are unacceptable.

Second, the ineffectiveness of existing state support for farms. For farms, the tax pressure at the actual low yield is too high. Moreover, tax legislation as a whole is still controversial and complicated. As a result, not all registered enterprises of small agrarian business fully and legally conduct business activities [9].

Third, difficulties in implementing innovative farm projects and programs. Increased risk of innovative projects, underdevelopment of the insurance system and guarantees in the implementation of such projects in the context of unpredictable fluctuations in agricultural prices and input material resources hamper the development of farms, in particular small ones. The lack of financial resources

to invest in the dire need of equipment upgrades and the use of modern technologies hinder their technical re-equipment.

Fourth, the underdeveloped system of information support for farms, in particular small ones. There is no complete and objective statistical information on the activities of these formations. The statistics of the State Statistical Service of Ukraine are formed on the basis of sample surveys using constantly changing methods of calculation, as well as the lack of necessary statistical observations on farms, including small ones, do not allow to have a clear idea about the real state of functioning of farms in Ukraine.

Fifth, there is a lack of professional training for farm owners to compete in competitive production. Due to the lack of a specialized system of training and qualification of farmers, their agricultural business is unstable and vulnerable in terms of competitiveness.

Sixth, a high level of market monopolization. As a result of monopolization by highly concentrated agricultural enterprises, some segments of the agrarian market, farmers do not have sufficient opportunities to sell their products.

When researching the activities of farms, it is important to analyze the characteristics of the management of medium, large and small agricultural enterprises. According to the methodology of the State Statistics Service of Ukraine, large and medium-sized enterprises are enterprises whose size is equal to or exceeds the thresholds of at least one of the following statistical criteria: the area of agricultural land is 200 hectares; 50 cattle livestock; livestock of pigs - 50 heads; livestock of sheep or goats - 50 heads; 500 birds livestock; number of employees in agriculture - 20 people; the amount of income (profit) from the sale of products, works and services of agriculture - 150 thousand UAH. An enterprise smaller than these thresholds is a small agricultural enterprise [10].

During the study period, small entities in the structure of farms were dominated by small entities of the aforementioned category of agricultural producers of the corporate sector of the agrarian economy (Fig. 2).

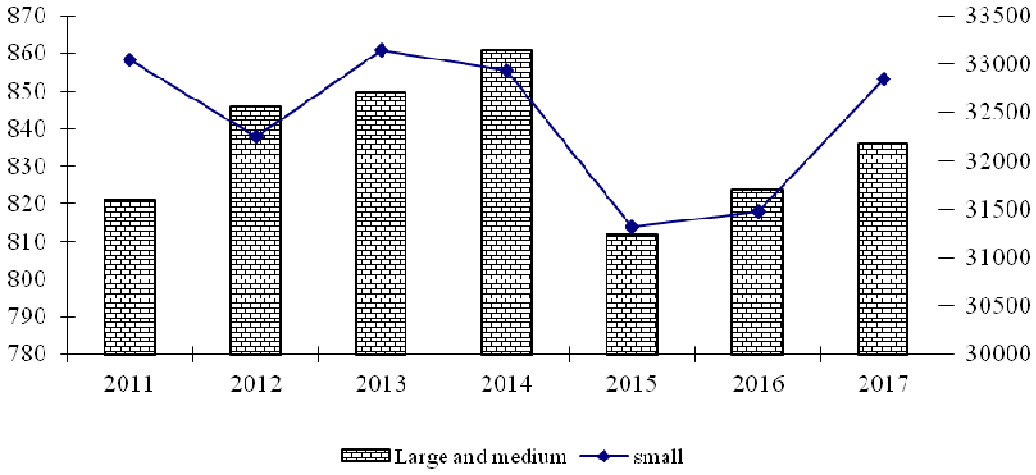

Fig. 2: Dynamics of the number of medium and large and small farms, units.
Source: Compiled according to the State Statistics Service of Ukraine.

It should be noted that during 2008–2017, the number of small farms decreased by 21.1%. The main reasons for this situation according to the survey results (123 polled in Kyiv, Cherkasy and Khmelnitsky regions in 2017) of the heads of the aforementioned category of farms are: elderly manager and lack of heir (41%), high probability of raider capture (23%), loss of production activity over a long period of time (32%), 4% - other factors.

It should be borne in mind that the land use area of the farm depends on the influence of certain factors: the subject's specialization, the quality of the farmland, the availability of labor and material resources, the location of the farm, the possibility of obtaining land for private ownership and rent.

According to the Land Code of Ukraine in 1990, a farmer could receive up to 50 hectares from the state for ownership and lifetime ownership. In fact, during 1990–1992, 0.54 million hectares of land were transferred to farmers. Over the past five years, land use has increased by 12.1% and amounted to 4.4 million hectares in 2017. The main land users are small farms, which account for 62.1% of agricultural land, which belongs to this category of agricultural producers as a whole.

For the production activity they use leased land. In the structure of land use, the share of leased agricultural land in 2017 was: large and medium-sized farms - 98%, small - 74.4%. There are about 4308.6 thousand hectares of farms in the country, or 12% of the total area of agricultural land, while agricultural enterprises use 44.6% of the total agricultural land fund, and personal peasant farms - 43.5%. During 2012–2017, the concentration of agricultural land and arable land in particular increased. Thus, in 2016 versus 2012, the area of agricultural land per farm increased by 27.6% (Fig. 3).

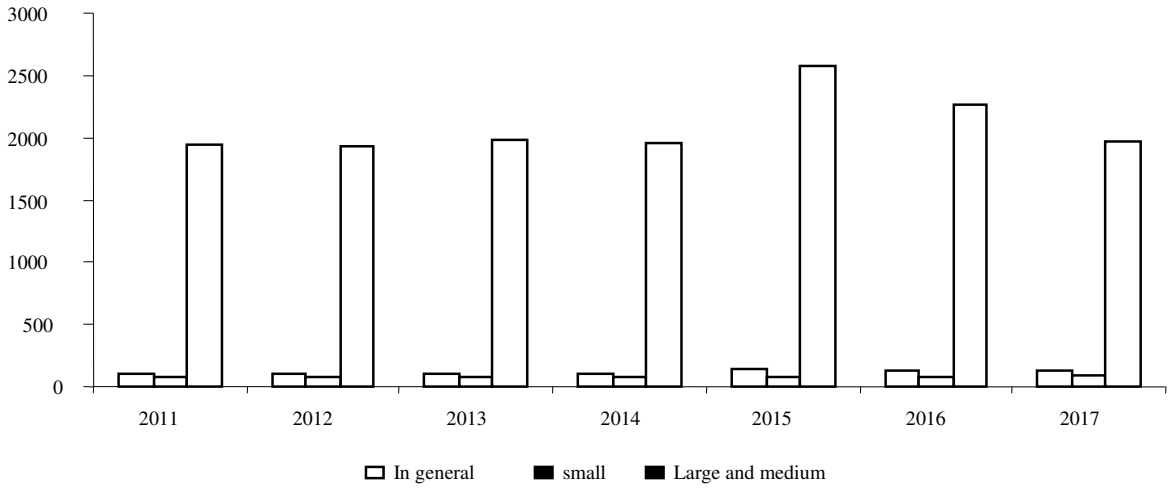

Fig. 3: Dynamics of land use depending on the size of farms per farm, ha
Source: Compiled by the State Statistics Service of Ukraine.

It should be noted that in the group of medium-sized and large farms, land use per capita is gradually decreasing (by 23.6%). This fact is due to the fact that now owners of land units in large numbers refuse to conclude formal lease agreements with agricultural producers, in order to save profits from farming due to non-payment of taxes. According to experts, as a result, the state budget is underpaid about 16 billion UAH [12].

It should be noted that in 2017, 75% of farms had an area of agricultural land up to 100 hectares, which is evidence of the low level of concentration of agricultural land and forms the prerequisites for the development of family-owned farms focused on local markets for agricultural products and food. Hence the need to develop a draft law on agrarian local markets, the adoption of which will

allow to sell in the local markets products of their own production in accordance with European requirements.

We believe that this size of land use by farms creates an environment for the emergence of trade and intermediary structures that could provide for the formation of large commodity lots of agricultural products and ensure their further sale, including in foreign markets. It was found that in 2017, the largest share - 33.3% (11 207 units) in the total number of farms was **occupied** by the group with land area from 20.1 ha to 50 ha. It can be assumed that this group is potentially formed by entrepreneurs, who are mostly family oriented, or lack the potential for expansion.

Attention is drawn to the fact that during the study period there is a decrease in the number of non-agricultural holdings. In 2017, there were 1,650 units, with a share in the structure of 4.9%, that is, for the period of analysis, a decrease of 43.2% compared to 2005 and 61.7% compared to 2010.

A detailed examination of the structure of farms by area of land use during the analyzed period gave reason to conclude that there were no significant changes, only slight deviations were noted, the value of which indicates that the current trends are maintained. In this regard, there is a need for a more in-depth study of small farms by the level of concentration of agricultural land (Table 1). The study found that, depending on the area of land use, the largest share is occupied by farms that use more than 100 hectares of agricultural land.

Table 1: Grouping of smallholder farms by agricultural concentration, 2017

№	Groups for area agricultural whatever, ha	Fraction PF, %	Specific weight in land use,%	Profitability, plant growing, %	Profitability, animal husbandry, %	Fraction products animal husbandry, %	Product rural farms	
							% to everything	rofitability,%
1	by 5	12,1	0,5	14,6	-0,7	67,6	1,3	3,8
2	5,1-10	9,1	0,9	26,9	15,1	12,4	0,5	25,3
3	10,1-25	17,6	3,8	38,7	6,5	18,8	2,6	31,3
4	25,1-50	30,5	14,7	33,8	11,2	3,2	7,1	32,9
5	50,1-100	12,3	10,5	41,2	9,6	8,0	8,4	38,0
6	100,1-500	15,0	40,7	47,7	12,7	1,8	44,6	46,9
7	More 500	3,5	28,9	48,9	27,0	2,7	35,6	48,3
Total		100,0	100,0	46,0	11,0	4,1	100,0	44,2

Source: calculated according to the State Statistics Service of Ukraine.

The results of the grouping show that with the increase in the level of concentration of land resources in farms the level of profitability of agricultural production increases. The area of agricultural land used by small farms is a determining factor that influences the choice of the direction of production activity. Thus, business entities with an area of land use up to 5 hectares specialize mainly in the production of livestock products. As farmland increases in smallholder land use, they reorient themselves to crop production, which is adequately reflected in an increase in the share of agricultural production in the entity's income structure.

Obviously, small farms have a high enough potential for future development. Thus, choosing a specialization of farms and defining a set of crops for cultivation, owners of small agricultural businesses should focus on those products that have a steadily increasing **demand** in both domestic and foreign markets, as well as those that can provide the greatest return - from 30 thousand UAH to 100 thousand UAH per 1 ha. So, the perspective direction for the development of small agricultural enterprises is the production of organic products, as well as "niche" - nuts, beans, spices, sorghum,

chickpeas, peas, lentils, mustard, flax, hemp, nuts, berries - raspberries, strawberries, blackberries, strawberries , blueberries, cranberries and more.

Among medium-sized and large farms, the largest share is occupied by economic entities that own 1001-2000 ha and occupy 45.8% of the land use structure. Thus, medium and large farms of groups 1 and 7 have almost no production of livestock products, with cultivation of up to 1000 hectares and more than 10,000 hectares. This situation can be explained by the following factors - both the economic result of business activity, the risks and complexity of animal husbandry processes, and the low efficiency of supporting livestock industries, in particular beef and dairy, pig, sheep and goat farming.

A comparative analysis of the efficiency of agricultural use of the two types of farms shows that the level of profitability of crop production in small businesses is lower compared to medium and large ones. In this case, the factor of scale of production, as well as the productivity of technical resources, higher savings in the procurement of material resources and so on.

Therefore, the contribution of the farming sector to the development of animal husbandry is not significant, which can be explained by the high level of complexity of production and capital intensity, the low profitability of the industry and the increased risk of epidemics, diseases and biosecurity, the implementation of additional costs for environmental protection.

The predominance of the share of crop production in farms has a negative impact on agricultural production in years with adverse climatic conditions, which also exacerbates the impact of this type of risk on the performance. In view of the above, there is a need to diversiPF the risks of farms on the basis of the development of a scientifically sound production program of the combination of plant and animal husbandry.

Effective and sustainable development of farms involves the strengthening of their skilled staff with sufficient experience, knowledge and skills in conducting agricultural production and agricultural business. In today's economic environment, the pre-emptive right to set up and operate a farm should belong to enterprising and enterprising citizens with experience in agriculture, capable of conducting effective business activities.

Farms in the economic crisis are becoming an important factor in the stability of the functioning of the country's agriculture, provide the village with additional jobs, improve labor resources, promote the involvement of retirees and adolescents in the production process, reduce rural unemployment, promote the recovery of peasants the younger generation. Being engaged in the production of a wider range of crops and animals than large forms of farming, farms help to preserve biodiversity of agrocenoses, ensure their sustainability, thereby improving the environmental situation in the countryside.

According to the results of a study by the author of farms in the Kiev region, the social portrait of a modern farmer looks like this. For the most part (90%) farmers are men. The average age is 48 years. 66% of farmers have higher education, a small part (10%) - secondary, 24% - secondary specialized. In terms of qualifications, 42% are engineers, 24% are agronomists, 9% are veterinarians and economists, 6% are teachers, 3% are lawyers and zootechnics. In most farmers (45%) families consist of 4 people, in 23% of farmers - 3, 18% - 2, 12% - 5; 2% of farmers have no family. Farming experience of up to 5 years is held by 24% of farmers, 6-10 years - 30%, 11-15 years - 34%, over 15 years - 12%.

At the same time, the unpretentiousness of work in agriculture causes a negative tendency to decrease the number of workers in farms since 2005. It should be noted that the number of members of farms during the study period decreased by almost 40%. This tendency in the development of farms testifies to the intensification of the processes of intensification of the production process in the production of agricultural products, which ultimately leads to a reduction in the complexity.

It is necessary to emphasize such a feature as an increase in the number of permanent employees - producers of the above-mentioned category of the corporate sector of the agrarian economy. This circumstance is evidence of a positive trend in the development of farms, ie the process of legalization of their activities.

Regarding the peculiarities of employment in the environment of small farms, where in almost 70% of them the number of employees is up to 1 person, who are members of the aforementioned agricultural business entity. This leads to the assumption that this group of agricultural producers can be considered as family farms.

According to the Law of Ukraine "On Stimulation of Creation and Activity of Family Farms" it is possible to create a family farm without the status of a legal entity on the basis of the agreement / declaration on creation of such farm. The contract is concluded by the person-owner together with family members at the location of the property and land plots of the farm. If a person intends to run the business on his own, then he makes a declaration about it (a typical form of the Ministry of Agrarian Policy). After writing the contract or declaration, the head of the family farm must register as a sole proprietor. Family farms can create families that cultivate up to 20 hectares of land without hiring workers. At the same time they are engaged only in growing agricultural products, fattening animals, preparing such goods for sale.

The law aims to obtain official status for rural people working on their land, which will allow legally to sell grown produce and obtain social protection and the right to a pension. The implementation of the provisions of the above-mentioned legal act will create the conditions for starting the development of family farms and the shading of entrepreneurial activity in the agricultural sector, which will positively affect the increase in local budget revenues from tax payments and create jobs in the country.

It should be noted that in medium and large farms more than 85% of employees are involved in the production of crop products except for 5-6 groups of the above-mentioned organizational and legal form of management. It is established that with increasing number of employees the level of land security in the farm decreases. This fact shows that these farms are highly concentrated and use innovative technologies that help reduce the complexity of production processes. Therefore, farms are in dire need of skilled professionals who have a specialist knowledge of the basics of agricultural technology, crop production, accounting, taxation, capable of performing commercial and management functions. Usually, the number of members of the farm is limited by the family, the responsibilities between the members of the farm are clearly distributed, and hired workers are engaged in sowing and harvesting.

Effective agricultural activity is not possible without sufficient technical means to complete the full cycle of production, storage and processing of products. In the EU countries, 95% of farms do not have permanent employees. All farm work is done mainly by farmers and their families. Outsiders are only hired to perform seasonal work for relatively shorter periods of time [13].

Summarizing the above, we can conclude that farms are now engaged in entrepreneurial activity in uncertain conditions, thus increasing the manifestation of various risks of economic activity. Therefore, the priority is to adapt them to new economic conditions and to ensure sustainable development, which can help to improve their economic efficiency.

The main focus on farms is the production of crop products. The main reason for the minimization of the number of agricultural enterprises of the above-mentioned organizational and legal form of livestock specialization is due to the system of pricing for agricultural products, which is characterized by an imbalance of prices for crop and livestock products, as well as due to the high complexity of production; the lack or overestimation of the necessary facilities and equipment for keeping animals; low profitability of the industry.

Scientists' calculations confirm that the enterprise of the corporate sector of agrarian economy, which specializes in the production of crop production, requires 3.0–3.5 times less fixed assets than the agricultural enterprise that produces livestock products [14].

The results of the analysis show that there are positive trends in the production of both crop and livestock products by farms. Thus, in 2017 compared to 2000, the volume of crop production increased by 7 times, animal husbandry - almost 6 times, which led to slight changes in the structure of agricultural production depending on the organizational and legal forms of agricultural producers.

It should be noted that in 95% of small farms in the structure of commodity production, the share of crop production accounts for more than 75%, which provides a high level of profitability. In the structure of commodity production of small farms, cereals and sunflowers, which are highly profitable and export-oriented crops, dominate. Such situation in the conditions of weakening of the national currency positively affected the level of profitability of crop production, which fluctuated within 24.5-52.8%. As regards the profitability of livestock production, the level of profitability in highly specialized livestock farms reaches 33.8%. With the increase in the share in the structure of commodity products of crop production the economic efficiency of production activity decreases and the loss of livestock production increases.

Unlike small farms, in 2017, 14.7% of medium and large farms did not produce crop products, focusing solely on animal husbandry. Thus, almost 85% of medium and large farms specialize only in crop production, focusing mainly on growing crops and sunflower. This ensures a high return on production costs, as evidenced by the level of profitability of production.

According to the results of the grouping, we have selected farms focused mainly on the production of crop products, namely with an area of land use of an average of 92 hectares and larger with an average value of agricultural land - 358 and 455 hectares. In the group of medium and large farms are allocated those not engaged in the production of crop production, the share of which reaches 14.7%, the average size of land use is 25 hectares.

The development of farms requires the use of a systematic approach to justiPF the prospects for their operation. In this regard, there is an objective need to investigate the areas of PF development that will improve their functioning and maximize the economic interests of all subjects of market relations. We believe that government support for PF is also necessary in view of the fact that agricultural products and food are social and strategic commodities [15]. The state should help to provide the population with food at reasonable prices to ensure social stability and strengthen our position in the world. In addition, in today's environment, small and medium-sized agribusiness is not only the production of agricultural raw materials and food, but also the guarantor of sustainable socio-economic development of rural areas.

State support must first and foremost ensure the profitability of farms, which will contribute to their economic sustainability. In a system of market relations, the PF may be considered sustainable if its economic activity ensures "... the fulfillment of all its obligations to employees, other economic entities, the state due to a sufficient level of income and compliance with income and expenses" [16]. Profitability of farms depends to a large extent on prices for agricultural products.

In order to substantiate the organizational and economic levers of improving the efficiency of farms, we have identified 5 clusters of small farms, which are characterized by specific features of the organization of production activities (table 2).

Table 2: Grouping (clustering) of small farms in Ukraine, 2017

Indicator	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
	6201	1898	2960	1575	15
Area, ha	127	276	75	181	3197
Number of employees	3	5	3	4	132
FG members	1	1	1	1	1
Employees	1,6	3,5	1,7	3,0	131,0
Share of employees	62,0	76,5	62,6	73,9	99,9
Revenue per 1 ha of agricultural land everything, UAH	10798	12803	12280	13294	6621
Profit per 1 ha of farmland everything, UAH	3269	3929	2776	3871	1405
Costs per hectare, UAH	8705,0	9635,0	11102,7	10716,7	12849,5
Profitability,%	43,4	44,3	29,2	41,1	26,9
Revenue share,%					
crop production	90,3	97,1	78,6	95,3	60,4
Crops	41,0	46,7	18,8	42,1	32,7
Sunflower	45,7	34,3	0,7	13,0	21,7
Potato	0,0	0,3	1,9	1,0	0,0
Vegetables	2,5	1,8	0,1	1,0	0,0
sugar beets	0,0	0,3	1,0	1,0	0,1
fruit, berry crops	0,0	0,1	7,5	0,2	0,1
Grape	0,0	0,0	0,7	0,1	0,0
other crop products,	1,0	13,6	48,0	37,0	5,8
not mentioned above	7,3	1,1	21,0	3,4	38,0
Livestock production is everything	1,1	0,9	13,5	1,5	16,4
livestock and poultry (live weight) - everything	0,0	0,1	4,4	0,6	11,7
Cattle	0,0	0,3	9,0	0,9	4,0
Pigs	0,0	0,0	0,1	0,0	0,0
sheep, goats	1,0	0,5	0,0	0,0	0,0
Poultry	0,1	0,0	0,0	0,0	0,7
other livestock	0,0	0,2	7,4	1,6	21,1
Milk	6,2	0,1	0,1	0,3	0,6
other livestock products,	2,4	1,7	0,4	1,2	1,6

Source: calculated by the author.

The given data of table 2 indicates that the fifth cluster has uncharacteristic characteristics that do not correspond to the characteristics of small agribusiness entities that are primarily family-owned. At the same time, in the farms of the second and third clusters, incomes from sales of crop production by 37% or more are generated at the expense of other crop production, that is, through the cultivation of so-called "niche" crops.

Despite the dominance in the overall structure of incomes of small farms of crop production, in the third cluster a significant share is occupied by livestock products, mainly cattle breeding and pig breeding. It should be noted that in the first cluster group up to 10% occupies the cultivation of so-called small farm animals and sheep. We believe that this circumstance requires the development of an effective program of support for the aforementioned groups of small farms.

We consider it necessary to develop a support program for small farms, in particular livestock products, whose share in the structure of agricultural production varies from 1.1 to 37%. Provide a mechanism for obtaining state support in the form of a grant for the development of a family livestock farm, based on the developed criteria for the selection of participants and the procedure for forming the composition of the selection boards. To identiPF the source of financial support for the proposed measures, the implementation of which will facilitate the process of their creation.

In order to encourage small-scale farms that produce “niche” crops, it is necessary to develop Regional Support Programs, in which it is advisable to provide for a material cost compensation of 50% of the normative costs of its production, and the mechanism of financing the compensation payments will be implemented on the principle of co-financing by the United territorial communities and state bodies in the ratio of 50:50. One of the areas of social partnership implementation may be the involvement of small territorial communities in the territorial communities in the supply of products under the School Food program.

Conclusions

The results of the study of organizational and economic conditions of development of farms in Ukraine allowed to systematize the restraining factors of development of farms: low level of economic efficiency of production activity; the presence of psychological barriers, lack of proper social status are often the cause of low entrepreneurial activity; because of small investments it is not possible to significantly improve economic results; the underdevelopment of cooperatives impedes the rational utilization of the potential of smallholder farms and rural areas; farmers' lack of educational attainment hinders economic transformation in the agricultural sector; low or lack of state support, imperfect government regulation impede the dynamic development of farms. A significant brake factor for the modernization of agriculture is the incompleteness of land reform, which reflects only the initial stage of the process of land capital formation and effective functioning.

It has been proved that dairy and meat cattle breeding, sheep breeding, open soil vegetable growing should be the priority directions of production activity of farms, provided that the state support is increased. In order to increase the effectiveness of state support for the purchase of agricultural machinery, it is advisable in the regulatory acts regulating its provision, to abolish the norm of location of the manufacturer of technical equipment, but at the same time to require economic justification from the economy regarding the financial and economic indicators of its use.

Farmers who have transparency and objectivity in declaring their income and expenses should be eligible for state support. In order to increase the effectiveness of the state farm support program, it is advisable to provide for the possibility of providing financial support for newly established farms and the creation of a Farm Guarantee Fund as a whole. There is a need to normalize the transfer of ownership of farms to land plots granted to the founders of such farms for permanent use, permanent ownership, lifelong inheritance, ownership for the establishment and maintenance of farms, as well as regulation of issues regarding manifestations of raiding.

One of the ways of ensuring the sustainability of small farms is to define the diversification of production activities based on the introduction of non-agricultural activities. In order to stimulate the development of non-agricultural activities, it is advisable to improve the taxation system for farms. The existing farm tax system (tax group 4) minimizes the tax burden. However, the introduction of non-agricultural activities by farms increases the risk of losing the status of payer of group 4, if the share of non-agricultural income exceeds 25%. We consider it advisable to attribute the income from the non-agricultural activity of the farm to the aggregate income of the household and to tax using a progressive scale.

References

1. On Farming: Law of Ukraine of 19.06.2003 No. 973-IV. Verkhovna Rada of Ukraine. available at: http://zakon5.rada.gov.ua/laws/ show / 973-15.
2. Chayanov, A.V. (1992) "The main ideas and forms of organization of agricultural cooperation", Selected Works, 420 p.
3. Onyshchenko, N. M. (2004)" Trends and prospects of development of Ukrainian legislation on farms", No 1-2, pp. 139-144.
4. Hnatyshyn, L.B (2012) " Farms in the organizational system of agricultural production", *Agrarian economy,* Vol. 5, No 1-2. pp. 26-31.
5. Horovyi, V.P. (2007) " Farming in Ukraine: theory, methodology, practice: monograph", National Institute of Agricultural Economics, 540 p.
6. Shulskyi, M.H. (2004) "Farming: problems of formation and development", Lviv National Academy of Veterinary Medicine, 390 p.
7. Radchenko, O. D. (2018) " Support of agrarian sector through preferential lending mechanism", No 1, pp. 161–177.
8. Shchuryk, M.V. (2017) "Lending to the needs of the agricultural sector in the current environment: the disadvantages and ways to overcome them", *Economic Forum.* No. 4, pp. 176–183.
9. Byba, V.A. (2019) "Organizational and economic principles of non-agricultural activity of farms in Ukraine", *Sustainable development of agriculture: global changes and national features of achievement: materials of International sciences,* Pract. Conf. May 28-29, Bila Tserkva, BNAU, pp. 32-33.
10. On approval of the Instruction on filling in the form of state statistical observation N50-SG "Main economic indicators of agricultural enterprises": Order of the State Statistics Committee of Ukraine No. 403. 06.11.2011 available at: https://zakon.rada.gov.ua/laws / show / z1303-07
11. Byba, V.A., Tkachenko, K.V., Svynous, N.I. (2018), " Economic aspects of land use by farms" , *AIC Economics and Management*, Bila Tserkva, No 1, pp.113–123.
12. Hryshchenko, O.Iu., Tulush, L.D. (2018) "Transformation of high-performing households into business entities: fiscal aspects". *AIC Economics and Management*, No.1, 40 p.
13. Nikitina, O.O. (2013) "Criteria for classifying farms as personal subsidiary and farm based on foreign experience", *Regional economics: theory and practice. Scientific and practical and analytical journal,,* No (280), pp. 49 -52.
14. Bielko, I.A. (2018) " Problems of implementation of strategic management of development of agrarian enterprises of Khmelnitsky region", *AIC Economics and Management*, No. 4,106 p.
15. Foreign experience of FG development (for example, USA, Canada, Germany, Poland). Electronic Library of the State Technical University P. O. Sukhoi. available at: https://docviewer.yandex.ru/view/77716604/?*
16. Byba, V.A., Korinets, R.Ia. (2018) "Economic aspects of state support for Ukrainian farms", *Ahrosvit*, No 11. pp. 27–32.

Role of the Management in the World Driven by the Industry 4.0

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Abstract

The Artificial Intelligence and connectivity between machines are the essences of the Industry 4.0 revolution. These rapid changes create challenges for the management and are the main reason for the question about its further role. There are differences between natural and artificial intelligence. Although artificial intelligence supports the decision making by a human now in very narrow fields, there are questions related to the replacement of people for example in the oncology hospitals network and change management in the inter-organizational networks. These doubts revolve around decisions making process, Artificial Intelligence development and management itself, therefore this paper present a theoretical discussion and research assumptions about the role of management in the world driven by the Industry 4.0 revolution.

Keywords: Decision-making, Industry 4.0, Inter-organizational Networks

Introduction

Industry 4.0 Revolution (hereinafter IR 4.0 or Industry 4.0) is a concept relating to the use of automation in industries, data processing and data exchange (Niemczyk and Trzaska, 2020). This concept also encompasses Artificial Intelligence (AI) and the digitization of the production process, introducing new technologies. These rapid changes create challenges for the management and are the main reason for the question about its further role. Industry 4.0 is quite well defined idea of the ongoing technological changes in many entities both private and public sector (Michalski et al., 2018; Rosienkiewicz et al., 2018)

Therefore, this paper attempts to explore and synthesize issues related to the creating an inter-organizational networks to achieve growth and development of organisations (Stańczyk-Hugiet et al., 2017). These concerns are based on the making decision process and the role of the management in the world driven by the IR 4.0. The Industry 4.0 is intertwined with the AI and its impact on the management (Lichtarski et al., 2014), what provokes deep philosophical reflection about the technological progress, opportunities and risks related to the technical philosophy (Sulich and Zema, 2017).

In this paper some research assumptions related to the Industry 4.0 concept are presented. These are difference between artificial and natural intelligence, similarity of collective intelligence and inter-organizational network performance. The reason of undertaking such problem is fact, that until now, organizations that have invested in acquiring knowledge or information and human resources have usually been successful in management (Hernes and Nguyen, 2007; Stańczyk-Hugiet et al., 2017). Modern organizations (and their members) operate in the "age of the big data", and overabundance of information, therefore, to be successful they need to perform better decision taking using IR 4.0 solutions (Lu, 2017). Currently, however, organizations that still invest in their assets and employees, these organization still are not successful and they have to compete with artificial intelligence (Hernes and Nguyen, 2007; Kuik et al., 2019; Lichtarski et al., 2014). The other companies try to gain advantage

creating an inter-organizational networks (Lichtarski et al., 2014) and use the synergy effect or to use a collective intelligence (Krupski et al., 2017) collective learning or knowledge management (Vaidya et al., 2018).

The presented in this paper research assumptions and definitions are related to the ongoing research which is dedicated to the relationships in the inter-organizational network (Zema and Sulich, 2019) created by the entities of Environmental Goods and Services Sector (EGSS) (Zema and Sulich, 2019). The connection to the Industry 4.0 in such specific sector is more expected than in others because of lower attractiveness of jobs dedicated to waste treatment and recycling. Also in this article the other examples of the researches on the inter-organizational networks are presented to draw our own study dedicated to the oncological hospitals inter-organizational network in Poland (Sus et al., 2019; Sus and Organa, 2020), which is the second research project that will benefit from the results of this article. Presented networks are related to the our research project, due to limited awareness among businesses regarding their specificity, prevalence and consequences of adopting IR 4.0 (Rüssmann et al., 2015). The adopted method used in this article was the literature review. The main finding of this study is that in the inter-organizational networks are one of the opportunities coming from the IR 4.0 positive impact. The IR 4.0 is a stimulus for both cooperation and organizational innovation and the development of inter-organizational networks. In future research the IR 4.0 will be analysed in terms of its impact on present-day organizations and the changes that occur in cooperation between companies in inter-organizational networks.

Impact of Industry 4.0 on the Management Sciences

Industry 4.0 Revolution generate significant issues to still large group of organisations and often create challenges and opportunities related to the processes of their further growth (quantitative changes) or improvements and development (qualitative changes) (Michalski et al., 2018; Stańczyk-Hugiet et al., 2019; Sung, 2018). Therefore IR 4.0 has an influence on organisation's management and the cooperation between them. This revolution changes everything in business and classic passive matching strategies will be ineffective (Niemczyk et al., 2018; Niemczyk and Trzaska, 2020; Schlingensiepen et al., 2016; Stańczyk-Hugiet et al., 2011). Strategic management process is striving to achieve the organization's objectives (Sus and Organa, 2020), and is based on the relevance of factors coming from the business environment (Chlebus et al., 2019; Michalski et al., 2018).

The professional literature of the subject (Gwóźdź and Parkitna, 2015; Niemczyk et al., 2012; Stańczyk-Hugiet et al., 2019) attempts to give inter-organizational networks a diverse theoretical framework with a wide spectrum from sociology, computer science through economics to management (Zema and Sulich, 2019). The interdisciplinary nature of considerations and research in the field of inter-organizational networks allows for a better recognition of their nature, functioning principles and significance for the functioning of the economy (Lichtarski, 2017; Zhong et al., 2017). The most-exposed reference theories in social sciences are transaction cost theory (economics), social network theory (sociology), and resource theory (strategic management) (Krupski et al., 2017). According to resource theory (resource-based view), competitive advantage depends on having or access to the appropriate resources (Sus et al., 2019). The resources giving a competitive advantage should therefore be valuable but scarce (rare) (Stańczyk-Hugiet et al., 2017). Resource based view assumes that there is no enterprise that has all the resources it needs (Niemczyk et al., 2012). Resources scarcity results in paying attention to the association of the organization with the business environment being the source of resources that the organization is not able to independently produce (Lichtarski and Niemczyk, 2015; Niemczyk and Trzaska, 2020). The desire to fill the resource gap pushes organizations seeking to maintain or gain a competitive advantage to establish inter-organizational ties and enter a network of collaboration (inter-organizational network) (Niemczyk et al., 2012). The networks are made up of at least two autonomous organizations that are becoming more similar to each other with time and the growing use of information technology (Kolberg and Zühlke, 2015; Lu, 2017). The necessity of cooperation with many stakeholders and business partners can bring surprises, discouragement and resistance in relation to the changes required in modern organisations which implement IR 4.0 infrastructure (Barreto et al., 2017; Hernes, 2019). This infrastructure is crucial not only for the management and information change, but also create a similarity between autonomous organizations

in the network. There are sectors in which not networked activities are impossible. However, the cooperation between organizations in the network brings more positive than negative effects (Gąbka et al., 2016; Niemczyk et al., 2012). Implementation of the IR 4.0 in the organizations allow them to form a network and to gain some organisational proximity (Lichtarski, 2017). Organizational proximity is a key property of cooperating organizations. Additionally the Artificial Intelligence can influence: explaining sources of competitiveness and efficiency as well as stages and conditions for development; identification of basic features and characteristics of nodes - transfer of research attention from ties to network nodes, identification and characteristics of relationships on the line of cooperation in networks and types of innovation (Chlebus and Rosienkiewicz, 2011; Michalski et al., 2018; Piórkowska and Lichtarski, 2016; Sung, 2018). Industry 4.0 in organization management favours: sharing information, knowledge and technology, thereby accelerating the implementation of innovation; intensifying development thanks to the effective benefits of cooperation; building inter-organizational trust reducing the level of business uncertainty.

Artificial and Natural Intelligence

The AI is often demonstrated in the contrast to the natural intelligence (Hernes and Nguyen, 2007; Rosienkiewicz, 2013) possessed by any of natural object, especially by the humans or animals (Sung, 2018). Human intelligence is based on the multiple cognitive abilities to learn, form concepts, understand, apply logic, and reason, including the capacities to recognize patterns, comprehend ideas, plan, solve problems, make decisions, retain information, and use language to communicate (Reinhard et al., 2016). Natural intelligence is measurable by different tests. Additionally according to the multiple intelligence theory there is no single human intelligence, but variety of them used in different context or situation interchangeably (Rojko, 2017). Multiple intelligence theory assumes that there are types of intelligence such as (Hernes, 2019): logical-mathematical, spatial, linguistic, musical, social (interpersonal), bodily-kinesthetic etc., used by human with elasticity in action, although one of this type can be leading one. Although we can observe the results of the intelligence, it is very hard to understand what it is. There are of course different tests measuring the intelligence, but they are also criticised because some of the require some knowledge and they can be not applicable in different cultures or even languages (Xu et al., 2018). Brain therefore can be understood as a biological infrastructure for the mind functions (natural algorithm) which combined effects creates intelligence phenomenon (Fig.1).

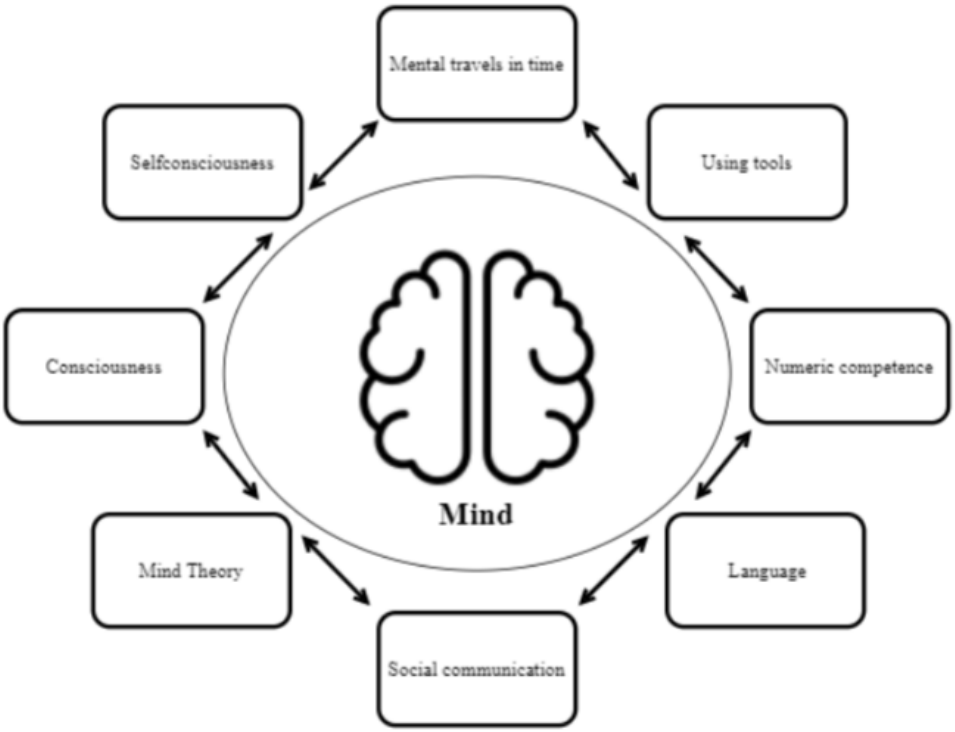

Fig. 1: Brain is an infrastructure for the mind functions used in natural intelligence phenomena. Authors' own elaboration.

Measurement of the intelligence among people or their individual achievement observation allow to distinguish group of genius. However, science recognised multiple examples of individuals, called savants, who possessed extraordinary narrow type of intelligence with dysfunction of other intelligence types. Savant syndrome is a condition in which someone with significant mental disabilities demonstrates certain abilities far in excess of average. There is also natural intelligence observed among animals. Intelligent creatures in a natural environment evolved and through the biological evolution (Vaidya et al., 2018) gained the biological infrastructure and capabilities to develop their intelligence. The bigger animals (vertebrates especially) has individual intelligence, although smaller (invertebrates) are sometimes characterised by the collective intelligence to achieve cognition, cooperation and coordination. The goal of collective intelligence is mutual recognition and enrichment of individuals. The collective intelligence phenomenon in the inter-organizational network is going to be discussed in the next sub-chapter. What is important collective intelligence group intelligence that emerges from the collaboration, collective efforts, and competition of many individuals and appears in consensus decision making.

The one of the proposed definition of AI is a this, which assume that it is "the ability of the system to adapt its operation in order to achieve the assumed goal in the environment in which it is located" (Zhong et al., 2017).

Artificial intelligence (AI) is a type of intelligence performed by any human-made machine equipped by the program or algorithm. Therefore, artificial intelligence aims to mimic human cognitive functions related to the problem solving and learning (Niemczyk and Trzaska, 2020; Stańczyk-Hugiet et al., 2011; Sus and Organa, 2020). Artificiality of this intelligence is caused by algorithm-based intelligence functions demonstrated by the computer program. It is often stated that algorithm is not elastic, but highly specialized and therefore its performance is higher than average human. This disproportion of effectiveness of undertaken action such decision making is visible especially in: decoding or

deciphering information, taking decision in business, market games, games and sport or searching for the unknown objects on the photos taken by telescope.

There are experiments which examine intelligence both natural and artificial. The most interesting is the Turing's test which is used to determining whether or not a computer is capable of thinking like a human being. On the one hand, generally humans are less effective when complicated mathematical patterns have to be used. On the other hand, it is very difficult to create an algorithm which can successfully recognize different human faces and the emotions of observed people, combined with situations. There are also works to help people with the security protection for example to prevent terrorist attacks. The AI can support human intelligence and inventiveness in areas which demand action and such is environment protection.

Chess Algorithms and Computers with Artificial Intelligence

The researches based on the automation of human calculations by mathematical algorithms began many years before modern microchip computers. The idea of computer invention was simple to help scientists perform fast calculations with great numbers related to the rocket industry. Some of scientist concerned an idea of artificial intelligence, which would mimic the human intelligence not in proteins but in silica. Their goal was to communicate with a computer and ask questions, to obtain best answers. The real revolution in Artificial intelligence began in 1950, when article titled "Programming a computer for playing chess" by Claude E. Shannon was published (Shannon, 1950). In his paper Shannon concerned with the problem of the constructing a computer routine or program for a modern general-purpose computer which will be enable it to play chess. Shannon predicted that this simple theoretical deliberation can bring a satisfactory solution for problems of a greater significance (Shannon, 1950). Proposed algorithm was simple, based on the computer which consider using the algorithm the current configuration of chess pieces. The computer considers using the algorithm the current configuration of all chess pieces and all their moves. The algorithm assigns a numerical value (evaluation function) to each move, which assesses how good the move is (Shannon, 1950). Subsequent moves made with chess pieces are evaluated and further moves with the highest value of the evaluation function are anticipated. The algorithm logic has been developed so much that in 1997 computer "Deep Blue" won chess match with world chess champion Garry Kasparov. Algorithm was improved by programmers and best chess players, and its latest form is called Stockfish chess engine. The algorithm was based on human experience, and it was supervised learning.

Completely other approach was to train algorithm in neuron network, which is unsupervised learning. There are no predefined assumptions (except basic game rules) in neural network learning, such as best moves. The algorithm must somehow come up with the best moves itself, it starts with the random structure of the algorithm steps, whose steps are strengthened if they lead to the expected result. Other alternative algorithm steps are not considered over time.

Management and Decision Taking

In recent years extended discussion concerning new trends in modern management and the challenges facing managers of contemporary organizations have been triggered repeatedly (Michalski et al., 2018). What is explored in this debate are the new demands related to dynamic, unpredictable and disruptive technological changes (Kolberg and Zühlke, 2015; Xu et al., 2018), and new expectations and requirements towards employees. Management is the most human action, making a decision is based on many factors, which computers can compute faster. Although their performance is higher than human (in this sense that any decision made by computer is far better, made faster, efficient than taken by human (Rüssmann et al., 2015; Stock and Seliger, 2016), it has to be said that machines will never become a human, and human never is going to become the machine. The decision process in the case of man consists of two thought processes: inventive and decision-making (Figure 2).

Human decision making is different from algorithms and machine learning methods described. The simplest form of making decisions consists of three phases: determining the set of action variants,

assessing them, and choosing the option considered the most advantageous (Bogdan et al., 1981; Nosal, 2001). Human thinking is sequential, so the algorithms reflect the stages of human thinking. The main reason for such organization of the decision-making process is the complexity of the situation and cognitive limitations experienced by members of the organization. People making key decisions in organizations naturally strive to expand the sequence of decision-making steps, but on the other hand it extends the time needed. The limited resources, the growing number of options for action, contradictory assessments and the lack of clear decisions lead to the search for an organization with which relationships can be established and cooperation to solve a problem or make a decision (Klimas, 2015).

In figure 2 presented the decision-making phases in two reference systems. The first of these covers the basic sequence of phases of related results and control questions. The second form of presentation captures decision thinking as a process involving "deviations" caused by various psychological factors. Convergence in the decision-making process means that this variant of decision thinking means that this variant of action, which will become a decision, did not appear by accident (Nosal, 2001). Moreover, the sequence of decision making phases gradually leads to a narrowing of results, enabling final settlement (Nosal, 2001).

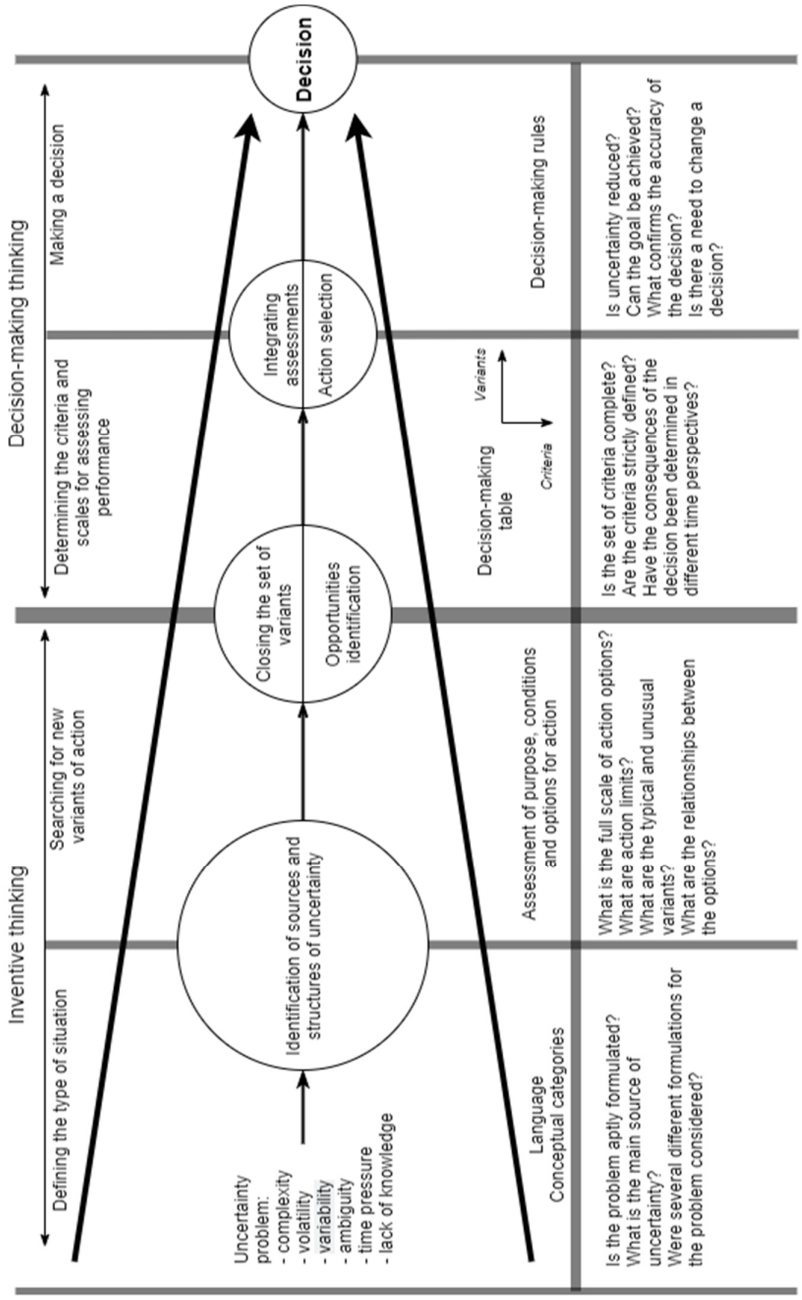

Fig. 2: Convergence of the decision-making process. Authors' own elaboration based on (Nosal, 2001).

Naming a computer code an Artificial Intelligence, which means that it can mimic functionality of brain, to some of people is somehow offensive. This term has been invented to rise this type of feelings. Some people, when they hear it automatically get triggered and contrary to that, there are people who see AI as promise of better future. Either way, everyone will admit that this mixed usage of biological and IT terms rises a discussion at many levels. At the most recent, looking at the peoples' attitude to AI it seems like majority of humanity decided, that if they cannot stop it, they may also enjoy the ride and get accustomed to self-driving vehicles, custom phone applications, but also chat bots and surveillance of public activities.

Network Organization

The inter-organizational network is a system of at least two independent and independent organizations (diad), connected with each other by a set of bonds for cooperation (Klimas, 2014). The inter-organizational network is a system composed of long-term, non-incidental connections of entities oriented on the relation of convergent goals (Ćwik et al., 2017; Klimas, 2012). In the description of the inter-organizational network based on graph theory, the organizations forming the network are called network nodes or vertices, while long-term relationships (inter-organizational ties, connections) oriented towards achieving common goals are called edges (Sulich et al., 2019). The application of graph theory allows to trace the processes occurring in the network, including determining the direction of interactions. The process that can reveal the existence and elements of an inter-organizational network is the product life cycle management (Sus and Organa, 2020). However, in the case of an inter-organizational network within the sector of environmental goods and services this process can be a waste recycling, e.g. waste tyres. This sector provides a wide spectrum for the usage of the robots and AI combined with the image recognition.

The adopted in this paper definition of the network organisation recognise it as a set of entities and relatively lasting ties between them. The main element defining the network are cooperative ties. The strength of the bond is based on trust and long-term contracts (Sulich et al., 2019).

Relationships in the Network Organisation

The natural intelligence is performed also by a group of animals. For example, ants exhibit some form of natural intelligence as a colony or in a swarm of bees. The similar natural collective intelligence can be observed among birds and fishes (the different species of fish) when they form a shoal. There is a similarity between biological forms of cooperation and these observed in the business environment.

Among the factors conducive to generating market advantage in management sciences are long-term inter-organizational interactions, participation in inter-organizational networks and availability of network resources (Klimas, 2015; Stańczyk-Hugiet et al., 2019). Inter-organizational relations on the market may take the form of coexistence, cooperation, competition and coopetition (Czakon, 2007; Czetwertyński, 2016; Kabarowski et al., 2006). These four relationship forms exist in parallel, but not proportionally in the space of economic practice (Klimas, 2014).

On the basis of strategic management, cooperation is seen as:

- a multi-entity activity aiming at achieving mutually consistent goals (Klimas, 2012),
- a dynamic and separate competences of the organization strengthening competitiveness (Klimas, 2014) and contributing to the increase of competitive advantage (Klimas, 2015);
- a type of knowledge management strategy (Dudek-Godeau et al., 2016; Sulich, 2018)in organizations used to create new, non-existent knowledge (Lichtarski, 2013).

The purpose of creating relationships in the network organization is to increase management competence and increase the flow of information between entities to improve their cooperation.

Cooperation is crucial for creating a network consist of independent organisations (Sulich et al., 2019). Moreover, the network organization gains an advantage over the other networks in the environment, due to the synergy effects. Humans and AI already collaborate: AI know best way in the traffic, drive autonomously or is able to find more efficient ways in the processes. In those examples human acknowledges, the results that AI delivers, because it improves the outcome. In the future AI itself might find best organisations to cooperate with. In industry 4.0 the machines can interact with each other and creating a similar network. Nevertheless, to reach such AI communication, the organizations cannot encapsulate their data to potential competitor (Stańczyk-Hugiet et al., 2019).

Conclusions

The modern economy based on knowledge and intelligence is characterized by networking (creation of inter-organizational networks). Organizations operate in a network economy supported by infrastructure solutions (development of information technologies and artificial intelligence) and cooperation relationships. The network economy is characterized by above-average dynamics, process orientation, chaos, lack of boundaries, unpredictability and promotion of intangible resources and cooperation processes between organizations (Klimas, 2014). Therefore, organizational efficiency and market advantage are generated due to network membership. The exchange of tangible and intangible resources, reciprocity and commitment are essential for the development of the network (Sus et al., 2019).

The artificial intelligence, which arose in the 20th century, transforms our reality and future. IR 4.0 organizes our reality and influences decision making (Niemczyk et al., 2012). The digitization is advancing in all areas of life from public administration, education, production and hobby implementation. In the literature, definitions of artificial intelligence boil down to determining that it is an attempt to model aspects of human reasoning using computers, or an attempt to solve using computers such problems that are usually solved by a human.

The conditions of the modern economy are privileged by innovative organizations, using the latest technologies, which fall under IR 4.0. This is because pioneering and innovation are one of the cornerstones of the competitive advantage sought by organizations. They subordinate their activities to the requirements of the market game, putting emphasis in their strategies, processes and activities on increasing the level of innovation. IR 4.0 IR 4.0 decides about inter-organizational cooperation, improves learning, creation, absorption and commercialization of knowledge.

The implementation of the Industry 4.0 concept necessitates involvement from top management promoting comprehensive change management activities and processes for arranging organizational and production structures according to the needs of the connected value creation. A collaborative, explorative, and entrepreneurial mind-set is a success factor that is necessary to establish among a company's most important resource: the employees.

Managers should have willingness to convince employees of the beneficial nature of Industry 4.0 and to address their concerns actively. By analysing the Industry 4.0 studies published so far, it has been discovered that they mostly discuss the technical aspects but do not pay attention to managerial approaches and organisational culture that are a significant factor influencing the success of the implementation of this concept. Implementing the Industry 4.0 concept requires continuous innovation and educatio1n that not only depend on people's abilities but also on organisational culture. Research has shown that successful organisations will be those that disperse decision making processes related to the leadership and managerial responsibilities throughout a network in the organisation.

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References

- Barreto, L., Amaral, A. and Pereira, T. (2017), "Industry 4.0 implications in logistics: an overview", *Procedia Manufacturing*, available at:https://doi.org/10.1016/j.promfg.2017.09.045.
- Bogdan, J., Duda, L.L., Kwaśnicka, H., Kwaśnicki, W. and Veith-Nosal, E. (1981), *Nauka i Technika 2020 Etap Hipotez*.
- Chlebus, E., Dybała, B., Helman, J.Z., Krot, K., Karoluk, M.J., Kurzynowski, P., Reiner, J., et al. (2019), *Strategiczne Kierunki Rozwoju Politechniki Wrocławskiej, Jako Uczelni Badawczej o Zasięgu Międzynarodowym*, Wrocław.
- Chlebus, E. and Rosienkiewicz, M.M. (2011), "A simulation model application in the product development process", in Edwarda Chlebusa, pod (Ed.), *Production Engineering : Innovations and Technologies of the Future*, Institute of Production Engineering and Automation. Wrocław University of Technology, Wrocław, pp. 27–36.
- Ćwik, K., Lichtarski, J.M. and Piórkowska, K. (2017), "Addiction to inter-organizational network. How does intensity of network relationship affect strategy and structure of node organizations?", in Jabłoński, A. (Ed.), *Business Models. Strategies, Impacts and Challenges*, Nova Publishers, pp. 159–180.
- Czakon, W. (2007), *Dynamika Więzi Międzyorganizacyjnych Przedsiębiorstwa*, Wydawnictwo Akademii Ekonomicznej w Katowicach, Katowice.
- Czetwertyński, S. (2016), "Formy dystrybucji cyfrowych dóbr informacyjnych w społeczeństwie online", *Studia Informatica Pomerania*, Vol. 40 No. 2, pp. 15–25.
- Dudek-Godeau, D., Kwiatkowska, K., Bogusz, J., Wysocki, M.J., Bielska-Lasota, M. and Kieszkowska-Grudny, A. (2016), "Analysis of changes in cancer health care system in Poland since the socio-economic transformation in 1989", *Roczniki Panstwowego Zakladu Higieny*, Vol. 67 No. 4, pp. 445–454.
- Gąbka, J.M., Susz, S. and Rosienkiewicz, M.M. (2016), "An integrated approach towards building a simulation model supporting the management of the passenger transportation system.Pt. 1,Theoretical basis", *Logistics and Transport = Logistyka i Transport*, No. 4, pp. 39–49.
- Gwóźdź, K. and Parkitna, A. (2015), "The role of the discount rate in efficiency measuring process of food industry enterprises over the economic crisis in Poland", *Ekonomia i Prawo*, Vol. 14 No. 4, pp. 415–426.
- Hernes, M. (2019), "Consensus Theory for Cognitive Agents' Unstructured Knowledge Conflicts Resolving in Management Information Systems", in Nguyen, N.T., Kowalczyk, R. and Hernes, M. (Eds.), *Transactions on Computational Collective Intelligence XXXII*, Springer-Verlag GmbH, DE part of Springer Nature, pp. 1–119.
- Hernes, M. and Nguyen, N.T. (2007), "Deriving consensus for hierarchical incomplete ordered partitions and coverings", *Journal of Universal Computer Science*, Vol. 13 No. 2, pp. 317–328.
- Kabarowski, J., Klonowski, M., Krzywiecki, Ł., Kutyłowski, M. and Lauks-Dutka, A.S. (2006), "E-Dolny Śląsk - perspektywy i przeszkody we wdrażaniu nowoczesnych technologii informacyjnych", *Innowacyjność Wyróżnikiem Dolnego Śląska?, Wrocław, [29] Czerwiec 2006.*, pp. 49–56.
- Klimas, P. (2012), "Efektywność zespołów międzyorganizacyjnych w świetle hipotezy bliskości", *Zarządzanie Zasobami Ludzkimi*, No. 1(84), pp. 83–96.
- Klimas, P. (2014), *Sieci Innowacji.Implikacje Bliskości Organizacyjnej*, Wydawnictwo Uniwersytetu Ekonomicznego w Katowicach, Katowice.
- Klimas, P. (2015), "Przesłanki i bariery zawiązywania więzi międzyorganizacyjnych", *Problemy Zarządzania*, Vol. 13 No. 1(50), p. 31.
- Kolberg, D. and Zühlke, D. (2015), "Lean Automation enabled by Industry 4.0 Technologies", *IFAC-PapersOnLine*, available at:https://doi.org/10.1016/j.ifacol.2015.06.359.
- Krupski, R., Piórkowska, K. and Sus, A. (2017), "Organizational endogenous development: The

micro-foundations, opportunities and real options perspective", *Argumenta Oeconomica*, available at:https://doi.org/10.15611/aoe.2017.1.03.

- Kuik, O., Branger, F. and Quirion, P. (2019), "Competitive advantage in the renewable energy industry: Evidence from a gravity model", *Renewable Energy*, Vol. 131, pp. 472–481.
- Lichtarski, J.M. (2013), "Strategiczne zarządzanie projektami", *Prace Naukowe Uniwersytetu Ekonomicznego We Wrocławiu*, No. 277, pp. 40–51.
- Lichtarski, J.M. (2017), "Heterarchia w strukturze projektowej a styl kierowania", *Ekonomika i Organizacja Przedsiębiorstwa*, No. 12 (814), pp. 303–318.
- Lichtarski, J.M. and Niemczyk, J. (2015), "Organizacja kształcenia ustawicznego na uczelniach wyższych - modele i doświadczenia praktyczne", in Jędralska, K. and Bernais, J. (Eds.), *Uniwersytet w Perspektywie Kształcenia Przez Całe Życie*, Wydawnictwo Uniwersytetu Ekonomicznego w Katowicach, pp. 21–30.
- Lichtarski, J.M., Wąsowicz, M. and Stańczyk-Hugiet, E. (2014), "Be entrepreneurial : active learning approach", *Journal Advances in Higher Education*, Vol. 6 No. 1, pp. 155–173.
- Lu, Y. (2017), "Industry 4.0: A survey on technologies, applications and open research issues", *Journal of Industrial Information Integration*, available at:https://doi.org/10.1016/j.jii.2017.04.005.
- Michalski, G., Rutkowska, M., Sulich, A. and Rothe, R. (2018), "The green jobs and the industry 4.0", in Dziura, M., Jaki, A. and Rojek, T. (Eds.), *Enterprises and Economies In the Face of Contemporary Challenges: Management - Restructuring - Innovation*, Fundacja Uniwersytetu Ekonomicznego w Krakowie, Kraków, pp. 321–329.
- Niemczyk, J., Kośny, M., Organa, M. and Trzaska, R. (2018), *Inteligentne Usługi Dla Przemysłu 4.0*.
- Niemczyk, J., Organa, M. and Piórkowska, K. (2012), "Mechanizmy zarządzania sieciami międzyorganizacyjnymi", in Niemczyk, J., Stańczyk-Hugiet, E. and Jasiński, B. (Eds.), *Sieci Międzyorganizacyjne. Współczesne Wyzwanie Dla Teorii i Praktyki Zarządzania*, Wydawnictwo C.H. Beck, pp. 207–248.
- Niemczyk, J. and Trzaska, R. (2020), "Network Approach in Industry 4.0: Perspective of Coopetition", in Zakrzewska-Bielawska, A. and Staniec, I. (Eds.), *Contemporary Challenges in Cooperation and Coopetition in the Age of Industry 4.0 10th Conference on Management of Organizations' Development (MOD)*, pp. 139–154.
- Nosal, C. (2001), *Psychologia Myślenia i Działania Menedżera. Rozwiązywanie Problemów. Podejmowanie Decyzji. Kreowanie Strategii.*, Wydawnictwo AKADE, Wrocław.
- Piórkowska, K. and Lichtarski, J.M. (2016), "Inter-organizational Network and Organizational Strategy: A Conceptual Framework", in Soliman, K.S. (Ed.), *Innovation Management and Education Excellence Vision 2020: From Regional Development Sustainability to Global Economic Growth*, International Business Information Management Association (IBIMA), pp. 2244–2249.
- Reinhard, G., Jesper, V. and Stefan, S. (2016), "Industry 4.0: Building the digital enterprise", *2016 Global Industry 4.0 Survey*, available at:https://doi.org/10.1080/01969722.2015.1007734.
- Rojko, A. (2017), "Industry 4.0 concept: Background and overview", *International Journal of Interactive Mobile Technologies*, available at:https://doi.org/10.3991/ijim.v11i5.7072.
- Rosienkiewicz, M.M. (2013), "Artificial intelligence methods in spare parts demand forecasting", *Logistics and Transport = Logistyka i Transport*, No. 2, pp. 41–50.
- Rosienkiewicz, M.M., Gąbka, J.M., Helman, J.Z., Kowalski, A. and Susz, S. (2018), "Additive manufacturing technologies cost calculation as a crucial factor in Industry 4.0", *Advances in Manufacturing*, pp. 171–183.
- Rüssmann, M., Lorenz, M., Gerbert, P., Waldner, M., Justus, J., Engel, P. and Harnisch, M. (2015), *Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries*, *The Boston Consulting Group*, available at:https://doi.org/10.1007/s12599-014-0334-4.
- Schlingensiepen, J., Nemtanu, F., Mehmood, R. and McCluskey, L. (2016), "Autonomic transport management systems—enabler for smart cities, personalized medicine, participation and industry grid/industry 4.0", *Studies in Systems, Decision and Control*, Vol. 32, Springer International Publishing, pp. 3–35.
- Shannon, C.E. (1950), "Programming a computer for playing chess", *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, available at:https://doi.org/10.1080/14786445008521796.

- Stańczyk-Hugiet, E., Lichtarski, J.M. and Piórkowska, K. (2011), *Management : Functions, Strategies, Methods*, Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław.
- Stańczyk-Hugiet, E., Lichtarski, J.M. and Piórkowska, K. (2019), "The Dynamics of Inter-firm Relationships along the Industry Life Cycle: Theoretical Background and Conceptual Framework", *Transformations in Business & Economics*, Vol. 18 No. 2B (47B), pp. 767–782.
- Stańczyk-Hugiet, E., Piórkowska, K. and Stańczyk, S. (2017), "Demystifying emergence of organizational routines", *Journal of Organizational Change Management*, available at:https://doi.org/10.1108/JOCM-03-2016-0048.
- Stock, T. and Seliger, G. (2016), "Opportunities of Sustainable Manufacturing in Industry 4.0", *Procedia CIRP*, Vol. 40, Elsevier B.V., pp. 536–541.
- Sulich, A. (2018), "The Green Economy Development Factors", *Vision 2020: Sustainable Economic Development and Application of Innovation Management from Regional Expansion to Global Growth.*, Proceedings of the 32nd International Business Information Management Association, pp. 6861–6869.
- Sulich, A. and Zema, T. (2017), "Problem zarządzania ryzykiem we współczesnej filozofii techniki", in Olkiewicz, M., Woźniak, M., Drewniak, M. and Chmura, J. (Eds.), *Nauka i Biznes - Wyzwania XXI Wieku. Cz. 2*, Wydawnictwo Naukowe Intellect, Waleńczów, pp. 8–21.
- Sulich, A., Zema, T. and Sulich, A. (2019), "Relations in The Interorganizational Networks", *4th International Business Administrative Sciences Student Conference - IBASSC 2019*, Vol. 6 No. 1, pp. 111–121.
- Sung, T.K. (2018), "Industry 4.0: A Korea perspective", *Technological Forecasting and Social Change*, available at:https://doi.org/10.1016/j.techfore.2017.11.005.
- Sus, A. and Organa, M. (2020), "Dynamics and the Dynamism of Strategy in Inter-organizational Network - Research Project Assumptions", in Zakrzewska-Bielawska, Z. and Staniec, I. (Eds.), *Contemporary Challenges in Cooperation and Coopetition in the Age of Industry 4.0*, pp. 313–330.
- Sus, A., Organa, M. and Sulich, A. (2019), "Effectiveness of Relations in the Inter-Organizational Oncological Network in Poland – Research Assumptions", *Transformations in Business & Economics*, Vol. 18 No. 2B (47B), pp. 745–766.
- Vaidya, S., Ambad, P. and Bhosle, S. (2018), "Industry 4.0 - A Glimpse", *Procedia Manufacturing*, available at:https://doi.org/10.1016/j.promfg.2018.02.034.
- Xu, L. Da, Xu, E.L. and Li, L. (2018), "Industry 4.0: State of the art and future trends", *International Journal of Production Research*, available at:https://doi.org/10.1080/00207543.2018.1444806.
- Zema, T. and Sulich, A. (2019), *Relations in The Interorganizational Networks*, *4th International Business Administrative Sciences Student Conference - IBASSC 2019*, Vol. 6, available at:https://doi.org/10.23918/ijsses.v6i1p111.
- Zhong, R.Y., Xu, X., Klotz, E. and Newman, S.T. (2017), "Intelligent Manufacturing in the Context of Industry 4.0: A Review", *Engineering*, available at:https://doi.org/10.1016/J.ENG.2017.05.015.

Financial Innovations and Their Role in Banking Industry (The Area of Funds Transfer) Development in Poland

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Abstract

The article aims to determine the characteristic features of the development of Polish banking in the area of funds transfer since the 1990s. through the prism of implemented innovations and their development. The study was conducted using both historiographic and factographic methods, as well as desk research. The fast pace of development of Polish banking is particularly visible in the area of services related to the transfer of funds. Directions of further development in this area focus on the speed, security and ease of payment transactions and other forms of financial settlements. Based on a preliminary analysis of the development processes in Polish banking since the early 1990s, one can observe four such breakthrough moments (mile-stones) that have introduced new revolutionary changes in areas related to money transfers, namely: the first cards and ATMs - "card revolution "; Internet banking services accessible from a personal computer; mobile banking services available from smartphones, tablets and other mobile devices; network banking based on blockchain technology. Observations provided evidence to support the thesis that the development of Polish banking was stimulated by implementing disruptive financial innovations and driving fast development based on implementing sustaining innovations at a given banking stage. The findings suggest that the main impetus for the continuous progress of such gradual "banking revolutions" lies outside the banking sector.

Keywords: Financial Innovations, Funds Transfer, Polish Banking, Development.

Introduction

The paper is an attempt at presenting the properties of banking industry in the area of funds transfer development in Poland from the viewpoint of financial innovations, both existing and foreseeable, from the 1990ies up to the present. The selection of properties for scrutiny was based on observations of initial implementations in time progression form as well as the forms and ranges of the associated financial innovations, with separate evaluation of main driving forces behind their implementation to the banking industry, and, lastly, the character of changes generated by their introduction.

Polish banking has been undergoing accelerated development since the beginning of the 1990s. It is known that this development is influenced by the implementation of various types of financial innovations (i.e. regarding products, processes, organization, marketing) and solutions adapting to the changed legal and regulatory environment. At the same time, banking industry development associated with financial innovations is accompanied by rapid civilizational progress, and further stimulated by advancement of technologies. It is also known that the rapid pace of development is particularly evident in relation to services related to the transfer of funds (money transactions and payments and management). And that directions for further development in this area focus on the speed, security and ease of payment transactions and other forms of financial settlement. Developments in funds transfer systems (EFTS) have long been a popular topic of discussion in banking circles. There are many papers about new technologies in payments in various contexts, such as: description of some EFT systems; categories of real-time payments and their potential to disrupt the existing payment ecosystem (Wu 2015, Thomalla, Arsdale 2017); the costs of making payments in the UE (Schmiedel, Kostova, Ruttenberg 2012) or in the United States

(Chakravorti, Mazzotta 2013); potential for changing costs and providing new services that will likely have far-reaching effects on the structure of and competition within the financial industry (Gupta, Tham 2018, FSB 2019, McKinsey.com 2019); strategies for improving payment system, e.g. to the U.S. payment system (2015); challenges to monetary policy (IssingLecture 2000). ECB publications, i.e. reports containing descriptions of the operation of payment systems in the European Union (institutional and legal aspects of the payment system, used forms of monetary settlement, retail and large-value payment systems, and securities settlement systems) - e.g. such as: Payment and securities settlement systems in the European Union (2007) - and data on the general economic situation in each EU country and payment statistics provided information on the number and value of payment transactions for each type of payment instrument and service in Europe can be used to identify trends in payments or to compare the degree and development directions of payment systems in different countries. But such, mainly quantitative, picture of state and changes is not enough to determine the properties (in particular features and character) of banking (in the area of funds transfer) development of a given country. A description of the course of development based on facts and chronological order, as well as a picture of changes in the quality of payment instruments, banking services and delivery channels are needed to determine these properties. Such information is not collected or recorded systematically in social accounting. There are no studies in the literature, neither on a national scale (e.g. Poland) nor international comparisons, which would comprehensively present or compare the properties (in particular the features and nature) of banking development in the area of transfer of funds under the influence of financial innovation implementations. This study assumes that the theory of disruptive and sustaining innovation – the Theory of Disruptive Innovation (1997, 2014) and the Theory of Hybrids (2013) – by Clayton M. Christensen provides a sufficient theoretical basis for describing and recognizing these properties. Although this theory concerns the issues of sustaining innovation and disruptive innovation, seen from the company perspective, it seems that it is also suitable for the sector perspective, e.g. banking industry perspective. Disruptive innovation means to reinvent a technology, business model, or simply invent it all together. It generates new markets and values, in order to disrupt existing ones. As opposed to disruptive innovation, sustaining innovation, seeks to improve existing products or services. Meaning, it does not create new markets or values, but rather merely develop existing ones. More distinguishing characteristics of sustaining innovation vs. disruptive innovation presents the Theory of Disruptive Innovation (2014). According to the Theory of Hybrids (Christensen, Horn, Staker 2013) disruptive innovation and sustaining innovation do not necessarily need to be alternative to one another, but rather complementary measures.

Based on a preliminary own analysis of progression of development processes in Polish banking from the early 1990ies, four such major breakthrough moments (milestones) can be observed, which have set (or are believed to present a potential for setting) new revolutionary changes in areas associated with funds transfers, namely:

- the first cards and cash-dispensing machines – “the card revolution”;
- Internet banking services accessed from a personal computer,
- mobile banking services accessed from smartphones, tablets, and other mobile devices,
- network banking, based on the blockchain technology.

Each new revolution is initiated by the introduction of disruptive innovations, which are forced by significant changes in the environment of the banking sector (primarily by competition from outside the banking sector). Disruptive innovations lead to the establishment of new rules of the game in the banking sector. As part of a given revolution, there are development changes based on sustaining innovations, i.e. implementations of financial innovations by banks that improve their competitiveness and gradually also transform the perception of banking by its users.

“The card revolution” in Polish banking

From the local perspective of Poland, the major stimulus for the development of electronic banking services was the introduction of cashless settlements in 1968, based on the use of the Diners Club International card issued by a non-banking entity, as part of the travel service package offered by

Polskie Biuro Podróży „Orbis" acting as a debit card agent. This decision proved to be the most important stimulus for further development of various types of payment card solutions. It must be noted that the response from the Polish banking sector proved quite deferred, as the first payment cards were issued as late as 1991, in the form of debit cards for enterprises and institutions, and ID cards for individual customers (Table 1). It may also be useful to emphasise that the above impulse came into focus much later than the one associated with the introduction of the pre-paid-card idea in many developed countries. The prepaid card concept was coined by Bellamini in 1880ies, and was subsequently realised in the form of metal cards (plates) first issued in 1914 to selected customers of the Western Union (a non-banking entity at that time). In 1946, the concept was formally introduced by the banking system J. Biggins, in the form of a card to be used for settling dues in service and trade outlets in Brooklyn. In 1991, holders of the Polish banking ID cards could make withdrawals from Poland's first cash-dispensing machine, originally installed in 1987 to service cards of a certain non-banking issue. The introduction of cash-dispensing machines in Poland was also dramatically, as the first European implementation of this type came into service in 1967 (London).

Table1: Early implementations of innovations in banking, based on dispersed network of cash-dispensing machines (ATMs)

Year of implementation	**Nature of the innovation**	**Name of the implementing organisation (bank)**
1991	Debit card BIG Visa Business Card for entrepreneurs and institutions	Bank Inicjatyw Gospodarczych BIG SA
	Customer ID card for individual customers	Polska Kasa Opieki S.A. (Bank Pekao)
	Cash dispensers with ID card access	Polska Kasa Opieki S.A. (Bank Pekao)
	Polcard – the Polish card transaction settlement centre (an entity responsible for settlement of non-cash transactions registered in trade and service outlets)	A limited liability company with shares held by Polskie Biuro Podróży „Orbis" and Bank Inicjatyw Gospodarczych; at present, after a series of ownership changes, the company operates under the name of First Data Polska
1993	The "Polcard" debit card for local transactions (only accepted in Poland), offered in various forms: for electronic transactions, for ATM access, both for individual customers and institutions	Bank Inicjatyw Gospodarczych BIG SA; soon followed by many other banks
2007	The Mastercard PayPass proximity payment card – a debit card with added proximity payment functionality – Poland was the first Central European country to introduce proximity payment solutions	
2010	The first implementation of biometrics in cash dispensing machines on the European market	Podkarpacki Bank Spółdzielczy and Bank Polskiej Spółdzielczości
2012	Cash dispensers with cash deposit	several banks

	functionality, a quality-of-life improvement with basic account services accessed without visiting the branch	
2013	The first card fitted with an electronic display and remote account operations functionalities: account balance verification, system messages, and transaction authorisation codes.	Getin Bank
2013	An ATM card with added function of withdrawals made in EUR, without the need for a separate foreign currencies account	Euronet Worldwide, Inc.
	Updated functionality of Bank Millennium's cash dispensing machines: petty cash loans with immediate card charge transfer; ordering of prepaid cards; and high-interest banking deposits managed solely via ATMs (the first such solution in Poland and Europe, probably also world-first)	Millennium Bank
2014	Mobile cash dispensing/deposit machines to service remote-location transactions, such as large deposits in coins or large sum operations in cash and petty cash (offered in the form of motored units – the first such innovation, and recognised as the 2015 best global innovation in payments (the BAI Finacle Global Banking Innovation Awards)	Idea Bank
2015	Cashless, or dual function cash dispensing/deposit machines offering deposits and withdrawals in a number of foreign currencies	City Handlowy
	Cards fitted with dynamic CVC codes, replacing the static security code with a dynamic one, displayed on reverse; the automatic changes of code are designed to limit the risk of data loss or unauthorised access in online transactions	Getin Bank
	The European payment card – widely accepted by trade and service outlets across Europe; the card is each time recognised as issued by a local provider, regardless of the customer's current location or place of transaction	Bank Smart
2017	Poland's first proximity-operated cash dispensing/deposit machines (with both deposits and withdrawals authorised by proximity access, without the need for physical contact between the card and the machine.	BGŻ PNB

Source: own study

The card revolution, initiated by stimuli generated outside the structure of the banking systems, is an ongoing phenomenon, propelled by technological advancements and yielding an incessant flow of

new innovations in the sphere of card payment services and products, resulting in formation and rapid development of card service infrastructure (dispensing machines, merchants, trade and service outlets, POS terminals, cash back). These product and service innovations are sustaining because they give results in performance improvement in attributes most valued by the banking industry's mainstream customers. These improvements are incremental or breakthrough in character. Radical changes ensued in payment turnover mechanisms, and the trend is continuing, with dynamic and incessant increase in the number of new cards issued to customers (from ca. 50 thousand in 1993, passing the 30 million mark early in 2009, with 2018 estimates at ca. 40 million, with 2019 estimates at ca. 42,5 million), with debit cards representing more than 3/4th of all issues. This was followed by a systematic increase in the number of dispensing units, with a slight decrease in 2018 (the steady increase continued up to the year 2017, resulting in ca. 23750 units installed in Poland, while the most current reports of 2018 place it at ca. 23200 units, Q3 2019 in. ca. 22600 units). In the initial period, the most dominant forms of card-based transaction were: ATM withdrawals, branch office withdrawals, and cash back services. Present trends show a clear dominance of cashless payment transactions – in 2018, card payments constituted 86% of all card-based transactions, and in Q3 2019 ca. 90% (NBP 2003, 2018, 2019). The ongoing technological revolution in the Polish card-based transaction turnover seems to fortify the present development trends on the path to cashless economy. These trends manifest themselves through various sustainable innovations of a breakthrough nature introduced to the banking system, particularly the following:

- late 20th cent. – a pilot chi card programme designed to streamline and secure the transaction process;
- early 21st cent. – proximity cards for the ease of servicing low value payments (PayPass and payWave: contactless readout and no PIN confirmation), largely improving the quality and speed of transactions (in 2016, proximity cards constituted nearly 80%, in 2018 – more than 80%, and in Q3 2019 – more than 86% of all payment cards in service, and Poland is one of the global leaders on the market of proximity transactions) (NBP 2016, 2018, 2019).

It may be interesting to note that, in the area of cashless transactions, development trends seem to focus on improvements and added functionalities, such as alternative forms of authorisation (with or without PIN codes), cards fitted with displays and keypads to enable remote access to services other than simple payment trans-actions. In addition (following the example of the Millennium Bank), banks are beginning to perceive ATMs as a basic form of interaction with their customers, in support of the already established network of local branches, thus constituting a major organisational innovation (i.e. departure from the rigid forms of tradition-al banking with dispersed networks of local branch offices towards an ATM-based model of service) as well as a modern embodiment of the traditional model of banking operation.

The technological revolution in card-based transaction turnover is an ongoing process, particularly well-manifested in the segment of cashless payments, and one that strongly affects the transformation of payment-related customs and routines among general public in support of the much-desired model of cashless economy. This, in turn, serves to fuel new revolutions in the sector, and their correlations seem to follow several distinct trends:

- integration of a modernised form of traditional banking based on dispersed POS networks (in the form of ATMs) with Internet banking, through special-offer products, both traditional (loans, deposits) and modern (online authorisation of ATM-ordered prepaid cards) – as evidenced in Bank Millennium's approach, or the use of dynamic CVC codes – as employed by Getin Bank;
- integration of a modernised form of traditional banking based on dispersed POS networks (in the form of ATMs) with mobile banking, exemplified by such products as: the "put credit on your phone" service offered by PKO BP, and servicing of deposits to banking accounts from modern ATMs and mobile devices – as in the case of ING Bank Śląski and BGŻ Paribas;
- recapitulation of conceptually parallel product innovations in subsequent revolutions – a good example of this trend is the use of proximity payments (near-field communication technology) in both the card revolution and the mobile banking revolution, as contactless payments may now be serviced from a card or from a smartphone.

Development of Polish Internet banking

With the onset of the card revolution, seed were sown for two equally revolutionary and almost parallel trends: Internet banking and mobile banking. The 1990s marked the entry of both the Internet and the IT and mobile technologies in Poland, resulting in a rapid transformation of the banking sector into a modern, refurbished and innovative model of 21st century banking service (Table 2). The common denominator of the two revolutions can be found in their modern approach to customers as active partners unrestrained by the constraints of time and space. This way of perceiving banking services, i.e. mobile banking service in the broadest sense of the term, is now commonly employed by Polish banks, as evidenced (PRNews.pl 2019) by more than 8 million in 2018, by more than 12 million in 2019 individual users in this segment of services, with ca. 50% accessing the service from an app installed on a mobile device.

Table 2: Early implementations of innovations in online banking (accessed via Internet from a personal computer)

Year of implementation	Nature of the innovation	Name of the implementing organisation (bank)
1993	Poland's first home-banking system – customers were required to download dedicated PC platform software to manage their accounts remotely	Bank Rozwoju Eksportu
1998	Poland's first on-line banking service, with complete online access to the banking account	Powszechny Bank Gospodarczy w Łodzi
2000	Poland's first internet bank; the common denominators of such organisations are the reduction of account service charges, and the ease of management	mBank
2000-2002	Development of e-banking as a distinct field of operation for universal banks	Bank Millennium, Bank Handlowy, ING Bank Śląski, and others
2010	The first implementation of biometrics in customer login authorisations in online platform services	Bank Pekao SA
	Poland's first implementation of online-submitted applications for loans	mBank
	Poland's first implementation of a solution for finance management and analyses in transaction systems	Meritum Bank
2011	The first personal account system with Internet-based access, and with new accounts opened by simple transfer of funds	Bank Ochrony Środowiska
2012	The first fund-transfer service accessed via Facebook	Alior Sync
2013	The first banking service to offer smart TV accessibility via a dedicated banking app designed for Samsung models and distributed through the Samsung Apps store	BZ WBK
2016	The first solution offering automated generation of the "Standard Audit Files for Tax" (for business customers only) and their submission to appropriate tax offices	Bank Millennium
2017	Poland's first implementation of video-	Inbank

	verification for the authentication of loan operations accessed online	
	Poland's first implementation of video-verification for the authentication of personal account opening procedures accessed online	Alior Bank
	Introduction of specialised services for the automatic generation of annual PIT (personal income tax) statements from personal account data	PKO BP, BGŻ PNB Paribas, Raiffeisen Polbank, and others

Source: own study.

The development of Internet banking in Poland was clearly preceded by the introduction of online commerce services, but it must be noted that the precedence was quite negligible, in view of the fact that the first e-mail message on record in Poland dates back to the year 1990. The revolution of online banking erupted in a sudden fashion and in many forms: new channels for accessing the banking account and banking services; new functionalities offered by e-banking (including those which cannot be accessed by traditional means); new models of banking operation (e-bank). In Q2-2019, the number of banking customers with online access to their accounts was reported in the vicinity of 37 million, with ca. 52% regarded as active users (defined as logging to the system at least once a month) (ZBP 2019). It may be useful to note that online banking was, from the very onset, designed to stimulate the shift from a POS service to a self-service banking model. While online banking functionality is now part of the industry standard of service, the online systems remain subject to regular updates, with new functions added to serve the interests and needs of both parties, i.e. the customer and the service provider.

Thus far, the development of online banking (expressed both in the number of individual users and the range of products on offer) has been contained within the classical formula of a two-way platform of communication (bank – customer). A popular view holds that the above formula has lost the potential to provide tangible benefits in terms of customer value added. Proponents of this idea believe that the future of banking lies in an evolutionary transformation towards multilateral platforms. Early signs of this approach can already be discerned, as evidenced in the evolution of the Polish mBank's multilateral plat-form offered as part of the mOkazje loyalty programme. The above approach is in line with the popular belief that banks will soon focus their efforts on consolidation of their product offer within a wider context of specific needs and requirements of their customers, be it individual or corporate (e-point.pl 2017), a trend already reflected in banking practice, a good example being the trade-auction platform for enterprises (aleo.pl), owned by ING Bank Śląski. AT the same time, the idea seems fairly consistent with the 'new economy' philosophy, where companies are expected to create new consumer needs with the purpose of future commercialisation of demand thus inspired.

Polish Banking in the Smartphone Era

The apex of the vigorous development of online banking coincided with the onset of another revolution – mobile banking, based on new technologies offered by the next generation of mobile devices: the smartphones (Table 3).

Table 3: Early implementations of innovations in mobile banking

(banking in the smartphone era)

Year of implementation	Nature of the innovation	Name of the implementing organisation (bank)
1999	Poland's first mobile banking service, based on WAP protocols and SMS (text) communication – customers were offered SMS access to account balance reports and details of the last 5 operations; for customers of the Plus GSM mobile network only	Wielkopolski Bank Kredytowy
2000	Access to accounts via mobile (WAP) browsers	Wielkopolski Bank Kredytowy, mBank
2004	Poland's first mobile banking app – R-Mobile, accessed from any device supporting the Java standard	Raiffeisen Bank
	Introduction of a 'lite' standard of services, offering a reasonable set of account functionalities which could be accessed easily from limited-size displays, coupled with packet size reductions (for economy and speed), and regular updates (new functions, improvements)	several banks
from 2011	The rapid increase in the share of Android-based devices on the Polish market; at present, dedicated smartphone apps (with Android and OS support) are part of the standard offer of banking services	several banks
from 2012	Introduction of proximity payments serviced via mobile phones, through dedicated NFC-SIM cards: Orange Cash, My Wallet; quality-of-life solutions offering intuitive interface, ease of service, and fast transfer rates	Operator Orange, T-Mobile
2014	Implementation of the first banking product linked to a mobile service plan – T-Mobile Usługi Bankowe; this represents a distinct revision of the banking mode of operation: 'a mobile plan with banking services attached' (in place of the traditional: 'bank in your phone' approach);	Alior Bank i T-Mobile
2015	Money transfers can now be made to accounts identified only by the owner's telephone number (no need for detailed account information).	Bank Śląski
	Poland's first implementation of voice-operated service and login confirmation via handprint sensors (from smartphones equipped with such functionality)	Smart Bank
2017	Further development of money transfers made to phones, in the form of BLIK – an 'insta-payment' platform serviced by the Express Elixir system (with special focus on defining a local standard of payments –	Alior Bank, Bank Millennium, Bank Zachodni WBK, ING Bank Śląski, Inteligo, mBank, PKO Bank Polski

	Polski Standard Płatności)	
2017	Poland's first integration of video-verification technologies in support of account opening procedures initiated from a mobile app	BZ WBK

Source: own study.

It must be said here that the boundary between the two banking revolutions (online banking – mobile banking) is purely academic and does not attempt to emphasise the breakthrough nature of the latter in freeing the user from the constraint of personal computer access. It may be dubious to say that the disruptive financial innovation of the smartphone era has been reached. The perception of the smartphone revolution as a separate process seems to be based on a popular belief often expressed in Poland that the mobile revolution shall lead to the development of a specific target model of mobile banking, one in which customers' wallets shall be replaced by smartphones, and that such a model should emphasise complete integration of payments and account operations from a single mobile app. So far, the mobile banking services based on smartphone access have largely taken the shape of simple renditions of the existing online functionalities in a mobile app form – one cannot possibly consider this a disruptive innovation. However, early symptoms of true innovations can already be observed, as in the case of the overseas Bank Number26 – "Your bank in a smartphone" – representing an entirely new business approach to banking services and a new concept of app functionality with potential to evolve into a disruptive innovation. Bank Num-ber26 is a German provider of mobile banking services (also with regular online access) with no physical points of service, which can be accessed from any location within the Euro zone (with the exception of Cyprus and Malta), offering full support of products such as card operations, account management and transfers, cash dispensing service via ATMs or paid from cash registers by selected outlets, etc. In its early days, the app was only an interface for third-party services, as the operations at that time were conducted without a banking licence. Thus, the impulse for this particular banking innovation came from out-side – its origins are in the fintech sector. In Poland, similar early symptoms of future innovation trends can be seen: as early as 2014, Alior Bank introduced mechanisms of support for invoices scanned and transferred from smartphones – this represents a truly innovative use of modern mobile devices, opening up new paths of development for the industry (e-point.pl 2017). The above are only examples of the latent potential behind the close and deep integration of banking as part of standard smartphone functionality, adding a completely new dimension to such elements as a personal contact list, event planner, and so on.

In parallel with the ongoing trend in mobile banking based on the idea of smartphones as wallets, and involving strong focus on mobile app development, the sector shows interest in alternative trends, such as the transition to responsive online banking through the use of the RWD (Responsive Web Design) technology – the first such solution (initiated in 2017) is already on offer on the Polish market (prnews.pl 2014). It seems reasonable to assume that new solutions in responsive online banking will soon emerge. One such promising area is the potential for direct integration of services with a mobile device, in place of the present middleware-based solutions (e-point.pl 2017).

New and prospective directions of development in the Polish banking industry, in the context of innovations

1. Introduction of new functionalities and service channels in online and mobile banking remains the core objective in the sector's development. In the area of banking services, innovations seem to place major focus on simplification of decision-making processes and streamlining of procedures. Present trends show a gradual emergence of another objective, aspiring to take the leading position, namely – providing cost effective methods for increasing the security of banking services.

2. In September 2019, the Payment Services Directive - PSD2 (2015/2366) regarding payment services, which all EU countries had to adapt to, came into force. This forced a stronger orientation of the banking development on:

- increasing consumer security and better protecting them against fraud in non-cash transactions, through a strong authentication procedure, and reducing customer liability for unauthorized transactions;
- increasing the speed of cashless payments.

This leads to the so-called open banking and two types of new services: Account Information Service (AIS) and Payment Initiation Service (PIS). The introduction of new payment services to legal transactions is an introduction to the construction of modern services based on the so-called API (Application Programming Interface), i.e. the economics of programmable access interfaces, which are to guarantee the safe functioning of both new services in the financial sector and are an introduction to the construction of so-called solutions open banking assuming the integration and greater personalization of financial and non-financial services for consumers and entrepreneurs performed by banks and competing technology companies. So far, the Polish Financial Supervision Authority's consent to provide services as a Third Party Provider (TPP) has been obtained by four banks in Poland, but fintechs are also applying for it - 64 notifications from foreign companies willing to provide services as TPP have already been submitted to Polish supervision (Uryniuk 2019). Banks will also have competition from the giants' websites - the so-called GAFAA (Google, Amazon, Facebook, Apple, Alibaba). The report „2019 Ovum ICT Enterprise Insights" shows that open banking will translate into better customer service and the so-called customer experience - 75 percent EU banks have confirmed that PSD2 will enable them to increase innovation by working with fintechs.

3. The future of banking (this also applies to Poland) will soon be shaped by the revolutionary impact of the latest techno-logical solution – the blockchain. Two important elements of this solution can be seen as evidence of the breakthrough nature of this innovation, namely:

- advanced cryptographic methods to increase the security of digital asset transfers, without intermediation or agency of any trusted third party (such as a bank), and
- the prospect of automating some of the most tedious banking procedures (from tasks related to checking decision compliance with the pending regulations, through claim processing, to communication and dissemination of last will), offered by the 'smart contract' instrument.

Preliminary analyses of potential risks and benefits associated with the broader use of the blockchain technology are al-ready under way, as evidenced by the report published by CB Insights, one of the globally recognised expert analytical centres specialising in new technologies (Szymański 2018). Polish banking sector also shows some interest in the blockchain technology, good examples being: the One Pay FX money transfer service offered by Santander Bank and serviced by the Ripple platform (prnews.pl 13.04.2018), or the first trade-finance transaction reported by HSBC and based on the distributed ledger technology (Wilson, White 2018). However, it seems that the key impulse for the increased interest from the Polish banking sector in blockchain solutions was not so much related to the impending competition from the fintech sector, but rather to the verdict of the EU Tribunal of Justice clarifying the concept of 'durable medium' in banking communication with customers (Polish banking sector was found in default of this regulation, as information passed via e-mails and via online banking platforms was judged in violation of the duty) and advised on reaching a systemic solution in this respect. Early in 2017, the national association of Polish banks - Związek Banków Polskich – in cooperation with banking institutions, initiated formal procedures for the development of a sectoral solution. The project reached the 'proof of concept' phase in 2018, as a blockchain-based solution offered by Billon (a Polish start-up company of the fintech sector, legal issuer of cryptocurriencies licenced by FCA – the British conduct regulator) in cooperation with Biuro Informacji Kredytowej (Credit Information Bureau) (prnews.pl 9.05.2018). The blockchain solution to the 'durable medium' problem, based on a distributed ledger system offered by Billon, shows promise to become the new standard for the exchange of digital information and assets. The solution presents a good embodiment of the new 'decentralisation paradigm' in banking and finance, much different from the established solutions employed by modern banks, and much favoured in the fintech industry. As such, it does not necessarily represent a new revolution in Polish banking, since it lacks the context of departure from the existing global financial order. It may, however, be read as a sign of two new trends in the area of banking security: decentralised and secure transaction systems

with proper support infrastructure (payment and settlement infrastructure), and the focus on increasing cost-effectiveness of such solutions. Blockchain, in this approach, serves to augment the traditional financial infra-structure, in terms of increased efficiency and omnipotence. But the world may still be in advent of a truly full-blown revolution in banking services, with the emergence of the Founders Bank, the first global and decentralised banking institution in world history, borne in the fintech sector with support from Binance (one of the largest cryptocurrency exchange providers) and in cooperation with Neufund platform (Germany). Founders Bank project is in the process of obtaining a full EU banking license under the regulation of the MFSA and the European Central Bank (Founders Bank 2018). The Founders Bank represents an entirely new approach to banking philosophy and business model. It is de-signed to utilise the blockchain technology in full capacity, instead of focusing on selected benefits (security) or restricting its use to narrow segments of operation. The originality of this approach lies in formulation of business and operational frameworks in tandem by stakeholders and ishareholders, giving the banking business an entirely new sense of existence (much different from the present profit maximisation models employed by financial corporations). The project is clearly designed to instil a revolutionary transformation of the existing global financial order into a zone of global financial order and just distribution of profits. It is obvious that the postulated model con-tests the pervasive 'greed is good' concept, along with capital concentration, profit maximisation, and corporate power. Proponents of this new revolution claim that the advent of new technologies, such as blockchain and tokenization, is a clear sign of the new era, but one that requires radical changes of standards and infrastructure. Most importantly, the future of these two trends seems to rest within legislative powers, slowly padding their way to embrace the rapid advancement of the technological blockchain revolution. Supervision authorities are left with the impossible task of trying to apply the existing regulations to a phenomenon that defies all available description. For the moment, the most favourable conditions in support of this type of operations are offered by the Malta Financial Services Authority.

Conclusions

So far, the development of the Polish banking in the area of funds transfer has transpired within the limits of the existing ('good old') global financial order, showing no real interest in exploring the new territories governed by the paradigm of decentralisation in finance and banking. Within the existing financial order, three distinct phases can be observed in the sector's development, which may be perceived as revolutionary: the card revolution based on dispersed networks of ATM, the online banking revolution based on Internet (PC) access, and mobile banking revolution following the introduction of smartphones and tablets. Each of the above revolutions resulted in a decidedly incremental increase in sector development. Despite being initiated at different points in time, all three phases are continued (often overlapping and converging), leading to further changes of a more evolutionary character, associated with such aspects as: updates and new functionalities, ease-of-use solutions and quality-of-life improvements, data transfer speeds, quality and range of account and finance management information, reduction of service costs and prices. This means that banks strive to implement sustainable innovations that are focused on product or service performance (resulting in improved performance in the attributes most valued by the main customers of banks) and affect the required business model (improve or maintain profit margins through the use of existing processes and structure costs and better use of current competitive advantages). At the same time, breakthrough solutions (disruptive innovations) must be implemented promptly, as the potential for supplying significant customer added value wanes dramatically if a bank fails to follow an important path of development. Directions for exploration are fairly diverse, including new uses for mobile apps, responsive online banking, open banking, and blockchain solutions for increased security and for servicing of selected narrow segments of operation.

From the viewpoint of financial innovations – sustainable innovations, both incremental and breakthrough in character – and their implementations, the present development of the Polish banking industry displays certain specific characteristics, namely:

- a relative expedience in closing the gap that distanced the sector from its counterparts in more developed economies,
- the incessantly high dynamics of growth, expressed both in the number of card users and the number of individual transactions (ATM and cashless),
- the increasing number, variety, and intensity of successful implementations, with examples of the world's first achievements, particularly after 2012, and
- nearly parallel coincidence and rapid development of innovations within each of the three revolutions, but also within the bounds of the established financial order.

At present, the sector reports suggest a rushing flood of interest among users in mobile banking solutions, but online banking and ATM banking remain as popular alternatives, as attested by continued growth in both segments. At the end of September 2019, active mobile banking users, with the help of smartphones and tablets, were already close to 13 million people. Already more than half of users of mobile banking applications are mobile only customers (prnews.pl 2019).

The most important challenge faced by the banking industry at present is the advent of the blockchain revolution. In an interesting turn of events, all major projects stemming from the fintech industry seem to concentrate on certain creative uses of the blockchain technology designed to replace some of the functions previously reserved to banks. The most decisive impulse for a revolutionary revision of the existing 'old' financial order will come from the fintech industry, perhaps in the form of the world's first decentralised and community-owned bank, currently awaiting banking licence approval in Malta.

In general, it can be stated that the development of the Polish banking sector was (and probably will be) stimulated by impulses generated outside the banking sector, causing revolutionary changes or impulses from the segment itself and causing changes of an evolutionary nature. Each new revolution in Polish banking (a new phase of banking development) in the area of funds transfer, triggered by a disruptive financial innovation that proves changes in the game by establishing new rules of the game in the banking sector, stimulates further changes and adjustments - i.e. sustaining innovations, resulting in noticeable development of banking services and their use by customers.

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References

- 2019 Ovum ICT Enterprise Insights, report. '*Ovum*, [Online], [Retrieved March 15, 2019], https://ovum.informa.com/products-and-services/data-services/ict-enterprise-insights
- Chakravorti, B. and Mazzotta, B. (2013), 'The Cost of Cash in the United States, 'IBGC Working Paper, September, [Online], Institute for Business in the Global Context, The Fletcher School, Tufts University, https://sites.tufts.edu/inclusioninc/files/2019/01/CostofCashStudyFinal.pdf.
- Christensen, C. M. (1997), The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail, Harvard Business School Press, Boston.
- Christensen, C.M., Horn, M.B.,Staker H. (2013), Is K-12 Blended Learning Disruptive? An introduction to the theory of hybrids, Clayton Christensen Institute, https://www.christenseninstitute.org/wp-content/uploads/2014/06/Is-K-12-blended-learning-disruptive.pdf

Christensen, C.M. (2014), Disruptive Innovation, The Encyclopedia of Human-Computer Interaction, 2nd Ed., Lowgren J., Carroll,J.M., Hassenzahl, M., Erickson, T. (ed), [Online], Interaction Design Foundation, Table 17.1, https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/disruptive-innovation

- Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market.

- European Central Bank (2007), Payment and securities settlement systems in the European Union. Blue Book, https://www.ecb.europa.eu/pub/pdf/other/ecbbluebookea200708en.pdf
- Federal Reserve System (2015), Strategies for Improving the U.S. Payment System, https://fedpaymentsimprovement.org/wp-content/uploads/strategies-improving-us-payment-system.pdf
- Founders Bank, [Retrieved December 22, 2018], https://www.founders.money
- FSB Financial Stability Board (2019), FinTech and market structure in financial services: Market developments and potential financial stability implications, https://www.fsb.org/wp-content/uploads/P140219.pdf
- Gupta, P., and Tham, T.M. (2018), Fintech: The New DNA of Financial Services, Walter de Gruyter GmbH & Co KG, DOI 10.1515/9781547400904-002
- IssingLecture, O. (2000), New Technologies in Payments: A Challenge to Monetary Policy, [Online], Center for Financial Studies Frankfurt am Main, [Retrieved June 28, 2000], https://www.ecb.europa.eu/press/key/date/2000/html/sp000628.en.html
- McKinsey.com (2019), Global Banking Practice, Global Payments Report 2019: Amid sustained growth, accelerating challenges demand bold actions, https://www.mckinsey.com/~/media/mckinsey/industries/financial%20services/our%20insights/tracking%20the%20sources%20of%20robust%20payments%20growth%20mckinsey%20global%20payments%20map/global-payments-report-2019-amid-sustained-growth-vf.ashx
- NBP (2003), Rynek kart płatniczych w Polsce, Warszawa, https://www.nbp.pl/systemplatniczy/karty/karty.pdf
- NBP (2018), Informacje kwartalne w latach 2005- I.kw.2018, Informacja o kartach płatniczych, Warszawa.
- NBP (2019), Informacja o kartach płatniczych III kwartał 2019, Warszawa, https://www.nbp.pl/systemplatniczy/karty/q_03_2019.pdf
- OECD/Eurostat (2005), Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd Edition, The Measurement of Scientific and Technological Activities, OECD Publishing, Paris, https://doi.org/10.1787/9789264013100-en
- Przyszłość bankowości mobilnej to serwisy lite, 'PRNews.pl, [Online], [Retrieved March 4, 2014], https://prnews.pl/przyszlosc-bankowosci-mobilnej-to-serwisy-lite-16486
- Raport: Liczba klientów mobile only – III kw. 2019, 'PRNews.pl, [Online], [Retrieved November 15, 2019], https://prnews.pl/raport-prnews-pl-liczba-klientow-mobile-only-iii-kw-2019-446926
- Responsywna bankowość internetowa, 'e-point.pl, [Online], [Retrieved August 2, 2017], https://www.e-point.pl/case-studies/responsywna-bankowosc-internetowa
- Santander uruchamia w czterech krajach pierwszą usługę płatności zagranicznych opartą o blockchain, 'PRNews.pl, [Online], [Retrieved April 13, 2018], https://prnews.pl/santander-uruchamia-czterech-krajach-pierwsza-usluge-platnosci-zagranicznych-oparta-o-blockchain-santander-one-pay-fx-434470
- Schmiedel, H., Kostova, G., Ruttenberg, W. (2012), 'Social and private costs of retail payment instruments: a European perspective' ESTA Business Conference "Crisis: Cash is Meeting the Challenge", 3 June 2013, Marseille, European Central Bank, https://www.ecb.europa.eu/pub/pdf/scpops/ecbocp137.pdf
- Szymański, D. (2018), 'Banki obudzcie sie!, *'Business Insider*, February 21, https://businessinsider.com.pl/finanse/kryptowaluty/blockchain-i-kryptowaluty-a-banki-raport-cb-insights/4dwh7ck
- Thomalla, P. and Arsdale, J.V. (2017), The New Payments Ecosystem: Fast, Open, Secure and Disruptive, ACI Worldwide, https://www.aciworldwide.com/-/media/files/collateral/trends/the-new-payments-ecosystem-disruption-ebook-banks.pdf
- Trwały nośnik bik billon wprowadzają rozwiązanie wykorzystujące blockchain, PRNews.pl, [Online], [Retrieved May 9, 2018], https://prnews.pl/trwaly-nosnik-bik-billon-wprowadzaja-rozwiazanie-wykorzystujace-blockchain-434854
- Uryniuk J. (2019), Fintechy w natarciu, [Online], KNF, [Retrieved September 11, 2019], https://www.cashless.pl/6386-knf-tpp-psd2-liczba-zgloszen
- Wilson T. and White L. (2018), 'HSBC swaps paper records for blockchain to track $20 billion worth of assets, *'Reuters*, November 27, https://www.reuters.com/article/us-hsbc-hldg-

blockchain/hsbc-swaps-paper-records-for-blockchain-to-track-20-billion-worth-of-assets-idUSKBN1Y11X2

- Wu, S. (2015), 'Forrester Research Mobile Payments Forecast 2014 to 2019, *'Forrester Research*, https://www.forrester.com/report/Forrester+Research+Mobile+Payments+Forecast+2014+To+2019+EU7/-/E-RES121015
- ZBP (2019), Raport NetB@ank, https://www.zbp.pl/getmedia/02918dd2-bf12-4cf7-a70a-09c1a297471c/Raport-Netbank_Q2-2019

The Support of The Bioeconomy in The Development of The European Union

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Abstract

In this study I will show that the bioeconomy involves a multitude of factors and actors whose collaboration depends on its success. Most of the times, the bioeconomy starts from the available resources, and its development can be influenced by the accumulation of new knowledge generated by the research-innovation projects. In the development process, the EU has identified a series of major social challenges whose resolution the bioeconomy can also contribute to a great extent. In order to support the development of the European Union, bioeconomy must establish a balance between economic growth, social development and environmental protection, which are essential components of sustainable development.

Keywords: Bioeconomy, European Union, Policies, Development

Classification JEL: F63, Q01, Q57

Brief History

The bioeconomy first appeared in the work *"The Entropy Law and the Economic Process",* published in 1971, on economic entropy. The father of bioeconomy theory, a theory that presents a revolutionary, integrative way and shows you how to see the economy, is Nicholas Georgescu-Roegen, a mathematician, statistician and American economist of Romanian origin.

Officially, a first definition of the term bioeconomy, given by the OECD, appeared with the publication of the document *"The Bioeconomy to 2030: Designing a Policy Agenda".*

Initially, in the European Union it was used the term of economy based on the bio concept, first oriented to food and energy. In a communication from the European Commission of 2011, the economy based on the bio concept is presented as "the full range of natural and renewable biological resources - terrestrial and marine resources, biodiversity and biological materials", to this concept being assimilated rather references to natural resources than to the conversion process itself.

Investigation of the specialized literature

I have studied the work entitled *"Leading the way to a European circular bioeconomy strategy",* Hetemaki et. al. (2017) and I've found that the authors believe that the orientation towards a circular bioeconomy could allow the achieving of at least some of the *Sustainable Development Goals (SDGs)* set by the United Nations (UN) for the period 2015 - 2030, which would lead to a growth of the whole economy.

In the authors' view, circular bioeconomy means more than bioeconomy or circular economy, so we made a table that presents sustainable management for the various ecosystem services.

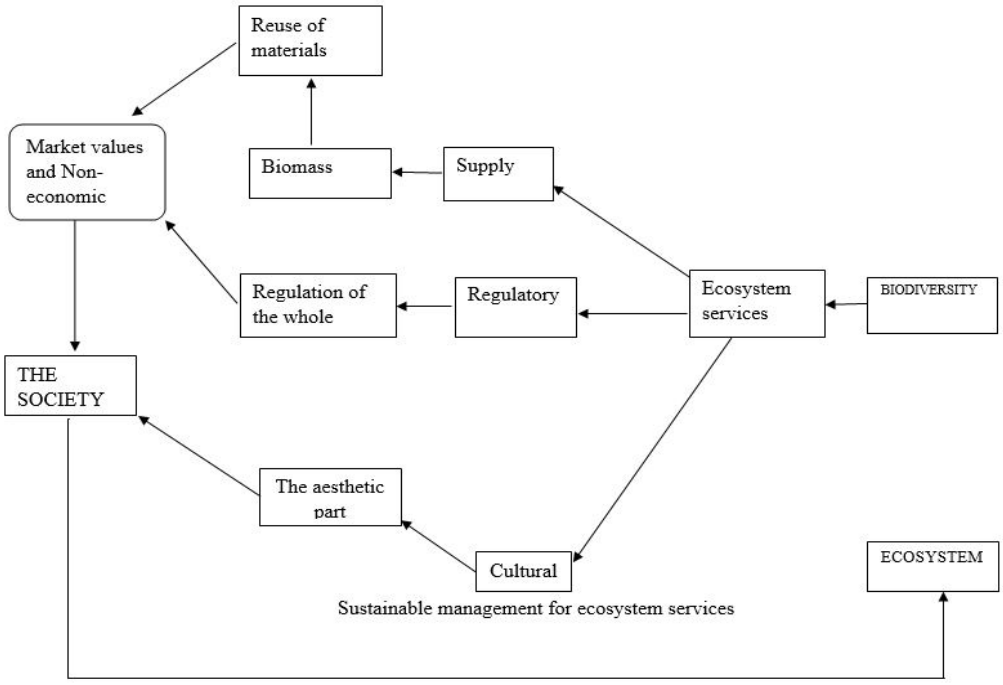

Figure 1: Bioeconomy seen as a future strategy

Source: Adaptation by Hetemaki et. al., Leading the way to a European circular bioeconomy strategy, 2017

From the figure above we see how biodiversity leads to ecosystem services, services that can be of Supply, Regulation and Cultural services.

The Supply services are directed towards the Biomass, then towards the Reuse of the materials to preserve the natural climate, the Regulatory ones follow the Regulation of the procedures of the whole climate, and the Cultural services follow the Aesthetic part. All this leads to a good organization and coordination of market values, but also of non-economic values.

Following the study of another paper, published by D'Amato et al. (2017), I found that, if we follow the concept of circular bioeconomy, we observe that this merges the two tendencies related to the concepts of circular economy, on the one hand, and bioeconomy, on the other, with the purpose of connecting rural and urban communities. This conclusion is the result of the analysis of 2,000 scientific articles that study the circular economy, the green economy and the bioeconomy.

Significant differences between concepts emerge from the specialty literature, but if we look at it from the perspective of scientific research, we see that the definitions and differences are very clear. An example can be given after I have studied the articles published by the above-mentioned authors, where I have identified that the circular economy is found in the specialized literature in closer connection with the urban industrial process, while the bioeconomy is analyzed in connection with the innovations related to the resources and land use in the context of urban development.

How the bioeconomy appeared and who supports it

Over the last 20 years, new concepts have emerged in the global economy. All these concepts are based on the same premise and have a common purpose, namely how the society will succeed in creating a balance between the resources available, which are limited, and the needs or desires of its members, which are potentially unlimited.

At the moment, there are asked questions which follow which of these concepts is more complex, what similarities and differences are between them, but also which will best answer the present and future needs of the society.

Table 1: Green economy, circular economy, bioeconomy

Source: Adapted by the author after the European Commission

	Green economy	**Circular economy**	**Bioeconomy**
When did it appear?	It was introduced in 1989 in the Blueprint report for a Green Economy (Pearce et al., 1989). The role of the report was to advise the UK government if there is a consensual link between the term of sustainable development and its implications for recording technological progress.	It took shape after 2012, with the publication of the report *Towards the Circular Economy: Economic and Business Rational for an Accelerated Transition* (Ellen MacArthur Foundation, 2012).	Its foundations were laid in the 1990s by the European Council - *Growth, competitiveness and employment. Challenges and ways to be followed in the 21st century*, document also known as the *White Paper of 1993* (European Commission, 1993).
How is it distinguished?	It aims to improve human well-being and social equity, significantly reducing the risks to the environment and the ecological deficit. At the same time, it is resource efficient and socially inclusive and generates low carbon emissions, according to the United Nations Environment Program (UNEP) in 2011.	It is regarded as the only viable alternative to the linear economy, i.e. the classical model of production and consumption. The raw materials are taken from nature and are used in the manufacture products, which are then consumed and eventually disposed of in the form of waste, and the cycle is realized again, reaching the concept "manufacture – use - throw".	It tracks the intelligent use of resources and encompasses the production of renewable biological resources and their conversion into food, animal food, bioproducts and bioenergy.

Therefore, the three concepts - green economy, circular economy, bioeconomy are different from several points of view, but in principle they have common goals.

However, the bioeconomy represents more than the circular economy or the green economy, because this aims to increase the efficiency of the production process beyond maintaining the value of products and materials for as long as possible.

Is the bioeconomy coming to support the development of the European Union?

In the last years the first aggregate data on the "size" of the bioeconomy began to appear and the main sectors completely integrated in the bioeconomy refer on the one hand to agriculture, forestry and fisheries, food, beverages, tobacco, paper and paper products and, on the other hand, in the textile and textile sectors, forestry industry, chemicals and plastics, pharmaceuticals, biodiesel and bioethanol production, bioenergy.

For a good development of the European Union, I think that some priorities must be achieved and followed until they are implemented.

Table 2: The bioeconomy priorities in the EU development

The relevant priorities of the bioeconomy for the European Union development	
Jobs that lead to economic growth	Stimulating investments and creating jobs
Energy union and combating change	Energy more secure, more sustainable, at accessible prices
A deeper economic and monetary union	A balanced and progressive trade policy that to capitalize the opportunities offered by globalization
An open trade - without sacrificing the European standards	To combine stability with equity and democratic responsibility
A deeper and fairer internal market	The digital single market

Source: The contribution of author based on literature.

The bioeconomy has received support from the European Union, and its strategies and initiatives are considered both a necessity and an opportunity.

For a good organization of the development policies of the European Union, the bioeconomy aims to promote public and private research, investments of companies in innovation but also the creation of multidisciplinary alliances between research centers and companies, so as to increase the chances of obtaining funds for development.

At the same time, as the social, political and administrative context of the bioeconomy is being consolidated, the proposed measures allow a social dialogue program on the bioeconomy, and the generation of an extended group of stakeholders from the bioeconomic field, but also the promotion of bioeconomic education in universities..

For a good development of the European Union we must follow the bioeconomy on the development side of the concept of social and environmental sustainability where we identify the legislative, administrative or of another nature limitations that impede the entry of new products into the market, but also how we can support the promotion of exports for new products obtained from biological resources, which come along with the analysis of standardization and certification processes of products or services.

Conclusions

In order to support the development of the European Union, I believe that the whole society must become aware of the role that the bioeconomy can play in meeting all needs. Bioeconomy is represented as a strategic, interdisciplinary, long-term project that addresses global issues that can only be solved through dialogue and collaboration between all stakeholders.

For a good organization, the bioeconomy helps to carry out research and innovation in the biological sciences sector in order to support the economic activities and to create advantages for the public, and has as main fields of action the health, energy, agriculture, environment and information sharing between different sectors.

The bioeconomy has development perspectives, if a closer partnership will be realized between the entrepreneurs, the academic environment, the central and local authorities, and, last but not least, the media as a means of promoting the proposed measures.

We want the European Union to rise to the highest standards, but we must realize that the change begins with us. We must support the bioeconomy, ensure the energy and resources efficiency, decrease the pollution degree towards 0 and be actively involved in creating the consumer profile.

References

Bairoch, P., (1981), "The Main Trends in National Economic Disparities since the Industrial Revolution", in Bairoch, P. and Lévy-Leboyer, M. (eds.) Disparities in Economic Development since the Industrial Revolution, London and Basingstoke: Macmillan Press;

Cohen, J., (1997), "Politics and economic policy in the United States", Editura Houhton Mifflin, Boston;

D'Amato et al., (2017), " Green, circular, bio economy: A comparative analysis of sustainability Avenues", *Journal of cleanen Production*, Volume 168, 2017;

Hetemaki et. al., (2017), "Leading the way to a European circular bioeconomy strategy", European Forest Institute;

Mascu Simona, Brasoveanu Iulian,(2015)"Politici publice utilizate in eco-bio-economie pentru asigurarea dezvoltarii durabile", Editura ASE, Bucuresti;

Mihai E. Serban, (2013), "Noua unire cu natura", Editura Universitara, 2013;

Musat, M. (2019), "European Union Economic Integration And Development", *Global Economic Observer*, 1,(17), 80-85, [Online], [Retrieved at December 27, 2019], http://www.globeco.ro/wpcontent/uploads/vol/split/vol_7_no_1/geo_2019_vol7_no1_art_009.pdf;

Nicholas Georgescu-Roegen, (1971) "The Entropy Law and the Economic Process", Harvard University Press.

Digitalization of Higher Education (On the Example of Distance Course of Urfu)

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Abstract

Digitalization has covered all areas of our lives, including education, changing it in a fundamental way. National digital education platforms allow a variety of distance courses to study, the same opportunities provided by educational platforms of individual universities, including UrFU. The purpose of this article was to conduct an evaluation and comparative characterization of the distance form of higher education on the example of a philosophy course for bachelors in Ural Federal University in terms of its flexibility and openness. We also aimed to analyze the advantages and disadvantages of distance learning as such. The model by D. Orr et al. was the basis of the research, using as the main criteria: 1) delivery; 2) content; and 3) recognition of learning outcomes. The data obtained allow us to conclude about a sufficiently high level of openness of distance education (65%), not a sufficiently high level of its flexibility (20%). There is also no doubt that distance learning is very convenient for students, which was noted by 75% of respondents, while 16% of respondents said that communication with a teacher is preferable. We believe that distance courses in humanitarian subjects for students of technical specialties should be converted into a blended form, which will allow students to create the soft-skills so necessary for them, such as creativity, sociability, communication, teamwork, that are in demand on the labor market of Industry 4.0.

Keywords: Digitalization, Higher Education, Distance Education, Teaching Methods.

Introduction

With the emergence of new information technologies, all around the world higher education is undergoing a period of transformation, which has affected our country as well. Digitalization of all areas of public life has become part of a general state program directly related to the field of education. [5, p. 124; 12]. Federal Authorities created the project "Modern Digital Educational Environment in the Russian Federation" and educational portal "Modern Educational Space in the Russian Federation", which included 125 Russian universities. [Ibid., p. 127] On the UrFU platform, which is also part of this educational portal, there is a course on philosophy, which we are going to consider in this paper based on the opinions of its listeners.

Digitalization is indeed the main direction for modern Russian higher education, as evidenced by experts (1,481 teachers and management representatives from 65 Russian universities) who took part in a study conducted at Siberian Federal University by V.S. Efimov and A.V. Lapteva and was presented in the article "The future of universities - is digitalization really a priority?" [3] It was found that in fact among the priorities of the high educational institutions on the first place is "PR and promotion of the university," as well as "interaction with the Ministry of Education and Science and

federal authorities," while investments in digitalization occupy only the third place among the current priorities of universities. [3, p. 1925] At the same time, experts note that some of the most important problems that higher education may face in the near future are "degradation of secondary education" and "development of the country according to the scenario of" commodity power "[3, p. 1925].

The purpose of our study is to consider the effect of digitalization of higher education as a distance learning form. Despite the fact that this form of training is gaining popularity everywhere, its effectiveness is still questionable. Experts, scientists, the administration of higher education institutions, as well as the participants of the educational process – teachers and students, have ambiguous opinions about it. Doubts are caused by such aspects of distance education as the criteria for evaluating tasks, the inability to accurately identify the person, who performs these tasks – the need for proctoring system, and the main problem is the motivation of students, since the absence of the teacher's identity can not be filled with any soft or hard deadlines, ratings, etc. Another important disadvantage of distance education, which we emphasize in our study – is the lack of communication between the teacher and students, which greatly impoverishes both the educational process as a whole and the personal development of students and strongly transforms the very profession of a teacher.

Methodology

The basis of our research was a model that considers flexibility and openness as key characteristics of distance education, proposed by D. Orr, M. Weller and R. Farrow and tested it at a URFU course. To check this model we gave a questionnaire to students who attended the course. In addition, we supplemented our study with an analysis of modern domestic and foreign sources on this issue, published in 2017-2019.

Distance education has become part of modern life, allowing to get both first education and retraining or advanced training. Despite constant criticism from adherents of traditional forms of learning, distance education is increasingly complementary to or replacing face-to-face education. If we accept distance learning as an equal form among others, we need to find adequate criteria to evaluate it. D. Orr, M. Weller and R. Farrow propose this kind of criteria. Their article has a title: "How does digitalization affect the flexibility and openness of higher education as such?" [9] The authors propose to base the idea of three pillars of education: "hours, content and powers." The authors finalize this model and consider it possible to talk about such components of education as 1) delivery; 2) content and 3) recognition of training results. All three criteria were considered in terms of flexibility and openness of education. In the above article, the authors analyze data on universities around the world having distance programs and courses. As the application of the proposed research model, the authors consider it possible to present 6 versions of its modification. Each modification is a diagram, on which 9 axes are located: 1) content delivery - flexible; 2) of content delivery - open; 3) content production - open; 4) content personalization; 5) support delivery - open; 6) support delivery - flexible; 7) recognition - open; 8) formal recognition - flexible; 9) assessment - flexible. [9, pp. 1-6)].

For our part, we propose to check this model on the example of UrFU and distance courses read for students of technical specialties.

Results of the study

Based on the results of a small study (150 respondents) conducted among students of the Radio Engineering Institute who took a distance course in philosophy last year, the following data were obtained. We obtained the following results on the respective scales: 50%; 2) 61,4%; 3) 15,9%; 4) 40%; 5) 50%; 6) 55%; 7) 15,9; 8) 10%; 9) 11,4%.
How can we translate this data? What do they mean? First of all we must pointed out, it is obvious that the greatest estimates are given in indicator 2 - openness of content delivery and 6 - flexibility of support delivery. This means, that students appreciate the possibility of accessing the course materials, considering that this course is available to everyone (52.3%), or is available to students of

universities included in a single educational space (9.1%). Accordingly, the lowest scores were obtained for 7 - the openness of formal access to learning results, because each student can only see the results of his or her learning, so consider 65.9% of the respondents and can also see only the results of his or her academic group as a whole - 18.2%. Also 8 - flexibility of formal access to training results, i.e. assessment per course is made up of estimates for individual tasks and results of final testing, as 55.5% of respondents believe. 9 indicator - flexibility of assessment of course results, i.e. 88.6% of participants believe that only creators of the course and tutors can carry out current and final control of the course. In addition, quite low estimates were obtained for 3 indictor - openness in content creation, because 84.1 students believe that the content of the course is exclusively determined by the author and the management of the institute, respectively students themselves, for example, cannot participate in topic correction, task creation, etc.

We can conclude from this data that the openness and flexibility of the distance course on philosophy were rated on 5 out of 9 indicators at 40 to 60%, and on 4 indicators at 10 to 20%. It turns out that the accessibility, i.e. the openness of this course to everyone is high, but the flexibility, i.e. the possibility of influencing its content, cannot be rated high enough. We must mention that the course discussed by us, is located on the platform of open education: http:// openedu.ru, which means that everyone has access to it. There also, for example, you can find a course for masters in "Philosophy and Methodology of Science," Time Management, "and many others also created by UrFU teachers.

The results, similar to those presented in this article, were obtained by Chinese scientists who conducted research on two groups of students who studied "Inorganic Chemistry" at the College for School Teachers in Shaanxi Province in a mixed-learning option: students watched online lectures and then discussed them at seminars, working in groups led by a teacher. [14] One group was experimental and the other was control. The students used the distance course (MOOC) for 6 weeks, listening to lectures and doing the corresponding tasks in it, and then already discussed what was not clear to them in the group with the teacher. The results of this study showed that 1) in the learning process, about 80% of students watched instructional videos more than up to half; 2) about 55% of students did more than half of online assignments, although a significant decrease in the number performing these assignments was observed - to 41.6%, starting with the second week of study. The authors of the study explain these results by the fact that the participants as a result could only see whether their answers were correct or not, but did not receive appropriate explanations, they were not provided for by the distance course. This, by the way, is one of the main disadvantages of all online courses. 3) 90% of students were satisfied with the very process of communicating with other students in groups when discussing course materials and 80% were satisfied with the communication between teacher and students 4) 90% of students praised the quality of online lectures and the possibility to view and review them, as much as needed. 5) 70% of students were convinced that the mixed learning option made their learning more effective. [Ibid., p. 11-12]

Discussion

Recently were published the results of a large-scale sociological study conducted under the leadership of Professor of Social Sciences G.E. Zborovsky in the universities of UrFO in 2018. According to it, the author raises many questions and discusses the pressing problems of modern Russian education. The main idea discussed by G.E. Zborovsky is to answer the question about the advantages and disadvantages of distance education, the main disadvantage of which he considers the division of the two main groups: students and teachers. Distance education, designed to link, on the contrary, breeds more and more teachers and students. "Meanwhile, distance education was originally conceived as an opportunity to establish new forms of communication between teachers and students. One of the main terms in the process of technological implementation of this type of formation - connect - means "connect, bind." But ironically, quite quickly, distance education from the linking, connecting has turned into its opposite - into an undertaking separating students and teachers. "[15] But, on the other hand, the obvious advantage and merit of distance education lies in its flexibility and supposed openness (which is true only partly and with many reservations, though proclaimed). Its flexibility is evident just in the independence of time and place, and sometimes even the pace of passing the course. This is the dignity of distance courses noted firstly by all students interviewed by us (75%).

It turns out to be an interesting situation: the distance nature of training is both a downside and a plus of this training, separating the teacher and the student, but freeing both of them from the need for mandatory interaction in a strictly defined time and place. This leads to the following obvious problem of distance education - assessment of learning outcomes and development and improvement of new methods of testing these outcomes. Here, of course, the task of organizing such work of students that not only trains their memory, but also other cognitive abilities: imagination and thinking, and creative abilities based on them, comes to the fore. How can we train this skills online, while tasks of the course, as well as answers to them, prepared in advance? So, what about problem learning, dialogue that encourages communication and activates thinking abilities? This task in distance education has is performed by blogs, chat rooms, seminars, where students ask questions and together search for answers to them, sometimes with the help of a teacher. However, in a series of studies [2] were noted that these tools of distance education are rarely used. "This indicates that tools like virtual seminars, online exams and professional networks are used extremely infrequently" [Ibid., p. 10]. Part of this task is to be carried out by mutual checks, i.e. mutual assessments of works/tasks by the course participants themselves, not by the teacher. Here we usually face initially loyalty of listeners to each other and a known different basic level of knowledge in a certain area, which does not allow everyone to complete the task completely in accordance with the requirements of the teacher. All these requirements, as well as the criteria for their evaluation, remain largely completely formal and rarely relate to the content of the work itself. As a result of this learning method, the teacher disappears as the key figure who evaluates and guides the student.

Of course, it is assumed that during 11 years of school the student has acquired an advanced skill in searching and working with information, which allows him to quickly and accurately find answers to the questions asked. Obviously, the answers to the questions of the tests are far from the same as the answers to the problematic questions of the teacher at the university, because for their preparation and formulation it is necessary to think, analyze, compare, rather than simply copy the found information. This skill is very much lacking for modern students. Lack of autonomy, which is particularly surprising at the beginning of the 21st century, when everyone and everyone "aspires" to it, not wanting and afraid of it really. So, here we see an infantile and in many ways template-thinking individual for performing distance course tasks and watching lectures. What do we want to get as a result? Where he will develop skills of creative thinking and originality, if there is no competition (each student knows mainly about his achievements, i.e. the level of academic achievement in the course - 65.9% of respondents believe that this is true, as a holistic picture is seen only by a teacher or a technical specialist, or a educational management, i.e. a person with the appropriate powers); communication (because there is no dialogue, which means there is no need to defend the actual opinion, look for arguments, etc.), team work?

In contrast to the opinion expressed in our article, M. Radovic-Markovic believes that distance education provides more opportunities for communication between teachers and students, communication becomes less formal, stimulates critical thinking and, in general, gives more freedom in discussing topics of the subject area. When students participate in a dialogue, nobody is looking at them, they do not attract attention, and, indeed, this is convenient for some people from the point of view of psychology. [7, p.292]

These are all key requirements for a modern person who wants to be successful, and therefore competitive in the labor market. It is interesting that G.E. Zborovsky also points to this: "only 10-15% of students are really motivated for educational activity and only 20% value the time factor in daily activity." [15, p. 53] With regard to the last comment, this is particularly surprising, especially since in the same article the author refers to an increase in the number of students who have been looking for work since the second year, and therefore spend their time not only on study, but also on work. Therefore the skills of self-management and time management should be demanded among students. It is a pity, but not many people realize it apparently. With regard to the students of the Radio Engineering Institute, I would like to note the following. Although they, in terms of their future profession, feel in a fairly privileged position in the labour market and indeed they fall into the I or III quadrant, according to model by F. Fossen and A. Sorgner, [4] because it refers to "Rising Stars

Occupations" or " Human Terrain Occupations." However, it is those additional to the main soft-skills, so necessary in the future, in principle, cannot form outside the group of other people exclusively in the digital environment. Most interesting, the possibility and ability to form these skills appears in students of technical specialties precisely when studying humanitarian subjects. One of the most difficult and important subjects designed to shape students "independent thinking" is the philosophy, which with easy submission of university leadership has been put into distance course mode (for some institutions). We will not discuss the reasons for such a short-sighted decision, but its devastating consequences will still affect students. However, it is pleasing that not all students think the same and there are those who consider the distance form of philosophy learning unacceptable because of the "fundamentality" of philosophy, as one listener has said, "Philosophy is fundamental and complex in self-study, thus online philosophy is not an effective way to study, (rather, from the discharge of hobby-study)." It is worth noting that 16% of respondents to the question "Should all humanitarian subjects be translated into an online environment?" answered that direct contact between the student and the teacher is preferable.

Despite these problems, the evaluation of distance learning should not be one-sided, so we will consider both the advantages and disadvantages of this form of training on the example of some of the studies and literature analysis.

In the article mentioned above, M. Radovic-Markovic points out the following positive aspects of online learning:

- Students at more than 90% of virtual facilities are satisfied with this kind of education and knowledge acquisition
- If you train teachers, the results of the education are good.
- Saving time and effort of teachers, which turns into additional income for the University. However, it is worth noting that in Russia, teachers are afraid of losing their "teaching rent", as noted by Roshchina Y. M. et al. [11, pp. 174-199.]
- Students also believe that the quality of distance education is not inferior to the traditional one, in addition, the training itself can be completed in a shorter time.
- At the same time, it should be noted that the work of the teacher changes its nature and becomes more stressful, since it requires daily communication with students, and not only during consultation hours.
- The number of students who want to get higher education is increasing.

The author also tells us that not all faculties switch to distance learning, some of the highly rated ones do not seek it, not seeing the need for it. [7, p. 191-193]

Another large-scale study conducted in Russia in 2016. Roshchina I. M. et al. [7] showed that along with the advantages of distance learning that we have already listed, online course participants in Russia point to following disadvantages: "a high probability of not completing the training (48%), the lack of individual communication with the teacher (41%), the inability to control who performs the task (30%), the requirement of payment for obtaining a certificate of completion of such a course (22%). The possibility of reducing the quality of education when using mass open online courses was noted by 18% of University students"" [7, p. 184]

An exhaustive analysis of the advantages and disadvantages of distance learning is presented in the article Arkorful V. and Abaidoo N. "The role of e-learning, advantages and disadvantages of its adoption in higher education". [1]

Another study that we would like to mention was conducted by scientists from Eastern Europe and is an analysis the demand for distance learning. [13] Analyzing the reasons for students ' choice of distance learning, the authors come to the following interesting conclusions: "The following conclusions can be drawn from the data listed above. Firstly, students who prefer the distance education form choose it not because of the form of the received materials but due to another reason. Secondly, students do not use information technology tools for acquisition of study information; they

still prefer traditional forms of real-life communication with the lecturer**.** It is fair to assume that the preference of this form is a result of the education at school, based only on communication between the teacher and the student. The core disadvantages of the distance education model mentioned by the students are insufficiency of face-to-face communication with the lecturer and lack of practical studies. Self-control and motivation are essential requirements of distance learning; however, many students lack them."[13, pp.110-112]

A separate detailed article is devoted to a comparative study on the electrocardiogram course, which students of one of the German universities can learn both online and face-to-face. The authors come to the following conclusions: "Despite the limitations mentioned above, our results provide first indications that the following three aspects could be of particular interest in the future development of online courses in order to better meet students' needs:

- Extrinsic motivation – create both fixed timeframes for working on topics and external support of self-regulation,
- Intrinsic motivation –Feedback to students and
- Preference of formats that enable at least some personal interaction with the lecturer" [6, p. 7]

Finally, we should mention another author, whose critical message is aimed at analyzing the opportunities that appear in different segments of the population in connection with distance learning. A separate study conducted by S. R. Lambert focuses on the reasons that enables and constraints the study of online courses. To do this, the author suggests considering each course through six relevant dimensions: technology, autonomy, purpose, skills, social support, and training materials. A separate area of research by the same author is related to the study of opportunities that appear due to the introduction of online training for everyone. Here, the focus of research problems is centered around the issue of accessibility of distance courses for people who, for example, lack basic knowledge (did not study well in school or did not finish it), do not know English, have a cultural background, different from European or American, etc. [7,8]

Conclusions

1. We believe that in the continuation of our study masters can be interviewed who listen to the distance course on Philosophy and Methodology of Science. In addition, a comparative study to evaluate the technical distance courses taught at UrFU for humanitarian professions is needed.
2. We also believe that mixed or blended training in the study of distance courses is worth to use. That is, holding lectures in a distance, online version, and after that group work in audiences. This will allow developing the skills of dialogue and communication so needed by students. We can apply this method, for example, for humanitarian courses in technical fields or for technical courses in humanitarian fields.
3. We are convinced that integration of different subjects into one course through modular training can be used, or through consistent teaching of different subjects within the same course. For example, it can be philosophy, logic, history of science and technology. If this is built into a unit course, where it is possible to weave topics and transit from one subject area to another, it would create in students minds a single picture of the history of ideas. They could see the process of there emergence, formation, consistently tested, denied and only the strongest remained as theories in science, making up the basis that is familiar to us today. Then students of technical specialties will have no rejection to humanitarian disciplines. It is necessary not to reduce the number of hours in humanitarian subjects or to translate them completely into a distance format of training, but to integrate them into technical specialties, at least in terms of studying the history of these sciences. Modern technicians, future engineers, have a steady, completely deceptive and actually dangerous illusion of seeing the world as it is (not for a second doubting in the correctness of their view). They do not realize that our whole world itself (our Planet), but also humanity in particular, has passed a rather long path of development, which needs to be known not just to broaden their horizons, but to understand the present state of affairs, to better represent our place in the world and our prospects.

Of course, integrating different humanitarian subjects into one course requires the interaction of different teachers, often working in different departments, much less when it comes to integrating humanitarian knowledge into technical knowledge. It is necessary to learn different subject areas by one teacher, but it is quite difficult, considering specialization.

It is also important to remember the ethical component of any knowledge, and especially its application from a technical point of view. Modern technologies fundamentally change our lives, so ideas about the value of human life, about the basic categories of freedom, responsibility, good and evil should somehow be part of the program of humanitarian courses for students of technical specialties. Scientists already now ask questions about the change of legislation due to the emergence of robots and artificial intelligence, the carriers of which need to be included in legal and ethical relations with people. These are not fairy tales from the future, but our present.

The process of digitalization, having fundamentally changed education, has become an integral part of it. It brought new challenges and new interesting ways of solving problems, new methods of training and evaluation of the results of the educational process. Our task is to make the new education effective and useful to all its participants. A careful study of the advantages and disadvantages of online learning will make it more effective and meet the requirements of both teachers and students.

References

- Arkorful V. and Abaidoo N. (2015) 'The role of e-learning, advantages and disadvantages of its adoption in higher education,' *International journal of instructional technology and distance learning*, 12 (1), 29-43.

- Bond, M., Marín, V.I., Dolch, C. et al. (2018) 'Digital transformation in German higher education: student and teacher perceptions and usage of digital media,' *International Journal of Educational Technology in High Education*, 15 (48), 1-20.

- Efimov V.S. and Lapteva, A.V. (2018) 'The Future of Universities: Is Digitalization the Priority? (Expert View),' *Journal of SibFU. Humanities and Social Sciences,* 12 (2018(11), 1925-1946.

- Fossen F. and Sorgner A. (2019) 'Mapping the Future of Occupations: Transformative and Destructive Effects of New Digital Technologies on Jobs,' *Foresight and STI Govenance*, 13 (2), 10-18.

- Ilyina E.A., Shchiptsova A.V., Poverinov I.E., Grigoreva S.V., Gorshkova N.K. and Fisunov P.A. (2019) 'Features of the Development of the Digital Educational Environment in Russia,' *International Journal of Higher Education*, 8 (7), 121-131.

- Keis O., Grab C., Schneider A. and Öchsner W. (2017) 'Online or face-to-face instruction? A qualitative study on the electrocardiogram course at the University of Ulm to examine why students choose a particular format,' *BMC Medical Education,* 17 (194), 1-8.

- Lambert S. R. "Do MOOCs contribute to student equity and social inclusion? A systematic review 2014–18," *Computers & Education*. [Online], [Retrieved January 10, 2020], http: www.elsevier.com/locate/compedu

- Lambert S. R. (2019) 'Six critical dimensions: A model for widening participation in open, online and blended programs,' *Australasian Journal of Educational Technology*, 35(6), 161-182.

- Orr, D., Weller, M. and Farrow, R., (2019). "How is Digitalisation affecting the flexibility and openness of higher education provision? Results of a global survey using a new conceptual model'. *Journal of Interactive Media in Education*, 2019 (1): 5, p.1-12.

- Radovic-Markovic, M. (2010) 'Advantages and Disadvantages of e-Learning in Comparison to Traditional Forms of Learning,' *Annals of the University of Petrosani, Economics*, 10(2), 289-298.

- Roshchina Y. M., Roshchin S. Y. and Rudakov V. N. (2018) 'Demand for mass open online courses (MOOC) experience of Russian education,' *Educational Studies Moscow*, 1, 174-199.

- Safiullin, M.R. and Akhmetshin, E.M., (2019) 'Digital transformation of a university as a factor of ensuring its competitiveness,' *International Journal of Engineering and advanced technology (IJEAT),* 9 (1), 7387-7390.

- Vasilevska D., Rivza B., Pivac T., Alekneviciene V. and Parlinska A., (2017), 'Analysis of the Demand for Distance Education at Eastern and Central European Higher Education Institutions,' *Journal of Teacher Education for Sustainability*, 19, (1), 106-116.

- Wang, K., Zhu, C. "MOOC-based flipped learning in higher education: students' participation, experience and learning performance," *International Journal of Educational Technology in Higher Education*, 16, 33 (2019) [Online], [Retrieved January 10, 2020], https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-019-0163-0
- Zborovsky G.E. (2018) 'Whether it is possible to be together while in trouble: students and teachers at the university' *Sociological research*, 9, 50-59.

Análisis Crítico Del Discurso En Las TIC Sobre La Ley De Procedimiento Administrativo General De Perú

Critical Analysis on The Speech in The IT About General Administrative Procedure Law in Peru

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Resumen

El presente artículo analiza las TIC en la Ley de Procedimiento Administrativo General peruano con base en el análisis crítico del discurso desarrollado por Van Dijk (2016). A pesar de que se ha realizado con fines de agilizar o efectivizar la atención a los ciudadanos en relación con la función administrativa del Estado; sin embargo, existe una asimetría en este proceso porque las entidades públicas sí cuentan con equipos o dispositivos tecnológicos para dar a conocer sus actos administrativos, pero los ciudadanos que viven en zonas rurales o alejadas de las urbes, donde no cuentan con internet, no tienen acceso a la información.

Palabras clave: Análisis crítico, procedimiento administrativo, función administrativa, asimetría.

Summary

The present article analyzes the IT in the General Administrative Procedure law in Peru based on the critical analysis of speech developed by Van Dijk (2016). It has been developed for the purpose of speeding up or making effective the attention to the citizens, in relation to administrative function of the Peruvian State, however, there is a symmetry in this process because the public entities do count on equipment or technological devices; so they can give make known their administrative acts, but the citizens who live in the countryside or far from the cities, where they don't have any Internet service, they don't have access to the information.

Keywords: Critical Analysis, Administrative Procedure, Administrative Function, Asymmetry.

Introducción

La presente investigación tiene como propósito analizar el uso de las TIC en la función administrativa, a pesar de que se ha realizado con un fin de comunicar con eficacia y eficiencia los actos administrativos del Estado; sin embargo, los administrados de las zonas rurales o zonas alejadas no tienen acceso a los medios electrónicos o internet, solo han accedido en un 22,5% frente a un 63,1% de la zona urbana (Instituto de Estadística e Informática, 2019); no tienen acceso a la virtualización del procedimiento administrativo y en algunos casos desconocen su uso. Esto genera una distancia e incomunicación entre una parte de los administrados y los funcionarios o administradores del Estado, el cual impide que los ciudadanos tengan acceso a los servicios del Estado. De esta manera no se cumple el propósito de la administración pública que es la búsqueda del bienestar de los administrados o a un proceso administrativo motivado en cumplimiento de los derechos de los particulares (Huapaya, 2019).

A pesar de que existe la Ley sobre transparencia y acceso a la información (Ley 27806), que está consagrada en la Constitución como un derecho fundamental (art. 2, numeral 5); sin embargo, las políticas del Estado no garantizan el acceso ni el uso de la información, generando un distanciamiento con los administrados.

El art. 182 de la Ley de Procedimiento Administrativo General establece que, en las zonas lejanas, deben encargarse de notificar las autoridades, asunto alejado de la realidad, porque muchas veces las autoridades no atienden intereses o problemas de los ciudadanos, menos los casos de los administrados de manera particular.

La falta de acceso a internet impide que los avances tecnológicos, que han acelerado el proceso de globalización (Mojica, Barandica, Rodero, Franco, Hernández y Arboleda, 2015), lleguen a toda la población, generando desigualdad o asimetría, y concentrando el poder en quienes tienen el control económico y mayor acceso a las TIC, en este caso el Estado quien incluso impone o propone un determinado sistema administrativo que el ciudadano debe acatar, muchas veces sin pensar en su bienestar, por ejemplo cuando los procesos se dilatan o demoran, violando el principio de celeridad. El Estado se ampara en el monopolio de la fuerza que es gobernada por una minoría (Bobbio, 2014).

Antecedentes y fundamentación

Existen diversos estudios sobre las TIC relacionadas con el derecho, desde perspectivas positivas o negativas. En el ámbito jurídico se han estudiado en relación al problema de plagio y la vulneración de los derechos de autor por los estudiantes (Vinueza et al, 2020); en el ámbito laboral, sobre los derechos del trabajador que tiene (derecho) a desconectarse ya que a veces está interconectado en horario no laborable el cual afecta a su tiempo libre (Victoria y Herrero, 2010); en la utilización de la enseñanza del derecho que permite a los estudiantes el dominio de competencias para desempeñarse adecuadamente en su campo laboral: judicatura, docencia, etc. (Antúnez, 2018); en aspectos relacionados con la regulación en su uso (Califano, 2017); en el acceso o uso para la adquisición de medicamentos y su respectiva protección del consumidor (Fernández, 2017); y su aplicación en el derecho procesal civil (Castro, 2016).

Respecto a los antecedentes específicos, sobre la virtualización o uso de las TIC en el derecho peruano, el Poder Judicial en enero de 2017, inició con el expediente judicial electrónico, acto que permitirá la celeridad de los procesos en el acceso a la justicia. Se está implementado en la Corte Superior de Justicia de Lima, en las especialidades de Comercial, Tributario y de Mercado y Nueva Ley Procesal del Trabajo (Poder Judicial del Perú, 2017).

Nuestro país tiene como referentes a otros países quienes tienen experiencia en la aplicación de las TIC. Por ejemplo, Brasil ha agilizado sus procesos internos, ha permitido modificar su corpus normativo; Costa Rica evidencia cambios en sus procedimientos y gestión con base a la aplicación de la tecnología; España ha creado los órganos judiciales: Justicia Digital y Fiscalía Digital, en ambos se han consolidado los procesos electrónicos íntegros; México también usa la tecnología para la toma de decisiones oportunas y el intercambio de información entre sus instituciones; Paraguay ha implementado su proceso electrónico judicial e incluso ha generado un sistema que guía a los profesionales para que puedan realizar el proceso (Lama, 2017). Estos avances reflejan que la tecnología sirve de base en los procesos y acceder a la justicia de manera eficaz y eficiente, sin dilataciones que afecten al Estado y al ciudadano.

Las nuevas tecnologías permiten afrontar cambios o adaptarse a estos, almacenar información, relacionarla, reproducirla por parte del legislador o la autoridad y tomar decisiones más justas para el administrado o ciudadano (Castro, 2015).

En este contexto, un aspecto relevante es al acceso a la información, como un derecho humano, en la que la persona reciba y difunda sus ideas, que le permita generar un diálogo armónico con la parte administrativa (Olivos y Gómez, 2019). No obstante, en este proceso se da una asimetría en la que una parte tiene menor información que la otra (Abello-Romero et al, 2019). Se enmarca dentro de la democracia que garantiza el acceso a la información y que debe ser tutelado de manera eficaz (Ruiz-Rico, 2019). Sin embargo, existe una brecha entre el acceso a la información pública y el acceso real a los espacios de transparencia de las entidades públicas (Fierro, 2018).

El derecho y la tecnología se enmarcan dentro de un enfoque interdisciplinar. Esta interacción ha ido fortaleciéndose y ha generado dos disciplinas: el derecho informático y la informática jurídica (Sanz, 1997).

El origen de la tecnología informática data desde la Segunda Guerra Mundial para satisfacer exigencias militares (Sanz, 1997). Esta ha sido una de las principales impulsoras de la reforma administrativa que tiene como función principal mejorar la actuación de la gestión pública en beneficio del administrado y del Estado (Elliot, 2014).

Las TIC permiten la celeridad, la simplificación administrativa, acortar tiempos y como consecuencia de ello también beneficio económico para el Estado y el administrado. Prevalece la responsabilidad del administrado y de la administración en la realización de los actos administrativos. En este contexto se genera la convergencia tecnológica que integra las tecnologías de la información y lo audiovisual (Califano, 2017), también entre los administrados y las autoridades o funcionarios.

El proceso de virtualización requiere de documento electrónico o virtual, el uso del correo electrónico, la firma electrónica (Castro, 2016). Estos elementos son fundamentales para la parte administrativa y para el administrado quienes interactúan o se comunican con el propósito de satisfacer el interés o petición del administrado, dentro del marco legal. Sin embargo, el desarrollo de la tecnología en el ámbito jurídico también acarrea algunos problemas, entre ellos, la incertidumbre regulatoria (Pacheco, 2019).

El proceso de virtualización administrativa se da dentro de un contexto macro y micro. El primero se establece en base al poder, la denominación, la desigualdad de los grupos sociales; en cambio el segundo, se funda en la interacción o comunicación verbal, el uso del discurso (Van Dijk, 2016). En tal sentido se debe establecer un puente entre el aspecto macro y micro, es decir debe existir una correspondencia entre los grupos dispares a través del discurso, que va acompañado de la cognición que implica poseer conocimiento sobre las reglas, normas que permitan una actuación pertinente dentro de la sociedad; estos principios se establecen en la comunicación virtual administrativa, en la que los funcionarios o administradores comunican sus decisiones a los administrados en función de las peticiones de estos.

El discurso legal se desarrolla a través de las macroestructuras y microestructuras semánticas (Van Dijk, 2016) que se expresan en el procedimiento administrativo. En las macroestructuras son los temas o tópicos que se desarrollan y están relacionados con el logro del bienestar social, pero este se obtiene a través de proposiciones o conceptos claros que están contenidos en la norma y que el administrador debe aplicarlo de manera pertinente, eficaz y eficiente. Sin embargo, existe una distancia entre la norma y la realidad por su inaplicabilidad.

Otro aspecto relevante del poder es el control (Van Dijk, 2016). En este caso, dentro del proceso administrativo, el poder lo tiene la autoridad porque es quien resuelve o no la petición; a pesar de que la norma le fija un plazo, muchas veces es incumplido o vulnerado. Este poder se da porque el administrador o autoridad tiene acceso privilegiado a la información, tiene mayor estatus.

El poder establece relaciones o jerarquías y por tanto una relación o comunicación vertical, la autoridad tendrá mayor poder sobre el administrado. Esto se da porque tiene acceso y conocimiento de las normas, la reglas, mayor estatus por su condición.

Método

La presente investigación es cualitativa. Se basa en el análisis de la Ley de Procedimiento Administrativo General de Perú, específicamente se interpretan los aspectos relacionados con los componentes tecnológicos que se expresan en la misma norma. No tiene fines de generalizar los resultados o conclusiones por tratarse de un caso específico, no obstante, se recurre también a otros trabajos de investigación para reforzar el análisis o estudio.

En este caso se trata de un análisis de documento cualitativo que tiene como unidad de análisis a la misma normativa administrativa, y las categorías se han establecido con base a la secuencia temática (Cáceres, 2003) de la misma ley, donde se evidencia la aplicación o uso de la tecnología: tratamiento de la información (acceso, difusión, intercambio y verificación), las formas o

modalidades, los requisitos, el procedimiento y expediente administrativo electrónico, administración de la información.

Análisis y Discusión de Resultados

Para el análisis se consideró la Ley de Procedimiento Administrativo General, que se modificó en enero de 2019, con algunos cambios que permiten su mayor efectividad o eficacia en los actos administrativos de la función pública. También recurriendo a fuentes teóricas o jurisprudenciales para triangular la información. Incluyendo la teoría del discurso crítico que estudia la relación entre discurso, cognición y sociedad, así como el abuso del poder que se desarrolla en los textos y los contextos sociales (Van Dijk, 2016), en este caso un contexto social-jurídico, que establece reglas o normas que regulan las conductas de los administrados y autoridades.

A pesar de la efectividad, eficacia o celeridad establecida en la ley del procedimiento administrativo, en la realidad concreta no se da, por ejemplo, en el caso concreto que ha resuelto el Tribunal Constitucional peruano a través del Exp. nro. 01264-PHD/TC, en el recurso de agravio constitucional interpuesto por el ciudadano Frank Vela contra la resolución expedida por la Segunda Sala Civil de la Corte Superior de Justicia de Lima que declaró improcedente la demanda, esta entidad del Estado declaró nulas las resoluciones del Poder Judicial y admitió la demanda a trámite interpuesta por el administrado porque las resoluciones del Poder Judicial habían incurrido en vicio procesal. En este hecho se demuestra que la administración de justicia no es eficaz y además es lenta, es un caso que se originó en marzo de 2016, fecha en la que Frank solicita una copia simple de cargo de un oficio ante la Procuraduría Pública, y esta se negó a proporcionarla, afectando su derecho al acceso a la información; después de esto el administrado presentó una demanda (el 23 de mayo de 2016) ante el juzgado el cual fue declarada improcedente, la misma acción tomó la Segunda Sala Civil, por este motivo presentó su recurso ante el Tribunal Constitucional y este resolvió en abril de 2019 a favor de Frank. En este caso específico, de una solicitud sobre acceso a la información, que es un derecho fundamental, termina siendo complicado y agónico, llegando al Tribunal Constitucional para que resuelva, generando más inversión de tiempo y economía para el Estado y para el administrado.

Parte 1. Tratamiento de la información: acceso, difusión, intercambio y verificación

La Ley de Procedimiento, en la parte preliminar establece el principio de acceso "Permanente" del administrado para recibir información de la entidad pública sobre el estado de su proceso u obtener las copias del mismo, en caso lo requiera; asimismo, el principio de "participación" que implica el acceso de la información por parte del administrado de manera directa o a su representante, siempre que solicite información que no afecta a la intimidad personal o el interés nacional, o que esté prohibida de acuerdo a Ley.

Aparte de los principios, citados previamente, también se especifica que el administrado, sin limitaciones, debe o puede acceder a la información de los expedientes u obtener copias de los documentos (66, incisos 3 y 4). La consulta de su expediente lo puede realizar en cualquier momento por él o por su abogado (art. 171.1). Asimismo, acceder a la información gratuita que brindan las entidades públicas. Los documentos o información pueden ser enviados por la entidad a los administrados a través de correo electrónico cuando se trate de una transmisión a distancia (art. 134.1).

Son concordantes con los planteamientos de las TIC porque permiten la comunicación y difusión de la información entre los protagonistas o interesados. No obstante, en muchos casos las entidades no proporcionan información oportuna a los ciudadanos, alterando el principio de celeridad y de acceso a la información; por tanto, se evidencia un mayor poder de la autoridad o Estado frente al administrado; en este caso la autoridad tiene el control o el dominio de la información.

Aparte de estar amparado en la Constitución, también se establece en la Declaración Universal de los Derechos Humanos, en su art. 19 donde se precisa que el individuo tiene derecho a aceptar o recibir información y a transmitirla sin limitaciones territoriales.

Sobre la difusión de información, le corresponde a las entidades hacerla llegar a los administrados a través de las notificaciones (físicas, electrónicas) o a través de sus portales o el diario oficial El Peruano. Por ejemplo, la publicación del TUPA se realiza a través de El Peruano o los portales de las instituciones que deben tener los procedimientos estandarizados a fin de que no haya conflictos o contradicciones entre estos; y en el caso de que haya cambios o modificaciones se deben realizar a través de resolución de la autoridad competente y luego ser publicados (arts. 44.1, 44.2, 44.3, 44.5).

Sobre el intercambio de información entre entidades, estas están en la obligación de permitir a otras instituciones sus bases de datos para obtener la información que requieran de los administrados, y en este caso el administrado solo debe presentar una declaración jurada indicando que cumple con lo requerido para el procedimiento administrativo o servicio que requiera (arts. 46.1, 46.2).

A la autoridad, también le corresponde solicitar información del administrado a fin de contrastar, verificar o encontrar la verdad material (art. 68.2); asimismo, la entidad puede solicitar información al administrado con base a lo que ha peticionado para que resuelva o se pronuncie sobre ello (art. 68.1). Lo realiza como un control posterior, para descartar si ha actuado de mala fe, para ello debe recabar información del administrado e incluso realizar pericias (art. 240, incisos 4 y 5).

En este caso la información se da dentro de un proceso comunicativo eficaz que interrelacionan a la autoridad con los administrados y a su vez entre entidades. Su propósito es comunicar con eficacia los actos administrativos que satisfacen los intereses de los administrados de manera oportuna. Aunque en la práctica los procesos o resoluciones no llegan oportunamente a los administrados y muchas veces no resuelven las peticiones de manera oportuna y pertinente, acentuando el poder de la autoridad administrativa sobre el administrado.

Parte 2. Las formas o modalidades de difundir la información

La Ley de Procedimiento establece formas de notificación: personal o a través de diversos medios, entre ellos telegrama, correo certificado (art. 20.1.2) siempre que el administrado lo haya solicitado.

La otra modalidad se da a través del diario oficial EL Peruano u otros medios de mayor circulación, cuyo propósito es que llegue la comunicación al administrado (arts. 20.1.3, 25.3). Aunque la norma contempla solo a través del diario Oficial en el art. 25.3, respecto a las publicaciones por notificaciones. Asimismo, a través de su portal institucional, si es que la institución cuenta con ese medio (art. 20.1.3). La entidad puede publicar en su portal de manera íntegra el acto administrativo (art. 23.3).

El administrado pude ser notificado del acto administrativo por correo electrónico, siempre que haya dado su autorización y además evidencie respuesta o aceptación de dicho acto (arts. 20.4, 25.2).

La autoridad administrativa muestra su poder porque tiene la prerrogativa o la potestad de publicar sus actos o resoluciones a través del diario El Peruano y otros medios; tiene mayores facultades que el administrado y por tanto mayor poder o control de la información.

Parte 3. Los requisitos que deben cumplir

Para difundir la información automatizada del acto administrativo, este debe cumplir algunos requisitos fundamentales: conocer el nombre y el cargo de la autoridad emisora (art. 4, inciso 4.3). Específicamente, cumplir con "lugar y fecha de emisión, el órgano que lo emite, el nombre y la firma de quien lo emite, además de contar con la firma autógrafa del funcionario con el nombre completo y claro" (Morón, 2019, pág. 230).
Sobre la firma, esta puede ser digital o electrónica. Es establecida a través de la plataforma digital. La primera tiene como firma previa a la autógrafa; y la segunda, en un sistema informático. Debe cumplir con todos los procedimientos, documentos y demás requerimientos legales: principios, derechos, garantías para que tenga plena validez (art.30.2).

Parte 4. El procedimiento y expediente administrativo electrónico

La Ley establece que el acto administrativo puede efectuarse total o parcialmente a través de medios tecnológicos a través del expediente o escrito electrónico sobre información de los administrados, de terceros o de las entidades. Este procedimiento tiene el mismo valor legal que el tradicional. Debe preverse las medidas pertinentes en el caso de que el administrado no tenga acceso a los medios tecnológicos. Todos los elementos o procedimientos administrativos que se realizan por estos medios electrónicos tienen la misma validez legal que los tradicionales (arts. 30.1, 30.2, 30.3).

El expediente electrónico debe contener todos los documentos del procedimiento administrativo que consta en una determinada entidad; poseer una única identificación y ser inalterable para que no se confunda entre otros casos o expedientes y que sirva de base para otras entidades que lo requieran, también constar con un número correlativo y la firma digital o electrónica del responsable (arts. 31.1, 31.2, 31.3).

Parte 5. Administración de la información

Las entidades están facultadas para recepcionar información y trámite documentario. En este proceso existe la posibilidad de que administren su información en soporte electrónico o informático a través de un solo sistema de trámite documentario (art. 128.3) y por tanto, a través de dichas unidades realizar todos sus procedimientos y adquisición de información para cumplir sus propósitos (art. 128.4).

En estos procesos es factible instalar mecanismos que permitan a los usuarios suministrar su información para su digitalización (art. 129.5).

Las entidades pueden emplear la tecnología o medios informáticos para el archivo y tramitación de expedientes manteniendo la seguridad e integridad de estos (art. 164.3).

Un aspecto relevante de la norma es el establecimiento del enfoque intercultural (art. 47) para adaptarse a las características geográficas, ambientales, socioeconómicas, lingüísticas y culturales; no obstante, en la realidad no es posible sobre todo en las zonas alejadas de la sierra y la selva donde tienen otra cultura, otros idiomas (quecha, aimara, etc.). Sin embargo, las normas siguen prevaleciendo o difundiéndose solo en el idioma español. Se evidencia el problema del poder que se ejerce a través del gobierno o el Estado, frente al administrado que está desprotegido, incluso por la misma ley que realmente no se adapta a su lengua, a su cultura.

Del análisis previo, se colige que el administrado tiene prerrogativas sobre el acceso a la información de las entidades públicas, sin embargo estas son las que mantienen el poder y el control de la información legal; es decir tienen la facultad de elaborarla, difundirla. Estas emanan sus decisiones a través de las resoluciones que transmiten a los administrados. Tienen el poder y

el control de la información legal porque poseen mayores conocimientos normativos que los administrados.

La ley administrativa, al igual que las demás actividades jurídicas (enseñanza, académicas, laboral, procesal civil, consumidor), está regulando de manera gradual la aplicación de las TIC; sin embargo, entre esta y la realidad existe una asimetría. Primero porque no todos los administrados tienen acceso a internet, quienes viven en zonas rurales solo tienen acceso en un 22,5%, frente a los de las zonas urbanas que es más del 60% (INEI, 2019).

Asimismo, no se genera la convergencia (Califano, 2017) entre la resolución de los actos administrativos de los funcionario o autoridades y los administrados, tampoco se resuelven con celeridad, como el caso de Frank, de quien el TC resolvió sobre el proceso de acceso a la información, que es un derecho fundamental, pero que debió solucionarse en el ámbito administrativo y no llegar al Poder Judicial y luego al Tribunal Constitucional. El mismo caso es concordante en el ámbito administrativo y en el ámbito del Poder Judicial, con el planteamiento de Huapaya (2019) que el administrado debe tener un proceso motivado. En este caso las autoridades administrativas concentran el poder y el control normativo frente al administrado.

No obstante la tecnología se viene usando gradualmente en el ámbito administrativo, que es concordante con lo que viene implementado del Poder Judicial desde enero de 2017; asimismo, es coherente con los avances tecnológicos legales de otros países: Brasil, Costa Rica, España, Paraguay, etc.

Este nuevo reto tecnológico de cambios e inclusión en el ámbito legal, va en camino a tomar mejores decisiones en favor del administrado (Castro, 2015) y que en algún momento se llegue a un diálogo armónico entre la autoridad administrativa y el administrado (Olivos y Gómez, 2019). No obstante, persiste la asimetría en entre el dominio y difusión de la información que se concentra en la autoridad y solucionar el problema del acceso reducido a las tecnologías de los ciudadanos de las zonas rurales que solo acceden en un 22.5%.

De todo lo avanzado aún falta incluir de manera integral las TIC en el procedimiento administrativo, a fin de evitar la incertidumbre regulatoria (Pacheco, 2019). Asimismo, armonizar el poder de la autoridad (que tiene el dominio de la información, Van Dijk, 2016) frente al administrado a fin de equilibrar el monopolio de la fuerza (del Estado) que es gobernada por pocos (Bobbio, 2014).

Conclusiones

Las TIC en el proceso administrativo tienen una finalidad: resolver los casos administrativos con celeridad y eficacia. Sin embargo, existe una asimetría o distancia entre la norma y la realidad, no se puede aplicar las TIC debido a que los administrados que viven en zonas rurales tienen menor acceso a internet (solo un 22,5%).

La celeridad y motivación se ven afectadas cuando los casos no se resuelven ni en el ámbito administrativo ni en el Poder Judicial, y concluyen en el Tribunal Constitucional, acentuando y prolongando la agonía del administrado.

Prevalece el poder de la autoridad o del Estado quien no resuelve los casos administrativos con la prontitud que se requiere y afecta directamente al administrado.

Las autoridades tienen el conocimiento y el dominio de la información legal porque están facultadas para difundir o dar a conocer sus decisiones a través de los diversos medios: diarios, portales.

Referencias

- Abello-Romero, J., Mancilla, C. y Viancos, P. (2019) "Diversidad del derecho a la información y su efecto divulgativo en universidades de América Latina", *Utopía y Praxis Latinoamericana*, 24(4), 47-63. [En línea], [consultado el 4 de enero de 2020], https://www.redalyc.org/jatsRepo/279/27961579005/html/index.html.
- Antúnez, A. (2018) "La enseñanza virtual del Derecho. Un paradigma en la universidad cubana", *Espacios*, 39(29), 25. [En línea], [consultado el 10 de enero de 2020], https://www.revistaespacios.com/a18v39n29/a18v39n29p25.pdf.
- Bobbio, N. (2014) *De la razón de Estado al gobierno democrático.* Instituto Electoral y de Participación Ciudadana del Estado de Jalisco: México.
- Cáceres, P. (2003) "Análisis cualitativo de contenido: una alternativa metodológica alcanzable", P*sicoperspectivas*, 2, 53-82. [En línea], [consultado el 10 de enero de 2020], https://dx.doi.org/10.5027/psicoperspectivas-vol2-issue1-fulltext-3.
- Castro, C. (2016) "LAS TECNOLOGÍAS DE LA INFORMACIÓN Y LA COMUNICACIÓN (TIC'S) EN EL DERECHO PROCESAL CIVIL HONDUREÑO", *Revista chilena de derecho*, 43(2), 757-780. [En línea], [consultado el 15 de enero de 2020], https://dx.doi.org/10.4067/S0718-34372016000200018.
- Califano, B. (2017) "En nombre de la convergencia: cambios en la política de regulación de las TIC en Argentina", *Estudos em Comunicação*, 24, 1-25. [En línea], [consultado el 20 de enero de 2020], https://dx.doi.org/10.20287/ec.n24.a01.
- Declaración Universal de los Derechos Humanos (s.a). [En línea], [consultado el 14 de enero de 2020], https://www.un.org/es/documents/udhr/UDHR_booklet_SP_web.pdf.
- DECRETO SUPREMO Nº 004-2019-JUS. Decreto Supremo que aprueba el Texto Único Ordenado de la Ley 27444 - Ley del Procedimiento Administrativo General. [En línea], [consultado el 10 de enero de 2020], https://spijweb.minjus.gob.pe/wp-content/uploads/2019/01/27444.pdf.
- Elliot, A. (2014) "Implementación de la notificación electrónica en la administración pública peruana", *Vox Juris*, 27(1), 261-267. [En línea], [consultado el 11 de enero de 2020], http://www.repositorioacademico.usmp.edu.pe/bitstream/handle/usmp/1011/Articulo%2012.pdf?sequence=1&isAllowed=y.
- Fernández, F. (2017) "Garantías de la legislación para evitar adicciones en los medicamentos", *Revista Española de Drogodependencias*, 42(2), 80-95. [En línea], [consultado el 18 de enero de 2020], https://www.aesed.com/upload/files/vol-42/num-completos/v42n2_secjur.pdf.
- Fierro, A. (2018) "Derecho de acceso a la información entre la Constitución y la realidad", *Cuestiones Constitucionales*, 39, 65-88. [En línea], [consultado el 6 de enero de 2020], http://dx.doi.org/10.22201/iij.24484881e.2018.39.12649.
- Huapaya, R. (2015) "El derecho constitucional al debido procedimiento administrativo en la ley del procedimiento administrativo general de la República del Perú", *Revista de Investigações Constitucionais,* 2(1), 137-165. [En línea], [consultado el 5 de enero de 2020], https://doi.org/10.5380/rinc.v2i1.43659.
- Instituto de Estadística e Informática del Perú. (2019). Estadísticas de las Tecnologías de Información y Comunicación en los Hogares (julio-agosto-septiembre). [En línea], [consultado el 15 de enero de 2020], https://www.inei.gob.pe/media/MenuRecursivo/boletines/ticdiciembre.pdf.
- Lama, H. (2017) "El uso de la Tecnología en el Proceso Judicial", Poder Juncial del Perú, Lima.
- Mojica, J., Barandica, A., Rodero, L., Franco, M., Hernández, H. y Arboleda, S. (2015) "La función administrativa en la era de las TIC", *Revista Lasallista de Investigación*, 12(2), 139-151. [En línea], [consultado el 16 de enero de 2020], http://repository.lasallista.edu.co:8080/ojs/index.php/rldi/article/view/841/591.
- Morón, J. (2019) *Comentarios a la Ley del Procedimiento Administrativo General. Tomo I. Nuevo texto ordenado de la Ley nro. 27444*. Gaceta Jurídica: Lima.

- Olivos, M. y Gómez, G. (2020) "La construcción jurisdiccional de los procesos de consulta de las comunidades indígenas y su aproximación al derecho a la información en México", *Revista Derecho del Estado*, 45, 155-185. [En línea], [consultado el 17 de enero de 2020], https://revistas.uexternado.edu.co/index.php/derest/article/view/6332/8358.
- Pacheco, M. (2019) "De la tecnología *blockchain* a la economía del *token*", *Derecho PUCP*, 83, 61-87. [En línea], [consultado el 20 de enero de 2020], https://doi.org/10.18800/derechopucp.201902.003.
- Poder Judicial del Perú. (2017). *Comisión de trabajo del expediente judicial electrónico*. [En línea], [consultado el 15 de enero de 2020], http://eje.pe/wps/wcm/connect/EJE/s_eje/as_info/.
- Ruiz-Rico, C. (2019) "ANÁLISIS COMPARATIVO DE LA LEGISLACIÓN IBEROAMERICANA EN MATERIA DE TRANSPARENCIA Y DERECHO DE ACCESO A LA INFORMACIÓN", *Boletín Mexicano de Derecho Comparado*, 51(154), 255-283. [En línea], [consultado el 18 de enero de 2020], http://dx.doi.org/10.22201/iij.24484873e.2019.154.14144.
- Sanz, J. (1997) "El derecho ante las nuevas tecnologías de la información", *Anuario da Facultade de Dereito da Universidade da Coruña*, 1, 499-516. [En línea], [consultado el 12 de enero de 2020], https://ruc.udc.es/dspace/handle/2183/1934.
- Tribunal Constitucional. (2019). Auto del Tribunal Constitucional, Exp. nro. 01264-PHD/TC. [En línea], [consultado el 10 de enero de 2020], http://tc.gob.pe/jurisprudencia/2019/01264-2019-HD%20Resolucion.pdf.
- Van Dijk, T. (2016) "Análisis crítico del discurso", *Revista Austral de Ciencias Sociales*. 30, 203-222. [En línea], [consultado el 18 de enero de 2020], http://revistas.uach.cl/pdf/racs/n30/art10.pdf.
- Victoria, I. y Herrero, A. (2020) "El derecho a la desconexión laboral: Un derecho emergente en el marco de tecnologías de la información y de la comunicación", *Izquierdas*, 49, 1053-1074. [En línea], [consultado el 18 de enero de 2020], http://www.izquierdas.cl/images/pdf/2020/n49/art56_1053_1074.pdf.
- Vinueza, I., Santacruz, H., Vaca, P., Vaca, H. y Portilla, L. (2020) "ICT in Higher Education and Its Relation to the Violation of Copyright and Intellectual Property", *Advances in Intelligent Systems and Computing*, 1110 AISC, 328-342.

Trust from Employees' Perspective in Polish Companies: A Preliminary Study

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Abstract

The present study aimed to investigate dependencies between the levels of trust in Polish companies and employment and organization structures. To measure trust in organizations from employee's perspective, we applied a multifaceted approach to trust that included survey measurement of the key content components of trust beliefs such as integrity, reliability, and dependability. The respondents were part-time undergraduate students who filled in the Trust Measurement Questionnaire. The results revealed that the most trusted organizations were small-sized companies as opposed to large-sized enterprises, which retained the least trust. Overall, our pilot analysis of trust beliefs suggests that the population of young adults in Poland is more willing to trust smaller-scale entrepreneurs.

Keywords: Trust, Trust Management, Organizations, Polish Companies.

Introduction

Trust as a vital category of management in organizations, particularly in the business sphere, has been a recurrent issue of academic discussion since at least 1970s (e.g. Zand 1972), assuming various different conceptualizations (see Dietz and Den Hartog 2006, pp. 557-566), along with different empirical approaches to its measuring and monitoring (Dietz and Den Hartog 2006, pp. 566-571; Shockley-Zalabak and Ellis 2006, p. 52-53). In Poland, especially after its transformation from the socialist system to the liberal one, the question of trust became more and more important both on the sociological level – which was manifested for example in Sztompka's work (see Sztompka 2003; Żółkowska 2014) – and on the specifically managerial level (e.g. Bugdol 2010; Trembaczewski 2016; Paliszkiewicz 2011; 2014). However, in the researches having been hitherto undertaken the main stress has been placed on the top and middle managers' perspective on trust in their doing business (e.g. Trembaczewski 2016; Paliszkiewicz 2011), while the employees' perception of organizations with respect to trust has gained relatively little attention. Accordingly, our study focuses primarily on the employees' experience of trust inside organizations in Poland.

Trust Manifested in Organizations

Trust, as referred to organizations, is a manifold phenomenon which may be approached on at least several different levels as well as placed in different contexts. Despite the variety of theoretical views on it (Shockeley-Zalabak and Ellis 2006), its significance both in successful dealing with crises (Mishra

1996; Kramer and Cook 2004) and in an organization's "business as usual" is nowadays widely acknowledged: "*it saves the organization money by reducing the costs of litigation, regulation, legislation, pressure campaigns, boycotts, or lost revenue that results from bad relationships*" (Paine 2003, 80), but it also – at the bottom level – favours employees' efficiency at work. And conversely, the detrimental long-run effects of lack of trust are clearly identified and counteracted (Kutsyuruba and Walker 2016).

As to the conceptualization of trust, it is usually accepted that (1) trust may be treated as a *multi-level relation* established between: co-workers, teams, organizations, as well as between an organization and its clients or the public. It is also held that (2) trust is *culturally rooted* and thus, on the large part, stems from values, norms and beliefs that are intrinsic in particular cultural background. Besides, it is believed that (3) it is *communication-based*, which means that it can be taken as a result of successful and fair communication: i.e. "providing accurate information, giving explanations for decisions and demonstrating sincere and appropriate openness" (Paine 2003, 5). Next, it is thought (4) to be *dynamic*, being changeable, possible to be built, rebuilt, sustained, but also undermined or dissolved. And finally, it is usually taken (5) to be *multi-dimensional* while also having three aspects: cognitive, emotional and/or behavioural (Shockeley-Zalabak and Ellis 2006, 45-46; Dietz and Den Hartog 2006, 558-560; Paine 2003, 5). The multi-dimensionality ramifies into a number of spheres that overall constitute the concept trust: competence, integrity, dependability/reliability, openness and honesty, vulnerability, concern for employees, identification, control mutuality, satisfaction and commitment (after Paine 2003, 5-6).

Measurments of Trust

The question of how one should measure trust has been the subject of several studies (see Dietz and Den Hartog 2006; Mishra 1996; Paine 2003). There is no simple all-encompassing research instrument or methodology to indicate levels of trust in organizations. Usually, a combination of variety of both quantitative and qualitative research techniques, such as surveys, focus groups, before-and-after polls, ethnographic studies, experimental and quasi-experimental designs, or multivariate analysis are used (Paine 2003). In fact, Dietz and Den Hartog (2006) have identified several criteria for choosing an adequate measure of trust. In particular, their analysis of the most-quoted definitions of trust has indicated three crucial elements to be measured: *trust as a belief*, *trust as a decision*, and *trust as an action*. Because trust is based on working relationships in organizations, all these elements may be involved in the process of party A (employee/manager-as the trustor) interacting with a trusting party "B" (manager/organization as the trustor). In fact, some measures of trust in the process are focused on the analysis of the content of the trust belief while other methodologies deal with either the output of this process (decision-making) or input (a specific source of the trust beliefs) (for more details see Dietz and Den Hartog 2006).

Objective of The Study

Our conceptualization of trust in this work was understood as a compilation of subjective judgments presented by employees on different characteristics of the organization. A similar way of measuring trust was presented in Mayer et al. (1995), who pointed out ability, benevolence and integrity as the key factors of trust. In other work, Mishra (1996) has presented arguments that characteristics of an organization (the trustee) should include also dependability/reliability as an important factor describing business's predictability. According to Paine (2003), the key elements needed to form trust inside an organization should embrace integrity, competence, and dependability (reliability).

Following the above mentioned multi-faceted approach to trust, it can be said that a key aspect of working relationships in an organization is employees' perceptions of these components in organizations (Mishra 1996). Our study adapted definitions by Dietz and Den Hartog (2006), claiming the component of integrity to be an "adherence to a set of principles acceptable to the other party, encompassing honesty and fair treatment" (Dietz and Den Hartog 2006). The second component, i.e. competence, describes skills and knowledge indicating organization's capabilities to carry out its

obligations. And the last component, i.e. dependability/reliability, is related to the consistency and regularity displayed in behaviour.

In spite of a large body of research on knowledge-based trust there are other research streams indicating how the formation of trust in the organisation proceeds (McKnight, Cummings and Chervany, 1998). For instance, McKnight and colleagues (1988) emphasize a role of situational variables (institution-based approach) that determine one's feelings of the security in the organization that is linked with structural safeguards including (i) guarantees, (ii) regulations and (iii) legal recourse. In other words, institution-based trust is associated with expectations that there is an impersonal structure in the organization that enables individuals to expect that their efforts and commitment will pay off in the future (Shapiro, 1987). According to McKnight, Cummings and Chervany (1998) guarantees may reduce the perceived risk of uncertainty in terms of trust building in the organization and contribute to an increase of one's positive interpersonal trust. Moreover, contracts or promises (legal recourse) make the employee's (the trustor) comfortable in believing that the employer (the trusted party) make every effort to fulfill promises and will be acting according to social norms in order to secure such promises (Sitkin, 1995). In addition, a high-trust organization should stimulate interpersonal trust via corporate practices and procedures (regulations) that assure people's beliefs about their expectations of future institution's behaviour (Sitkin, 1995). Thus, safeguards such as regulations, guarantees and contracts build sort of system trust that is based on the efficiency of social norms in diminishing uncertainty and providing secure feelings about the individuals' future (Luhmann, 1991).

Shapiro (1987) claims that above-mentioned institutional safeguards form a sort of structural assurance belief that most likely have the effects on the formation of initial trust towards an organization. Therefore, the process of believing that the situation of an individual is connected with the institutional safeguards makes possible for an individual to believe that his or her situation is trustworthy (McKnight, Cummings and Chervany, 1998). Here, we therefore investigated the effects of institution-based trust on trusting beliefs (see Figure 1). Since structural assurance beliefs are not directly measurable constructs, we operationalized these variables by linking structural assurances with the size of an organization and the form of employment respectively. As indicated above, the variable such as the form of employment is indicative of legal recourse and therefore might be influential on trusting beliefs. Blunsdon and Reed (2003) indicated that organizational factors linked with size, location and type of industry have an impact on generation and its maintenance of interpersonal trust. For example, Dasgupta (1988) claims that trust which an individual has in other's party to fulfil a contract is strictly dependent on the power of an agency. Therefore, we linked the contextual condition such as the company size with one's beliefs about a combination of regulations and guarantees reflecting trust on a group- or organizational-level (McKnight, Cummings and Chervany, 1998).

Taking the above perspective on trust in organization, the main research question in this study was identified as follows: *Does institution-based trust linked with contextual conditions of the organization (company size and the form of employment) affect employees' trusting beliefs*? With regard to this research problem the following hypotheses relating institution-based trust and knowledge-based trust as specified by Paine (2003) were formulated:

1) *Institution-based trust, i.e. the size of an organisation and the form of employment, will affect the component of integrity.*
2) *Institution-based trust, i.e. the size of an organization and the form of employment, will affect the component of dependability*.
3) *Institution-based trust, i.e. the size of an organization and the form of employment, the size of an organization and the form of employment, will affect the component of competence.*

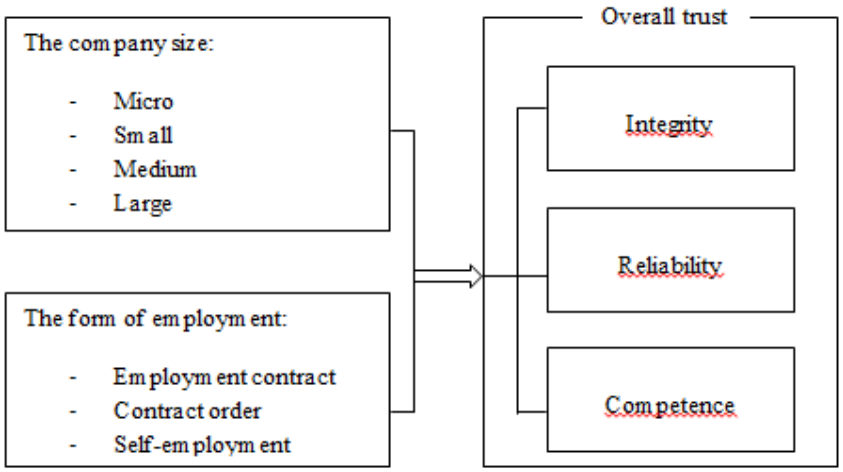

Figure 1: Theoretical model of Formation of Trust in Organization. The contextual conditions of the organizations such as the company size and the form of employment were the independent variables (on the right side). The trusting beliefs of integrity, reliability and competence were dependent variables.

Method

Respondents

One hundred twenty-eight part-time students of psychology at University of Lower Silesia took part in the study. A total of 110 usable questionnaires was further analysed (72 women and 38 men). Selected participants ranged in age from 19 to 50, yet the vast majority in the sample were young people under 30 (84%). All participants completed informed consent forms before the study. The study was approved by the Research Ethics Committee at the University of Lower Silesia, Wrocław, Poland. The survey was conducted in 2020.

Table 1: Sociodemographic characteristics

		Frequency	Percent
Gender	Woman	72	65.5
	Man	38	34.5
Education	Secondary	78	70.9
	Higher incomplete	26	23.6
	Higher	6	5.5
Place of residence	Village	18	1.4
	A city of up to 50,000 residents	16	14.5
	A city from 50,000 to 100,000 residents	24	21.8
	A city of over 100,000 residents	52	47.3

Sociodemographic and structures of employment and organization

The study included employees of micro-sized enterprises, small-sized enterprises, medium-sized enterprises and large-sized enterprise in the population of part-time undergraduates. The criteria for the inclusion in the study considered individuals who worked in various forms of employment: (i) employment contract, (ii) contract order; (iii) a contract of work, (iv) self-employment, (v) managerial, contract. In addition, to address our research questions, we also gathered information on employee population with regard to working time system, a period of employment in the company, position held.

Table 2: The respondents' characteristics as to their employment structure

		Frequency	Percent
The company size	Micro (up to 10 employees)	40	36.4
	Small (up to 50 employees)	18	16.4
	Medium (up to 250 employees)	14	12.7
	Large	38	34.5
The form of employment	Employment contract	72	65.5
	Contract order	34	30.9
	Self-employment	4	3.6
The position held	Managerial	7	6.4
	Specialist	39	35.5
	Worker	36	32.7
	Other	28	25.5
The level of monthly net income*	Up to 1000 PLN	10	9.1
	(1000 – 2000 > PLN	24	21.8
	(2000 – 3000 > PLN	42	38.2
	(3000 – 4000 > PLN	20	18.2
	Over 4000 PLN	14	12.7

**1 PLN equals to 0.23 EURO*

The Questionnaire

The measurement of trust was based on the Trust Measurement Questionnaire (TMQ) (Paine 2003, 9-10). To measure trust, we used 11 items from TMQ survey (see Table 3 for particular items). The items come from three subscales of the original TMQ (Paine 2003, 9-10); in the present study the dimensions of *Integrity*, *Competence* and *Dependability* (*Reliability)* have been applied. The subscale of Integrity measured beliefs that an organization is fair and just. Dependability (Reliability) subscale indicated beliefs that an organization acts in a consistent and dependable manner, while the last subscale of Competence was relevant to measures of beliefs that an organization manifests its competence as being effective, able to compete on the market.

The Polish version of the TMQ was adapted following a back-translation procedure. First, we involved a team of two translators with a psychological and ethical background (one of them was living in English-speaking countries in the past), who were fluent in English and native in Polish, in translating the original version into a single Polish version of the tool. Then, the team of two researchers with deep knowledge in organizational psychology and ethical philosophy and a specialist in the English language being familiar with British and American culture, evaluated all aspects of the translation and reached the agreed version of the items. After the positive evaluation, two bilingual translators made two back-

translations. Next, the team involved in preparing the Polish version of the instrument and evaluated its compatibility with the original. As a result, the content of the back-translations did not depart from the original version.

Table 3: Items to measure Trust including Dimensions of Integrity, Competence, and Dependability/Reliability (Paine 2003)

	Dimension	Item
1.	Integrity	This organization treats people like me fairly and justly.
2.	Integrity	Whenever this organization makes an important decision, I know it will be concerned about people like me.
3.	Integrity	Sound principles seem to guide this organization's behavior.
4.	Integrity	This organization does not mislead people like me.
5.	Dependability	This organization can be relied on to keep its promises.
6.	Dependability	I believe that this organization takes the opinions of people like me into account when making decisions.
7.	Dependability	I am very willing to let this organization make decisions for people like me.
8.	Dependability (Reversed)	I think it is important to watch this organization closely so that it does not take advantage of people like me.
9.	Competence	I feel very confident about this organization's skills.
10.	Competence	This organization has the ability to accomplish what it says it will do.
11.	Competence	This organization is known to be successful at the things it tries to do.

The instructions and procedure were slightly modified as compared to previous studies investigating trust in organizations (see Paine 2003). Participants in the present study indicated their responses on a five-point Likert scale from (0) „Strongly disagree" to (5) „Strongly agree". The five categories were worded as follows "strongly disagree, ... disagree, ... undecided, ... agree," and "strongly agree." The respondents were asked to respond to the items based on the statement "*what you can tell about the company/organization/institution which you work in or cooperate with*".

The reliability of the Polish version of TMQ subscales for Integrity and Dependability was at the satisfactory levels, yielding Cronbach's Alfas of 0.793 and 0.700. In the case of Competence component, the Cronbach's alpha was of 0.274. The items of Competence with the lowest reliability were therefore removed from the data.

Statistical Analysis

The independent variables were groups of respondents categorized on the ordinal scale with the grouping variables such as (i) size of the company, (ii) the form of employment, and (iii) the position held. Separate analyses were conducted for dependent variables which constituted the overall measure of trust as well as each content component of trust measured on TMQ sub-scales. Since the Shapiro-Wilk test indicated that the data did not comply with normality assumption, hypotheses testing was examined using a non-parametric Kruskal-Wallis method. All calculations were done with SPSS software and the significance level of 0.05 was established.

Results

First, we calculated mean ranks based on individual observations for overall trust as well as for two trust components of Integrity and Dependability given the enterprise size, the form of employment, and the position held by the respondents.

Table 4: Effects of the company's size on the employees' perceived trust – Kruskal-Wallis analysis

	Overall trust Mean Rank	Integrity Mean Rank	Dependability Mean Rank
Micro	69.25	70.25	66.73
Small	71.61	68.78	74.33
Medium	34.50	38.36	31.07
Large	41.13	40.00	43.76
	$p < 0.0001$	**$p < 0.0001$**	**$p < 0.0001$**

In the next step, we started investigating dependencies between company size and overall employee's trust with the Kruskal-Wallis statistics. The results are presented in Table 4. In particular, for company size, the non-parametric K-W test showed a significant difference in overall trust across all groups ($p < 0.05$) (Figure 1).

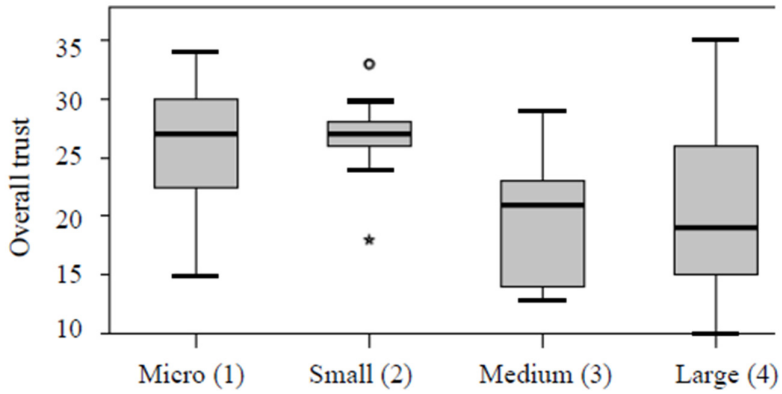

Figure 1: Boxplots with the effects of company size on overall trust perceived in organizations, Kruskal Wallis $p<0.0001$. Not significant difference between Groups 3–4 and 1–2. Significant difference between Groups 3–1, $p=0.003$. Significant difference between Groups 3–2, $p=0.006$. Significant difference between Groups 4–1, $p=0.001$. Significant difference between Groups 4–2, $p=0.005$.

Then, we analysed trust belief components of Integrity and Dependability, separately. For Integrity sub-scale, there was a significant difference between the groups overall (Kruskal Wallis, $p <.0001$). In the boxplots (Figure 2, 3) it can be seen that the most trusted organizations was the micro-sized enterprises (Group 1), and the least trusted organizations were those of a large size (Group 4).

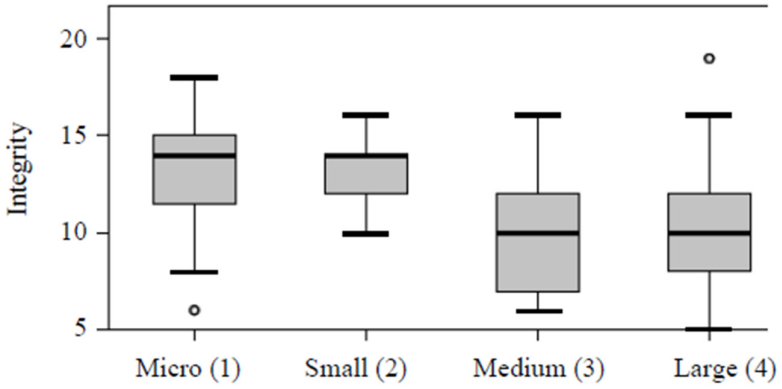

Figure 2: Boxplots with effects of company size on perceived integrity in organization (Kruskal Wallis, $p=0.000$). Not significant difference between Groups 3–4 and 1–2. Significant difference between Groups 2– 3, $p=0.042$. Significant difference between Groups 1–3, $p=0.007$. Significant difference between Groups 2–4, $p=0.009$. Significant difference between Groups 1–4, $p=0.000$.

For Dependability sub-scale, there were also significant differences among all groups (Kruskal Wallis, $p < 0.0001$). Again, the boxplots (see Figure 3) suggested a similar course of the measured trust component, because the highest reliability was declared in micro-sized organizations as opposed to the least trusted organizations, i.e. the large size ones (see difference between Groups 1-3 on figure).

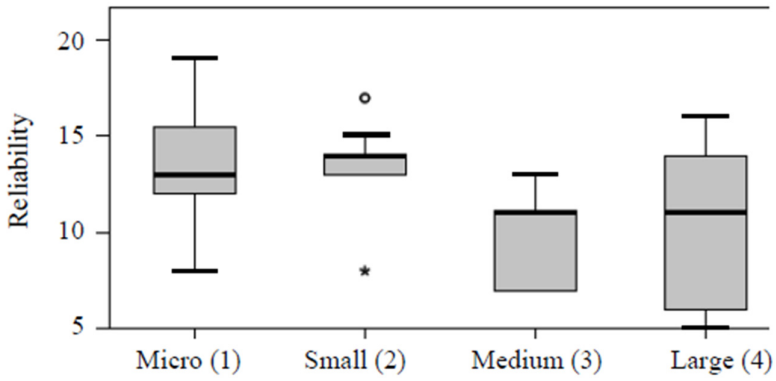

Figure 3: Boxplots with effects of company size on perceived reliability in organization, Kruskal Wallis *p*=0.000. Not significant difference between Groups 3–4 and 1–2. Significant difference between Groups 1–3 and, *p*=0.002. Significant between Groups 2–3, *p*=0.001. Significant difference between Groups 1–4, *p*=0.008. Significant difference between Groups 2–4, *p*=0.005.

Table 5: Effects of employment form on the perceived trust - Kruskal-Wallis analysis

	Overall trust Mean Rank	Integrity Mean Rank	Reliability Mean Rank
Employment contract	50.75	50.43	51.72
Contract order	61.44	62.00	60.38
Self-employment	90.50	91.50	82.00
	p = 0.022	**p = 0.015**	**p = 0.099**

Then, we analysed how the form of employment in an organization might affect trust in the organization. The results are presented in Table 5. There were significant differences for overall trust (K-W $p < 0.05$) and for the single component of integrity ($p<.05$), respectively. For both measures of trust presented in boxplots (Figure 4 and 6), post-hoc analyses indicated that employees trusted companies less when the employment was in the form of a contract as opposed to self-employment (Kruskal Wallis *p=.045*). The analyses of other factors on trust in organizations showed no effect (K-W, $p > 0.05$).

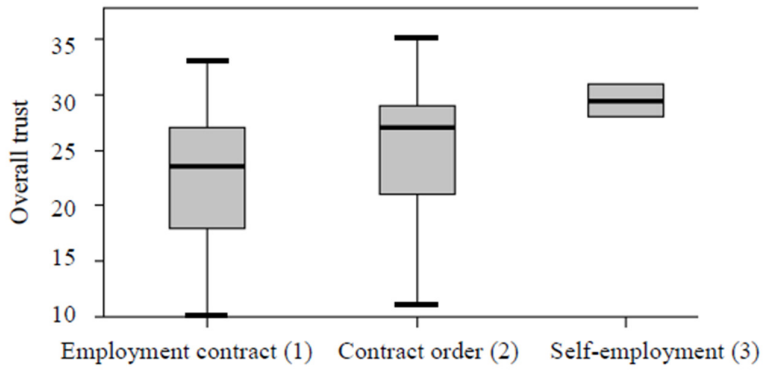

Figure 4: Boxplots with effects of employment forms on perceived overall trust in organization (Kruskal Wallis p=0.022). Not significant difference between Groups 1–2 and 2–3. Significant difference between Groups 1–3, *p*=0.045.

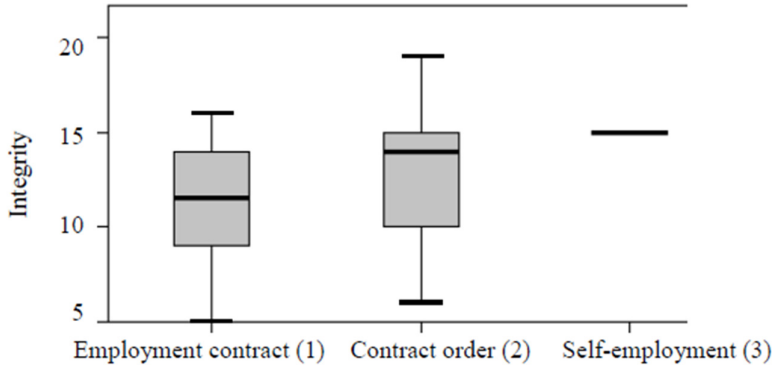

Figure 5: Boxplots with effects of employment forms on perceived integrity in organizations, Kruskal Wallis statistics, *p*=0.006. Not significant between all groups, except of significant between Groups 1–3, *p*=0.035.

Discussion

The present research confirmed the effects of institution-based trust on trusting beliefs. We indicated that institution-based trust affected the components of integrity and dependability. In terms of the organization size, the post-hoc analyses showed that the highest level of trust was displayed by the employees of small-size companies, while the lowest one was a characteristic feature of the large ones: the bigger the company the less trust in it. For the contextual condition of the form of employment, the study showed that the highest level was declared by the self-employed as opposed to contract orders and employment contracts.

The focus of our study was on intra-organizational trust and aimed at identifying "bottom-up" direction of it: at stating and measuring trust exhibited by employees towards the organization, whose structure and actions are, in turn, shaped by the leaders. We accepted trust's culture-rootedness, though it we have not set ourselves the task of relating the results of our research to any specific factors/values of Polish culture. We also admitted both the belief that trust is communication based and the conviction that is dynamic. Similarly, we share the stance that the dynamics of trust largely depends on the actual communication in organization. As to the issue of three-aspect/dimension understanding of trust, our research attempted to access this phenomenon – via survey that explored the employee's trust beliefs of cognitive and emotional aspects as declared in the survey's responses. The dimensions of trust that we employed in order to measure its level and that are relevant to relate it with the organization's size

and the form of employment (the categories that we have distinguished to inspect) are: “competence”, “integrity” and “dependability/reliability”.

Our study included the contextual factors of the company size and forms of employment to manipulate system trust that is based on beliefs about the effectiveness of social structures in reducing uncertainty and securing feelings about employee’s future (Luhman, 1991). The results showed that the efforts of Polish companies in building system trust do not bring expected results in increasing trust in the organization. On the contrary, it seems that for the companies of larger size there is a lack of trust among employees who more likely start to rely on their own dispositional trust within the organization. These effects of institution-based trust on trusting beliefs could be explained at some point by a participant sample that mainly consisted of young adults who in fact have little or no work experience (young adults under 30 age represented 84% of our sample). It seems plausible that young adults usually have no sufficient access to information about company policies and regulations. Therefore, they use their own’s distrusting beliefs about the functioning of company and their role in the organisation (McKnight, Cummings and Chervany, 1998), indicating that social structures implemented into the organization to enable an employee to be successful are not possibly in a place. Since young people seem to be feeling relatively unsecure with companies of larger size, entrepreneurs who want to reach a higher stage of trust in their organization should implement set of policies to stimulate interpersonal trust for young employees, for instance, via relationship-oriented culture, consistent induction training, creating opportunities for meeting informally (Six and Sorge, 2008).

Limitations of the study

It should be noted that the Polish version of TMQ questionnaire was applied to population of part-time undergraduates. The authors claim that this was a reason of getting low reliability values of items measuring beliefs of competence in organization as opposed to the American version of the survey. For that reasons, the competence data was removed from further analysis as being uninterpretable. Further research needs to be taken to validate the Polish version of TMQ in broader samples of adult employees.

Acknowledgements

The authors wish to thank Katie Delahaye Paine for agreeing to translate and publish the Polish version of the Trust Measurement Questionnaire. The authors also thank to Ewelina Cichoń, PhD student, for her assistance in the data elaboration. The study was supported by internal funds of the Faculty of Education at University of Lower Silesia, donation number: 251TZ-DPFPP20 under the decision, no Dec 203549/E-680/S/2018 issued by the Ministry of Science and Higher Education (Poland).

References

- Biesiok G. (2013) ‘Zaufanie jako czynnik satysfakcji pracowników [Trust as a factor of employee satisfaction],’ *Zeszyty Naukowe Politechniki Łódzkiej. Organizacja i Zarządzanie*, 1146 (51), pp. 167-176.

- Blunsdon, B. and Reed, K. (2003) ‘The Effects of Technical and Social Conditions on Workplace Trust,’ *International Journal of Human Resource Management*, 14 (1), 12– 27.

- Bugdol M. (2010), Wymiary i problemy zarządzania organizacją opartą na zaufaniu [Dimensions and Problems of the Management of a Trust-Based Organization], Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków.

- Dietz G. and Den Hartog D. N. (2006) ‘Measuring Trust Inside Organizations,’ *Personnel Review*, 35(5), 557-588.

- Dasgupta, P. (2000) Trust as a commodity, Trust: Making and Breaking Cooperative Relations, Gambetta D. (ed), Department of Sociology of the University of Oxford, Oxford, 49-72.

- Kramer R. M. and Cook K. S. (2004) Trust and distrust in organizations: dilemmas and approaches, The Russell Sage Foundation series on trust. Trust and distrust in organizations: Dilemmas and approaches, Kramer R. M., Cook K. S. (eds), Russell Sage Foundation, New York, 1-18.

- Kutsyuruba B. and Walker K. D. (2016) The destructive effects of distrust: leaders as brokers of trust in organizations, The Dark Side of Leadership: Identifying and Overcoming Unethical Practice in Organizations, Normore A. H., Brooks J. S. (eds), Emerald Group Publishing Limited, Bingley, UK, 133-154.

- Luhmann, N. (2000) Familiarity, confidence, trust: problems and alternatives, Trust: Making and Breaking Cooperative Relations, Gambetta D. (ed), Department of Sociology of the University of Oxford, Oxford, 94-107.

- Mayer R. C., Davis J. H. and Schoorman F. D. (2005) 'An Integrative Model of Organizational Trust,' *The Academy of Management Review*, 3(20), 709-734.

- McKnight, D. H., Cummings, L. L., and Chervany, N. L. (1998) 'Initial Trust Formation in New Organizational Relationships,' *Academy of Management Review*, 23(3), 473-490.
- Mishra A. K. (1996) Organizational responses to crises: the centrality of trust, Trust in Organizations, Kramer R. M., Tyler Th. (eds), Sage, Newbury Park, CA, 261-287.

- Paine K. D. (2003) 'Guidelines for Measuring Trust in Organizations' [online], Durham: The Institute for Public Relations [Retrieved January, 2020]. https://instituteforpr.org/wp-content/uploads/Guidelines-for-Measuring-Trust-KDP-4-13.pdf

- Paliszkiewicz J. (2011) Orientacja na zaufanie w przedsiębiorstwach [Trust orientation in companies],' Komputerowo zintegrowane zarządzanie', Kosala R. (ed.), *Oficyna Wydawnicza PTZP,* Opole, vol. 2, 227-232.

- Paliszkiewicz J. (2014) 'Rola zaufania w zarządzaniu [The role of trust in management],' Innowacje w zarządzaniu i inżynierii produkcji, Kosala R. (ed), *Oficyna Wydawnicza PTZP,* Opole, 409-418.

- Shapiro, S. P. (1987) 'The Social Control of Impersonal Trust,' *American Journal of Sociology*, 93(3), 623-658.

- Shockley-Zalabak P., Ellis K. (2006) The communication of trust, The IABC Handbook of Organizational Communication. A Guide to Internal Communication, Public Relations, Marketing and Leadership, Gillis T. L. (ed), John Wiley & Sons, San Francisco, 44-55.

- Sitkin, S. B. (1995) 'On the Positive Effects of Legalization on Trust,' *Research on Negotiation in Organizations*, 5(2), 185-218.

- Six, F., and Sorge, A. (2008) 'Creating a High-Trust Organization: An Exploration into Organizational Policies that Stimulate Interpersonal Trust Building,' *Journal of Management Studies*, 45(5), 857-884.

- Sztompka P. (2003) Trust: A Sociological Theory, Cambridge University Press, Cambridge.

- Trembaczowski Ł. (2016) Zaufanie i ryzyko w doświadczeniu przedsiębiorców [Trust and risk in the experience of entrepreneurs], Wydawnictwo Uniwersytetu Śląskiego, Katowice.

- Zand D. E. (1972) 'Trust and Managerial Problem Solving', *Administrative Science Quarterly*, 17, 229-239.

- Żółkowska T. (2014) Zaufanie: szkice teoretyczne, Wydawnictwo Naukowe PWN , Warszawa.

Evaluation of Adaptation Process Efficiency: Russian Practice

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Abstract

Personnel adaptation is one of the most important elements in the personnel management system. Adaptation represents an important component of the professional training system and regulates the links between the education system and the production industry. The personnel adaptation measures taken in the organization aim to cover the organization's needs in qualitative and quantitative workforce in order to increase their profitability and competitiveness using minimal costs. Interpretation of the results made it possible to formulate and implement a number of measures to improve the adaptation process within the organization. The practical significance of this work lies in the opportunity of using the developed recommendations for the personnel adaptation process in various organizations.

Keywords: Personnel Management, Adaptation Process, Mentor, Professional Adaptation

Introduction

Experts give a large number of definitions to the concept of adaptation in a wide and a narrow sense, and reduce the essence of the adaptation process to the problems of a certain level – from biochemistry to sociology (Kirina and Khomyakova, 2015). The "adaptation" concept was proposed and justified by such biologists as Jean-Baptiste Lamarck, Etienne Geoffroy Saint-Hilaire and Charles Darwin in the nineteenth century, and was used only in biology, where it was considered as adjustment of organisms to the environment. During the scientific development, the problem of adaptation went beyond the field of biology and started to spread into medicine, social psychology and sociology (Krutsova, 2010). «In general, the concept of adaptation reflects the basic principles that ensure the existence and development of various systems in a certain interaction of the internal and external conditions of their existence.

The variety of the definitions of adaptation builds on the results of research in different fields of science.

In common definitions of the concept of adaptation the researchers working on that problem can give this concept several meanings depending on the examined area (Fig. 1).

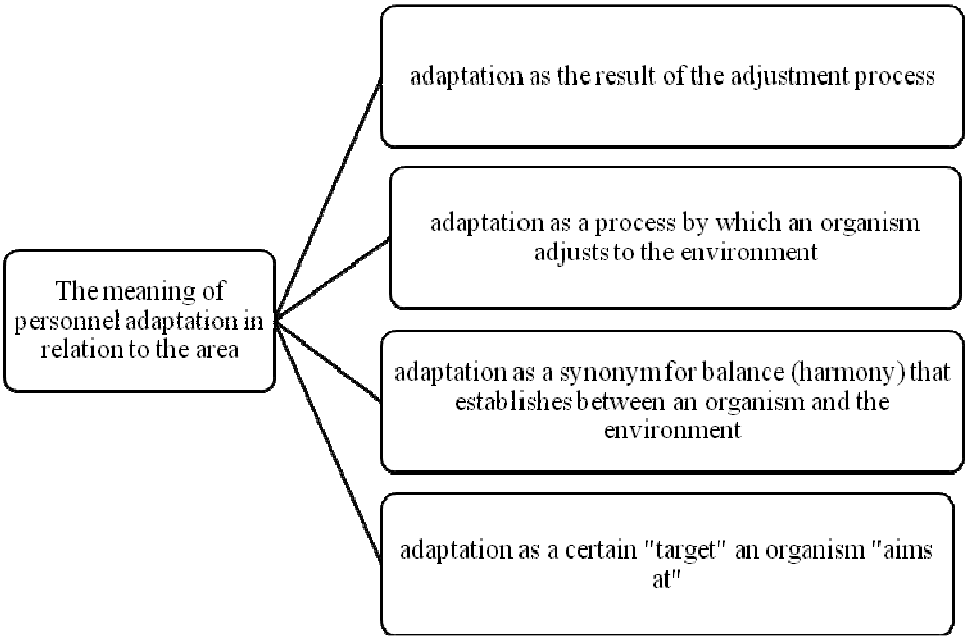

Fig. 1: The meaning of personnel adaptation in relation to the area

Personnel adaptation is a process of introducing an employee to the goals, strategies, colleagues and work of the entire organization; as well as developing the appropriate behavior in accordance with the requirements of the company, in other words, establishing the relations between the organization and an employee at the very first stage of collaborative work. The adaptation goals are represented in Figure 2.

The wide variety of adaptation types depends on the criteria in review» (Krutsova, 2010).

Depending upon the problem solving tactic, the adaptation types can be:

– adaptation of an individual by changing or complete solving an emerging problem or conflict. This is an active and mainly non-protective adaptation. In this case, the resources and mechanisms of adaptation of an individual are activated to build a real social situation; at this time the individual experiences insignificant and mostly positive changes (obtaining new skills and knowledge);

– adaptation of an individual by avoiding a problematic situation. This is a so-called “passive” adaptation that leads to searching for new strategies, which are more favorable for the individuals’ safety and for meeting their needs. In this case the individuals experience the most significant changes, however, many of them do not affect human self-actualization and self-improvement;

– adaptation that preserves a problematic situation and adjusts to it. This adaptive strategy is implemented either by changing a person’s perception and interpretation of this situation, in other words, by creating its positive subjective image, or by means of the most serious changes in human personality, first of all in its Self-concept.

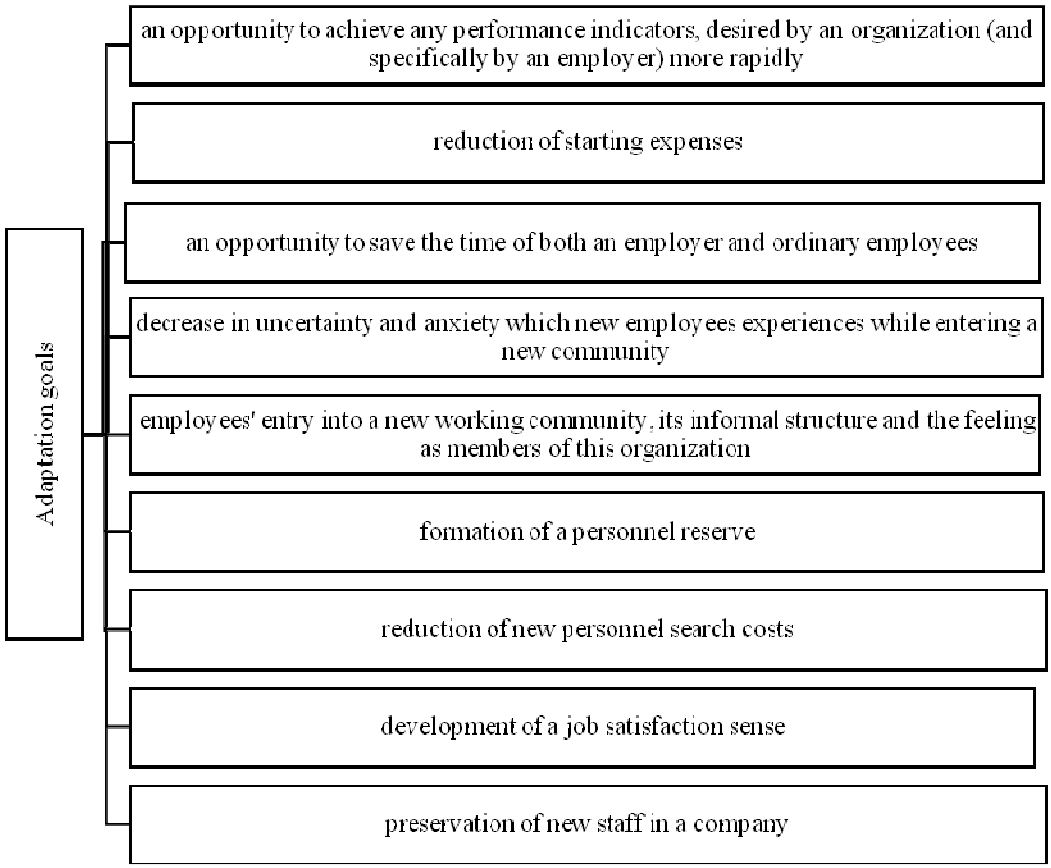

Fig. 2: Personnel adaptation goals

There is also another classification that includes external and internal adaptation.

External adaptation is an adaptation process in which an individual adjusts to external objective problematic conditions (by maintaining or eliminating a problematic situation).

There are several types of internal adaptation:

– adaptation that aims at resolving various internal conflicts and other internal personal problems (Pushkareva and Sudorgina, 2012);

– structural adaptation in the narrowest sense. This is a process of coordinating a separate mechanism of the human organism with already formed mechanisms, in combination with which it will constitute a complex;

– structural adaptation in a general sense. This is an adaptation process of a separate mechanism or a complex of mechanisms to the general personality structure (Bykova, 2008);

– according to the subject-object relationship, adaptation can be active and passive. Active adaptation is a desire of an individual to have an impact on the environment in order to change it. Passive adaptation has the opposite meaning – this is a lack of any desire to change the environment.

According to the employee exposure criteria, adaptation can be progressive and regressive (Esikova, 2017).

Progressive adaptation has a positive effect on a person, whereas the regressive type has a negative effect.

Depending on the adaptation level, there is primary and secondary adaptation. Primary adaptation involves a new employee who does not have any work experience, whereas secondary adaptation implies adjustment of new employees who already have it. Within secondary adaptation, there are two subtypes as well: employee's adaptation in a new position and to the demotion.

All adaptation types are closely interrelated and represent an integrated system, but the value of separate types is not the same (Fig. 3).

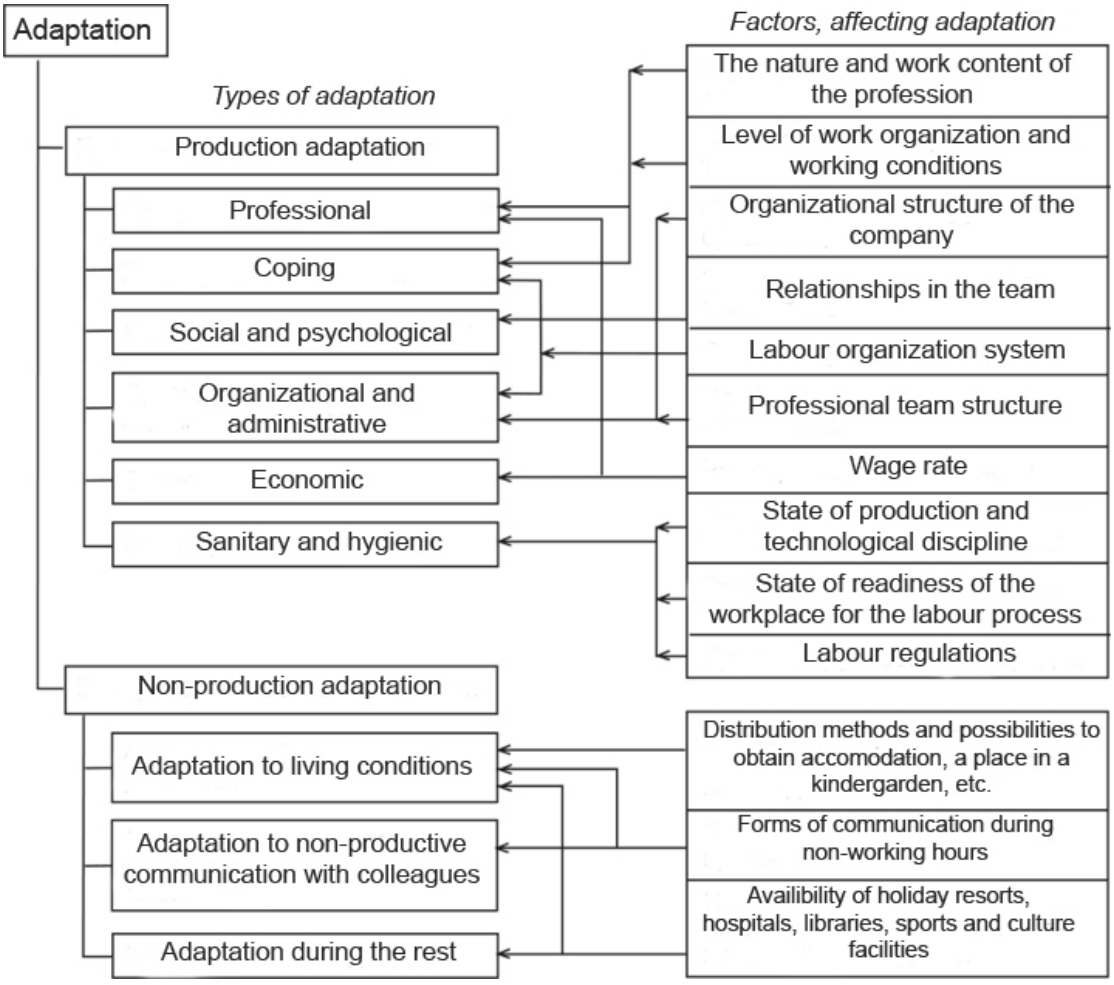

Fig. 3: Classification of adaptation types

The adaptation mechanisms can be divided into:

– social imagination, which is an ability to determine one's own experience and destiny by imagining (dreaming), i.e. to put oneself mentally into the real framework of any period of society development and realize one's capabilities;

– social intelligence, which is an ability to identify complicated relationships, processes and dependencies in a particular social environment;

– realistic perception;

– orientation on what is proper.

Protective mechanisms represent a system of human adaptation reactions that allows to reduce anxiety and ensures the integrity of "Self-concept" as well as steadiness of self-esteem by understanding the relations between one's ideas about the world and about oneself.
There are four main adaptation types during the adaptation process (Fig.4):

– negation. It occurs when an employee protests against the company's values, and their expectations exist in contradiction with reality. As a rule, such employees leave the job in a couple of months;

– conformism. It occurs when an employee fully accepts the company's values, norms and rules, and is ready to obey any "rules of the game". Generally, these employees represent the bulk of the team;

– adaptative individualism. In this case, newcomers agree with the company's basic values, however, they have some rejection of the secondary norms and values;

– mimicry. A new employee complies with the secondary norms but does not accept the basic ones. This type is mainly characteristic of a potential risk group, the participants of which can leave their company in any moment. The employees maintain a certain level of individualism, but still work well in a team (Kaznacheeva and Repina, 2015).

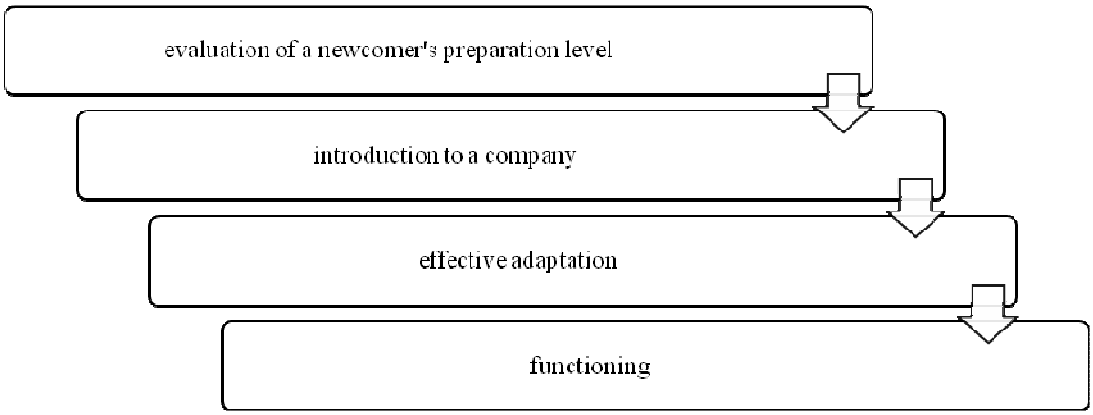

Fig. 4: Stages of the adaptation process

Based on the research literature, the four main sides of a new employee's adaptation process in a new team can be divided into organizational, coping, social and psychological, and professional.

Professional adaptation is an active development of skills, techniques and nuances of a new profession.
Coping involves adaptation to labour activity by physiological changes.

Social and psychological adaptation involves networking within a team, introduction to its values, norms and traditions.

Economic adaptation implies adjusting to the earned revenues and methods of income generation.

Express adaptation is also considered one of the adaptation types, which represents a short stage in the initial period of an employee's work in a company.

The adaptation process includes four stages: evaluation of a newcomer's preparation level, introduction to a company, effective adaptation and functioning. At the first stage, it is more desirable to use such instruments as proprietary documents, introductory workshops and instructions.

The second stage is orientation, which is an introduction of a new employee to their duties and a company's requirements. It is also called "orientative" and involves a strong reaction or a certain tension of all the human organism systems in response to a common set of some new external stimuli. This so-called "physiological storm" can last approximately for two-three weeks, or even more.

The third stage is effective adaptation. This stage involves an employee's adjustment to their new status and provides their incorporating to a team. At this point, it is important for colleagues and directors to provide the fullest support to a newcomer, and regularly evaluate the efficiency of their activity and the features of interaction with their team (Zelenskaya, 2016).

This stage can also be called unstable accommodation as it represents a search of the body for any optimal response to these effects. However, it must be taken into account that at the first stage of adaptation the human body uses (and sometimes it even "borrows") all the accumulated resources, so the body resource saving is out of the question. But at the second stage the consumption of the human body resources decreases and "the storm" slowly stops.

The last stage is functioning. It implies overcoming all the production and interpersonal challenges and transition to stable work. At this stage, it is necessary to monitor an employee's work in order to reduce the adaptation period to ensure the financial benefits for the company. During this time, the human body finds the most convenient responses to certain pressures that require less stress of the body systems.

There are a great number of reasons to create comfortable conditions for an employee's adaptation, and that should be done with the help of adaptation programmes.

All adaptation programmes must solve the following problems:

– reducing the work period of an employee to reach their planned productivity level more rapidly;

– normalization of warm relationship within a team, i.e. creating interpersonal relations that exclude conflicts, aggression, envy and other types of hostility. This can significantly eliminate the amount of the time lost for resolving conflict situations;

– reducing staff turnover. Dismissal of an employee entails the costs of new staff recruitment. Therefore, an employer spends more time and money on adaptation of a newcomer;

– raising self-confidence. If employees are bolder and more confident in the workplace, they perform much more efficiently. As during this period the stress level is quite high, it can lead to some professional mistakes uncharacteristic of this specialist in comfortable conditions, which results in decreased performance of an employee.

Today companies rarely use adaptation programmes, despite the fact that the result of staff adaptation has an impact not only on cost savings in terms of staffing, but also on better motivation and loyalty, taking into account the positive effect after the starting period of an employee's adaptation in a company. If the actions of a personnel service are right, companies do not have any problems with an employee turnover. Consequently, efficient adaptation of a new employee affects the economic and financial indicators of a company, and also serves as a measure of success of a personnel service work.

An adaptation programme can be developed and implemented not only by a personnel service in a company, but by some recruitment agency as well. It is important to understand that nowadays an employer should both attract employees by providing a good salary and retain them by creating a psychologically comfortable atmosphere. Generally, personnel adaptation takes time equal to the probation period of a new employee. In that case, newcomers check their abilities at work, whereas companies test personnel adaptation programmes.

Adaptation programmes are necessary for full functioning of a company. Each organization develops their own programmes, which are usually general and individual ones. General programmes are developed for the whole company, whereas individual ones - for a particular work unit or department.

Adaptation process has a complicated structure which includes the following constituents: acquisition of professional knowledge and skills, acquisition of professional role, meeting the requirements of different spheres, satisfaction from the job content, an interest to the job, desire of improvement in a chosen profession, awareness, psychological comfort and safety, sense of fairness of exchanges, mutual understanding with administration.

Adaptation process management is an active influence on the factors that presuppose the course and timing of adaptation, as well as reducing negative consequences that arise in this process.

The basis of the adaptation management process is a certain technology, which includes a specific approach to each employee, evaluation of one or another side of adaptation for particular conditions of the production environment, development of appropriate measures to facilitate the process.

The need for adaptation management is predetermined by the chance of the maximum damage to both the organization and employees, which has been proven by the experience of domestic and foreign enterprises and companies.

The information about how the process of a new employee's adaptation is organized in a company can say a lot to the company, including the development level of a team, its unity and internal integration.

Notably, the largest companies attach high priority to such an important process as adaptation, as their future will mostly depend on it.

Methods

The theoretical basis of this study is represented by the results of scientific and practice-oriented research in the field of personnel management and particularly in the sphere of personnel adaptation, by the works of psychologists and executives, devoted to the problems of adaptation process research and its role in modern companies.

For the first time, questions of adaptation of the individual to the social environment are present in the works of Z. Freud and G. Gartman. Psychological aspects of personality adaptation were addressed in the writings of G. Eisenk, A. Maslow, L. Colberg, C. Cooley, R. Linton, J. Piage, E. Fromm, T. Shibutani.

The methodological basis of the sociological approach in the study of adaptation problems is M. Weber 's theory of social action.

The social and managerial foundations of the problems of staff adaptation in are covered in the works of N. Archapov, T. Bazarov, V. Vesnina, V. Volina, V. Dyatlov, B. Eremina, A. Ignatiev, A. Kibanov, E. Kohanov, Yu. Kuznetsov, E. Maslov, M. Meskon.

In relation to this article, the object of study is the largest vertical agricultural holding in Russia. The total number of respondents is 3000 persons. At the moment, it occupies the leading positions in sugar production, pig breeding, crop production and the oil and fat manufacturing. In all business areas the group is actively introducing the newest world technologies both in terms of equipment and management practices.

In order to identify the problems and develop the recommendations for the personnel adaptation process improvement, there was performed the diagnostics of the personnel adaptation system efficiency, which consisted of 3 stages:

– defining the level of employees' satisfaction with the adaptation process and with the organization in general;

– defining the level of employees' alienation;

– staff turnover evaluation.

The first step aimed at defining the level of employees' satisfaction. To define the level of satisfaction there was conducted a survey.

The second stage of the diagnostics aimed at defining the level of employees' alienation (Esikova, 2017) with the help of the "Evaluation of professional alienation" questionnaire. The respondents were asked to read the statements and evaluate how these statements correspond to their condition, and after that, the responses of the survey participants were compared with the key to calculate the results. Each answer that matched the key was worth 2 points, the answers "conforms partially" were worth 1 point. The more points people had, the higher was the level of alienation, and, therefore, the lower was the level of employees' adaptation.

The third step of the diagnostics of personnel adaptation system aimed at staff turnover evaluation.

Systematization of the achieved results made it possible to evaluate the efficiency of the personnel adaptation system and identify existing problems.

Results and Discussion

The analysis of the questionnaire results showed that the degree of the employees' satisfaction with the adaptation process is high, so the adaptation system can be considered acceptable.

The respondents' answers made it clear that new employees are given enough attention, as the adaptation period takes no more than 6 months.

Only 20% of the respondents need readaptation, i.e. a number of measures aimed at adjustment to the environmental conditions at one level or another (Fig. 5). This demonstrates the minor defects of the adaptation system.

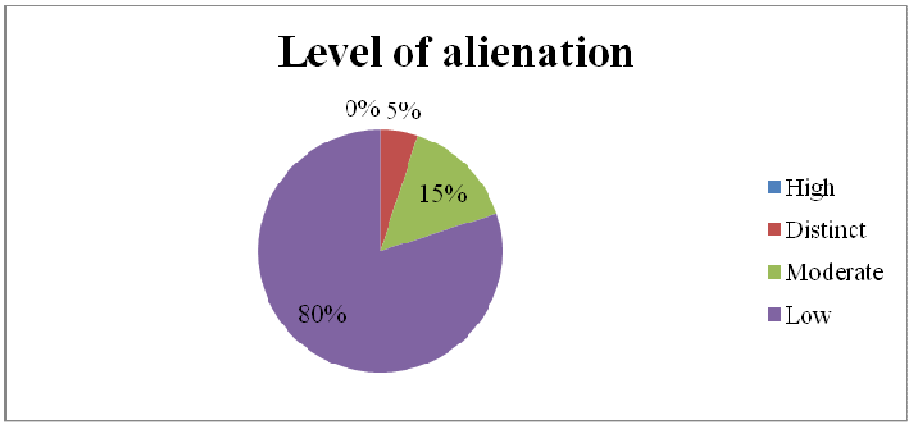

Fig. 5: Level of employees' alienation

The analysis of staff turnover indicators for the last three years showed that the number of employees who quit during the adaptation period changes every year, but does not exceed the minimum limit.

This is due to the fact that newcomers face with some difficulties in obtaining precise information about the company, where and how they can find some help, and also with conflicts between colleagues.

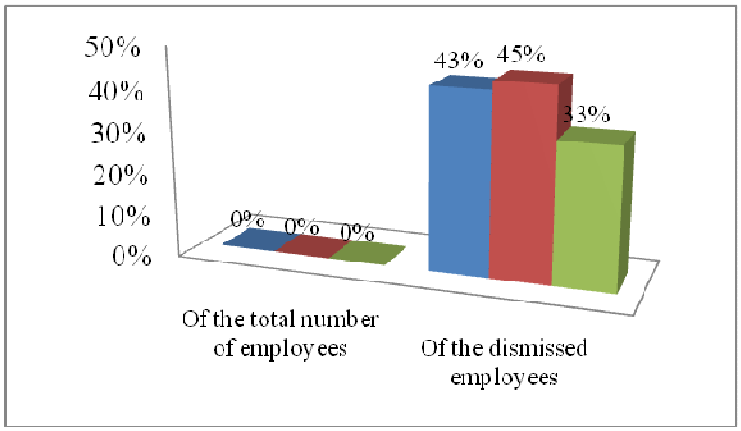

Fig.6: The dynamics of staff turnover during the adaptation of workers in the company.

Having compared the results of the conducted research, we can draw the following conclusions: the adaptation process in the company goes well, but during the analysis it was revealed that it has some disadvantages that have a negative effect on the adaptation process in general, as well as on the indicators and the development of the company. Insufficient attention is paid to such stages of adaptation as effective adaptation and functioning, as well as to such type of adaptation as social and psychological adaptation. And the conflicts between the mentor and newcomers in the process of mentoring method implementing can have a negative effect on the adaptation process and on the organization, too.

Recommendations

The conducted research and analysis of the adaptation process allowed us to define the directions to improve the process:

to improve the stages of the adaptation process it is necessary:

– to ensure feedback at the stage of effective adaptation

– for managers to regulate the adaptation process of a new employee by designing certain documents “Adaptation Plan” and “Task List” at the stage of functioning.

2) to improve social and psychological adaptation, it was proposed to conduct teambuilding events that could enhance the social-psychological climate in the team.

3) to regulate the conflicts between the mentor and new employees, as well as to increase the interest and efficiency of mentoring methods it was proposed to:

– introduce an entrance test (character test) for both mentors and newcomers to resolve the conflict between them;

– hold an annual contest “Best mentor of the company”.

Consequently, implementation of proposed recommendations can contribute to solving the problems that arise in the process of adaptation in the company, and can also improve the quality of that process.

Conclusions

As can be seen from the above, personnel adaptation is an essential element of the personnel management system.

Personnel adaptation is a process of “initiation” of a new employee to the work of a company by using special techniques and methods.

The classification of the process is diverse. All adaptation types are closely interrelated and represent an integrated system, but the value of separate types is not the same.

Adaptation process includes four stages: evaluation of a newcomer’s preparation level, introduction to a company, effective adaptation and functioning.

Adaptation process has a complicated structure which includes the following constituents: acquisition of professional knowledge and skills, acquisition of professional role, meeting the requirements of different spheres, satisfaction from the job content, an interest to the job, desire of improvement in a chosen profession, awareness, psychological comfort and safety, sense of fairness of exchanges, mutual understanding with administration.

The basis of the adaptation management process is a certain technology, which includes a specific approach to each employee, evaluation of one or another side of adaptation for particular conditions of the production environment, development of appropriate measures to facilitate the process.

The interpretation of the obtained study results showed that the way the process of a new employee's adaptation is organized can say a lot about the development level of a team, its unity and internal integration.

Further observations of this adaptation process, as well as surveys conducted with employees, confirmed the results.

As a result of the research and implementation of the proposed measures, the following problems were solved:

– to reduce the entry period for new employees in the company;

– to establish a positive attitude towards the company and its current rules and standards among new employees, and to develop skills for applying corporate standards in work situations;

– to increase staff awareness of the company's market position, its mission, goals, and history, and "educate" this trait as a characteristic of the company's corporate culture;

– to ensure that employees are familiar with the company's procedures;

– to increase the motivation of employees.

The measures proposed by the authors are effective and can be implemented in other enterprises to improve the process of personnel adaptation.

References

- Kirina A., Khomyakova A. (2015) Aspects of personnel adaptation in public services, *Collection of treatises of Russian universities « Problems of economy, finance and production management*, №36, p. 87-89.

- Krutsova M. (2010) Personnel adaptation management: study guide, *Vologda: Legia*, 128 p.

- Pushkareva E., Sudorgina L. (2012) Culture of self-determination: adaptive mechanisms of personality, *Novosibirsk state pedagogical university Gazette*, №4(8), p.80-87.

- Bykova T. (2008) Aspects of social and professional adaptation of foreign students to Russian educational conditions, *Siberian pedagogical journal*, №11, p.42-56.

- Esikova R. (2017) Improving the adaptation process in organizations, Social *and economic phenomena and processes,* №12, p.34-38.

- Kaznacheeva S., Repina R. (2015) Problems of personnel adaptation in staff management, *Online-journal "Naukovedenie*", №5(30), p.50.

- Zelenskaya A. (2016) Improving the personnel adaptation system (using the example of "Russian Railways"), *Young Scientist*, №10(114), p.704-707.

Tools to Promote Smoking Cessation in The Workplace

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Abstract

The purpose of the study was to develop an incentive program to encourage employees to quit smoking. The authors developed a four-stage program. The first step is to find out how many employees smoke in the workplace and identify what made them nicotine-addicted. At this stage of the program, it is planned to install cigarette smoke detectors, introduce video surveillance and control systems, to conduct questionnaire surveys to identify the causes of smoking and provide the employees with the psychological assistance they need. At the second stage it is essential to implement incentive measures (incentive pay to those employees who lead a healthy lifestyle). At the third stage, it is proposed to introduce a system of penalties for smoking during working hours by means of reducing the monthly performance-based incentives and introduction of long working hours. The fourth stage implies continuous monitoring of the implementation of incentive measures and the system of penalties. After this program was tested, it proved to be economically and socially effective.

Keywords: Personnel Management, Healthy Lifestyle, Promoting A Healthy Lifestyle For Employees

Introduction

Tobacco smoking results in many chronic diseases that cause significant economic damage to the organization. According to the expert data presented in the public domain, if in the company there are 15 employees who have 4 five-minute smoke breaks during the working hours, the firm loses almost 150,000 rubles per month (an average salary is 30,000 rubles per month).

In 2019, an average salary was 43,700 rubles, which means that the loss of the company was as much as 218,500 rubles per month. According to the study conducted by the Higher School of Economics, the smoking employees are 9 % more likely to fall ill and take a sick leave than non-smokers. Also, it takes smoking workers over the age of 35 longer to recover. Non-smokers often work more efficiently than those who smoke.

The labor productivity depends on how much an employee smokes: the labor productivity loss caused by the employees who smoked one pack of cigarettes a day was as much as 75% compared with the

labor productivity of non-smokers. Preventive programs lead not only to financial investment return, but they also contribute to the creation of a healthy microclimate in the team, social cohesion, and a healthy working atmosphere. Prohibitive measures turn out to be the most effective. Thus, it is advisable to use an integrated approach based on systematization, generalization and ordering. Applying these methods, a company can significantly increase its labor productivity.

Methods

The experiment that was carried out in one of the service businesses in Tambov region became a methodological basis for the study and development of a program to promote smoking cessation in the workplace. The methodology relies on the consistency of the proposed motivation program in terms of labor legislation. The implemented tools within the framework of the system for promoting a healthy lifestyle and the application of penalties do not contradict the Labor Code of the Russian Federation and are regulated by internal local regulatory acts of the organization.

The introduced system of long working hours does not contradict labor legislation, since it is not about working overtime, but it implies that the working time lost due to smoking is to be recovered. The implemented monitoring and diagnostics system does not contradict either the Federal Law "On Fire Safety" dated December 21, 1994 No. 69-ФЗ, or the local acts regulating enterprise safety issues. Furthermore, there are no patented smoking cessation programs, registered in Rospatent (Russian Federal Service for Intellectual Property, Patents and Trademarks).

The experimental project was to be implemented within one year; it was aimed at 15 smoking employees; the total number of the employees was 20; the average salary was 18,000 rubles; initially, the average number of smoke breaks was 8; one smoke break lasted for 5 minutes; the room area was 162 m^2. The empirical base of the study and conduct an analysis does not need to be differentiated according to the category of employees (worker, specialist, manager). Because the tools presented are suitable for all categories of employees in the enterprise and have the same influence on them with the same efficiency.

The project was economically justified on the basis of income and expenditure budget (Table 1, Table 2) within the framework of implementation of smoking cessation program.

Table 1: the expenditure budget related to the period of implementation of smoking cessation program

№	Item of expenditure	Cost per 1	Quantity	Total
1	Smoke sensors of special sensitivity	20000 rub/pie	9 pieces (one sensor per 18 m^2)	180000
2	Surveillance cameras	33000 rub/pie	1 piece	33000
3	Questioning	500 rub/hour	4 hour (15 min. for 1 employee)	2000
4	Services of the psychologist (outsourcing)	1000 rub/hour	15 hours during the project	15000
5	Incentive payments to non-smoking employees (by phase) *	2880 rub/hour	5 person*1 month	14400
		2880 rub/hour	10 person *3 months	86400
		2880 rub/per	14 person *1 month	40320
		2880 rub/per	18 person *7 months	362880
	Total			**734000**

* the average monthly salary is 18,000 rub; the incentive pay is as much as 30% (6,000 rub). A non-smoking employee gets 2% of the incentive pay per day (120 rubles per day or 2880 rubles per month(there are 24 working days in a month).

** There were no penalties for smoking in inappropriate places within the period the program was implemented. When the program was launched, there were 15 smoking employees in the company. They made 8 smoke breaks a day. The fine for the first smoke break was as much as 60 rubles (900 rubles in total). The fine for the second smoke break was 72 rubles (1080 rubles in total). The fine for the third smoke break was 78 rubles (1170 rubles in total). The fine for the 4th-8thsmoke breaks was 90 rubles for each (6750 rubles in total). In total, each day the fine was as much as 9900 rubles.

Table 2: the income budget related to the period of implementation of smoking cessation program

№	Item of income	Cost per 1	Quantity	Total
1	Losses from smoking	0,465 rub/min [1]	40 minutes a day per person	68913[2]
2	Smoking penalties (by program phase)	9900 rub/day **	10 working days	99000
		9900 rub/day ** 4800 rub/day ***	24 working days 72 working days	237600 345600
		4800 rub/day *** 600 rub/day ****	24 working days 118 working days	115200 70800
	Total			**937113**

*** After the implementation of the second stage (by the end of the first month the incentive measures were introduced), five employees quit smoking. Within the first month of implementation of incentive measures the employees were fined 9900 rubles per day (in total) for smoking. There were 10 employees who continued to smoke (within the next three months). They had6 smoke breaks per day. The fine for the first smoke break was as much as 60 rubles (600 rubles in total). The fine for the second smoke break was 72 rubles (720 rubles in total). The fine for the third smoke break was 78 rubles (780 rubles in total). The fine for the 4th-6thsmoke breaks was 90 rubles for each (2700 rubles in total). In total, each day the fine was as much as 4800 rubles.

**** After the implementation of the third stage (by the end of the first month the system of penalties was introduced), four employees gave up smoking. Due to the introduction of penalties, the employees were fined 4800 rubles per day (in total) for smoking. Within the next three months, 4 employees gave up smoking. Within the last three months of the program implementation there were only two smoking employees who had 4 smoke breaks per day. The fine for the first smoke break was as much as 60 rubles (120 rubles in total). The fine for the second smoke break was 72 rubles (144 rubles in total). The fine for the third smoke break was 78 rubles (156 rubles in total). The fine for the 4th smoke break was 90 rubles (180 rubles in total). In total, each day the fine was as much as 600 rubles.

The program was implemented within the period of one year. The expenditures were as much as 734,000 rubles while thereceipts were 937113 rubles. Thus, the economic efficiency was as much as 1.27 for each ruble invested. It was also effective from the social point of view, as more employees started to lead a healthy lifestyle. Thus, the employees had a better state of health and good workplace microclimate.

Results and Discussion

Implementing the above-mentioned stages, the authors put forward a program aimed at smoking cessation in the workplace. This program includes four stages.

Stage 1 –identifying the number of the smoking employees and the causes of smoking.

[1] With annual production of 1,100,000 rubles. Based on the work of 20 people. 118200 minutes at 40 hours working week - 1970 hours (Working time standards in 2018 [Electronic resource]. – Access mode: http://www.consultant.ru/law/ref/calendar/proizvodstvennye/2018/ [in Russian]

[2] Based on 247 working days per year.

At this stage the following measures have to be taken:

- installation of AR01-12M cigarette smoke detectors. These tools are the first to be employed and they have to be used as long as the program is implemented. They are aimed at preventing the employees from smoking in inappropriate places. Detectors help to monitor the level of cigarette smoke indoors. They are also used to analyze the air quality in the workplace. If the air gets polluted with cigarette smoke, the detector goes off. The detector consists of open and closed contacts, an optoelectronic relay (100V 0,1A) and two red LEDs. In addition, if necessary, a built-in buzzer can be used. The high sensitivity smoke detectors are installed in the places where employees are likely to smoke (staircases, WC, corridors). The process of work of the detectors is monitored by the employee responsible for fire safety. In case the detector goes off, a formal note is taken which is later used alongside with the recordings made by the video surveillance systems to impose disciplinary sanctions in accordance with Article 192 of the Labor Code of the Russian Federation (the fine for a first offense is 1000 rubles, while the fine for a second offense is 1500 rubles);

- the in stallation of video surveillance and control systems. These systems are introduced within 2 week sand they have to be used as long as the program is implemented. At this stage the goal is to identify the total number of smoking employees and to determine how much working time is lost due to smoke breaks. The video surveillance and control system includes two components. Firstly, surveillance cameras (with a facial recognition system) are in stalled in smoking areas to identify the employees. Secondly, in smoking are as there should be access control systems (electronic identification cards are used to monitor how long each employee spends at work) to identify the smoking employees and determine how much working time is lost due to smoke breaks. All the information is dealt with by the personnel manager responsible for the implementation of the program and later a psychologist consults the smoking employees. The information received via the access control system is also dealt with by the personnel manager responsible for the implementation of the program, who finds out who many employees smoke and how many smoke breaks they make. This diagnostic system is aimed at systematization of information on the number of smoking employees at the moment the program is launched and the information on how much working time is lost due to smoke breaks;

- a question naire survey carried out by a psychologist who collects and processes data. At this stage it is crucial to identify the causes of smoking and if needed the psychologist has to consult the employees who cannot quit smoking. The questionnaire was developed by the staff of the Department of Therapy, Cardiology and Functional Diagnostics of the Ministry of Health and Social Development. The authors made some changes in the questionnaire to accurately identify the causes of smoking.

Questionnaire "Causes and level of nicotine addiction"

We would like to identify the level of your nicotine addiction. Could you please read the questions carefully and then tick or write your answers that reflect your personal position about the problems mentioned in this questionnaire? Thank you for your participation.

1. How often do you smoke?
   - To 10
   - 10-20
   - 20 or more
2. How many years have you been smoking? _____
3. When did you smoke the first cigarette?
   - Up to 14 years old
   - 14-20 years
   - Over 20 years old
4. Why did you start smoking?
   - Because friends smoked
   - Because parents smoked
   - Because the older brother or sister smoked

- To change your image
- Due to problems at study, work, family
- To look older
- I do not know
- Another _____

5. How many cigarettes do you smoke at work?
   - Rarely, 1-5 cigarettes a day
   - Often, 6-10 cigarettes a day
   - Very often, more than 10 cigarettes a day

6. If Give the main reason for which you do not want or you cannot leave off smoking? _____

7. Do you feel more cheerful when you smoke?
   - Sometimes
   - Often
   - From case to case
   - Seldom
   - Never

8. Do you like the smell of tobacco?
   - Yes
   - No
   - I find it difficult to answer

9. Do you smoke when you need to focus and pack?
   - Sometimes
   - Often
   - From case to case
   - Seldom
   - Never

10. Do you think that with smoking you can find new friends and it is easier to maintain social contacts?
   - Yes
   - No
   - I find it difficult to answer

11. Does smoking affect your workflow?
   - Yes, affects
   - No, does not affect
   - Did not notice similar
   - Other

The questionnaire survey is carried out by a psychologist after the video surveillance and control systems are installed. It takes each employee 15 minutes to answer the questions. The information on the number of the employees who are potentially willing to quit smoking on their own is provided to the personnel manager responsible for implementing the program. Then the manager decides which additional incentives should be introduced;

- psychological assistance according to the results of the question nairesurvey. The psychologist consults the smoking employees as long as the program is implemented. The psychologist can consult both the employees who make their first attempt to quit smoking and the employees who have already made such attempts before. At this stage employees should be encouraged to give up smoking. They need to learn to deal with stressful situations at work and in their personal life. After processing the results of the questionnaire survey, the psychologist figures out which psychological assistance the employees need. For example, an automated advisory system "Quit Smoking Treatment, could help to cope with nicotine addiction.

Stage 2 - implementation of incentive measures.

This strategy involves the introduction of additional incentive measures alongside with performance-based incentive pay. At this stage the goal is to promote smoking cessation in the workplace by means of additional incentives. The employees are offered incentive pay if they refrain from smoking for one full day. This stage is to be introduced within 4 months. Additional incentives (2% of the salary) are offered to those employees who lead a healthy lifestyle (do not smoke). The employees are awarded this way at the end of each month after the program is launched. To get additional payments, the employees must have no smoke breaks at work, which is controlled by the video surveillance system.

Stage 3 - the implementation of the system of penalties.

This system involves two tools introducing a ban on the employees who smoke during working hours:

- firstly, the employees who have smoke breaks during working hours will be fined (the monthly performance-based incentive pay will be reduced). At the end of every work day the head of the department analyzes the data received via the video surveillance and control system that was introduced at the first stage of the program and calculates the total amount of fines (which is cumulative). The fine for the first smoke break is as much as 1% of the performance-based incentive pay. The fine for the second smoke break is1.2%. The fine for the third smoke break is 1.3%. If the employee has the 4th smoke break etc., the fine rises up to 1.5%;

- secondly, the system of penalties should introduce long working hours to recover the time the employees lose when they have a smoke break. This measure is taken as soon as the amount of fines is as much as the monthly amount of performance-based incentive pay. The employees start to work longer hours after the manager processes the data received via the access control system which was introduced at the first stage of the program (electronic identification cards are used to monitor how long each employee spends at work).If the employee has one smoke break, his/her work day gets 5 minutes longer and he/she will have to work overtime. A second smoke break prolongs the work day by ten minutes, a third smoke break adds twelve minutes to working overtime; whereas each subsequent smoke break prolongs the work day by15 minutes. The implementation period of this stage takes four months. It is aimed at motivating 100 % of the employees to quit smoking in the workplace.

At this stage the goal is to urge all the employees to give up smoking by means of the system of penalties.

Stage 4 - continuous monitoring of the way the incentive measures are taken and the system of penalties is introduced.

It is essential to control the process of promotion of the smoking cessation program, to timely make necessary changes and to ensure the coordinated and effective implementation of all program stages. The process of continuous control over the employees' activities in the work place is aimed at prevention of smoking during the working hours. It is realized by means of cigarette smoke detectors, video surveillance and control systems which were installed at the first stage of the program. To control the employees, the incentive system is introduced, and the system of penalties stimulates the employees to completely stop smoking. If the employees manage to give up smoking, the incentive pay will be offered to them on a regular basis. If new employees are hired, this program starts from the first stage. If the employees start smoking again, it is advisable to use a questionnaire to identify the reasons for that and to provide psychological assistance to them, since it might be connected with certain psychological problems and stressful situations.

Conclusions

The novelty of the study consists in the development of a smoking cessation program, which differs from the programs introduced before. It includes a number of stages implemented in strict sequence; in addition, a different set of tools is employed. The program promoting smoking cessation is effective for companies of any type. It consists of the following stages (Table 3).

Table 3: smoking cessation program for employees

Stage of program implementation	**Tools**	**The period of implementation**	**The ways the tools are employed**	**Results**
Stage - identifying the number of the smoking employees and the causes of smoking. At this stage the goal is to find out how many employees smoke in the workplace and what made them nicotine addicted.	Installation of AR01-12M Cigarette Smoke Detectors The goal is to prevent smoking in inappropriate places.	Introduction– within 2 weeks after the program is launched. Implementation period - on a constant basis.	The high sensitivity smoke detectors are installed in the places where employees are likely to smoke (staircases, WC, corridors).	Preventing the employees from smoking in inappropriate places
	Installation of video surveillance and control systems. The goal is to identify the total number of smoking employees and to determine how much working time is lost due to smoke breaks.	Introduction -within 2 weeks after the program is launched. Implementation period - on a constant basis.	The video surveillance and control systems are introduced: - surveillance cameras (with a facial recognition system) are installed in smoking areas to identify the employees. - access control systems (electronic identification cards are used to monitor how long each employee spends at work) are installed in smoking areas to identify the smoking employees and to determine how much working time is lost due to smoke breaks.	Systematization of information on: - the number of smoking employees at the moment the program is introduced; -how much working time is lost due to smoke breaks.
	Conducting asurvey. The goal is to identify the causes of smoking and to offer psychological help to the employees who cannot quit smoking.	Introduction - a month after the program is launched. It is to be carried out only once.	A psychologist carries out a questionnaire survey (on the basis of the adapted questionnaire which was initially developed by the staff of the Department of Therapy, Cardiology and Functional Diagnostics of the Ministry of Health and Social Development) and processes personal data.	Systematization of information on the number of the employees who need psychological help to quit smoking.
Stage – providing the smoking employees with the psychological assistance.	Providing psychological assistance tothe employees who make their first attempt to quit smoking and to the	Introduction - after the questionnaire survey is carried out and the results are	Consulting the employees after the questionnaire survey is carried out and the results are processed. In some cases a psychologist can advise the employees to	A drop in the number of smokers who have problems giving up smoking on their own.

At this stage the goal is to help the employees to quit smoking and to cope with high levels of stress in the workplace.	employees who have already made such attempts before.	processed. Implementation period - within the implementation of the program.	address specialized centers for nicotine addiction treatment.	
Stage - the implementation of incentive measures. At this stage the goal is to promote smoking cessation in the workplace.	Offering higher incentive pay to the employees leading a healthy lifestyle (who do not smoke or quit smoking).	Introduction - within four months (a month after the program was launched) Implementation period – on a constant basis.	The introduction of additional monthly incentive pay which is offered to the employees who lead a healthy lifestyle (do not smoke).	A drop in the number of smokers, a promotion of a healthy lifestyle.
Stage - introduction of the system of penalties. At this stage the goal is to motivate all the smoking employees to give up smoking by introducing a system of fines and long working hours.	The introduction of the system of penalties for smoking during the working day. It is aimed at the promotion of smoking cessation in the workplace.	Introduction - within four months (after the incentive measures are introduced). Implementation period – on a constant basis.	The employees who have smoke breaks during working hours are fined (the monthly performance-based incentives are reduced). At the end of every work day the head of the department analyzes the data received via the video surveillance and control system that was introduced at the first stage of the program and calculates the total amount of fines (which is cumulative).	A drop in the number of smokersthanks to the introduction of additional measures.
	Introduction of long working hours for having smoke breaks. It is aimed at stimulating the employees to give up smoking.	Introduction - as soon as the amount of fines is as much as the amount of performance-based payments. Implementation period –as long as this measure is required.	The employees work overtime (in accordance with how many smoke breaks they have during the working hours).	The system of penalties is aimed at motivating 100 % of the employees to quit smoking in the workplace.
Stage - continuous monitoring of the way	Continuous control over the employees' activities in the	Introduction– as soon as the program is	The process of monitoring is carried out via the cigarette smoke detectors, video	The integrated use of incentive measures and

the incentive measures are taken and the system of penalties is introduced. At this stage the goal is to control the process of promotion of the smoking cessation program, to timely make necessary changes and to ensure the coordinated and effective implementation of all program stages.	workplace is aimed at prevention of smoking during the working hours.	launched. Implementation period – on a constant basis.	surveillance and control systems which were installed at the first stage of the program.	the system of penalties ensures that 100 % of the employees quit smoking in the workplace.

References

- Organization and regulation of labor at the enterprise (2016) - URL: http://ekrost.ru/poster/organizaciya-i-normirovanie-truda-na-predpriyatii.html

- Anti-Smoking Program [Electronic resource]. - Access mode: https://pred-pensioner.ru/2019/08/18/программа-борьбы-с-курением-на-предпр [in Russian]

- Radyukova Y.Y., Kolesnichenko E.A., Smagina V.V., Kozhevnikova T.M., Pakhomov N.N. (2020) Improvement of the personnel adaptation system, *Lecture Notes in Networks and Systems*, T.73, p. 1073-1086.

- Polyanskaya I.A., Latayeva G.V. (2016) Effectiveness of tobacco smoking control among students of primary vocational education in Kemerovo region, *Preventive medicine* T. 19, No.2-3, p.66.

- Vyazmin A.M., Shchaveleva M.V., Romanova A.P., Schwab L.V. (2016) Anti-tobacco activities in the context of the development of public policies to combat smoking, *Health care (Minsk),* № 9, p. 31-36.

Net International Investment Position as Early Warning Indicator: Does It Differ for European Union CEECs and non-CEECs?

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Abstract

The Macroeconomic Imbalance Procedure (MIP) applied by the European Commission aims to identify, prevent and address the emergence of potentially harmful macroeconomic imbalances that could adversely affect economic stability in the EU. Fourteen scoreboard MIP indicators have been defined. In our previous papers we were able to show that 1) net international investment position (NIIP) is one of the few MIP variables able to predict economic and financial crises and 2) only two of five NIIP components possess systematic predictive capacity of crises: derivatives and other investment. The aim of the paper is to check whether the NIIP components, which have the most predictive strength of crises, differ between two groups of EU countries: Central and Eastern European Countries (CEECs) and non-CEECs. All components of NIIP (direct investment, portfolio investment, financial derivatives, other investments, reserve assets) at the end of the year will be applied as regressors. Our model is an ordered probit model. We show that different components of NIIP are able to predict crises in Central and Eastern European Countries (CEECs) and non-CEECs. Only two NIIP components show relatively systematic predictive capacity of crises in CEECs: portfolio investments and other investments, while for non-CEECs there are no systematically proven variables.

Keywords: Macroeconomic Imbalance Procedure; European Semester, macroeconomic stability, economic crisis, ordered probit model.

Introduction

The Macroeconomic Imbalance Procedure (MIP) aims to identify, prevent and address the emergence of potentially harmful macroeconomic imbalances that could adversely affect economic stability in the EU. MIP should be considered as a tool of the European Semester, which was introduced in 2010. It helps the EU member countries to coordinate their economic policies and address the economic challenges facing the EU. The goals of the European Semester are: ensuring sound public finances (avoiding excessive government debt), preventing excessive macroeconomic imbalances in the EU supporting structural reforms, creating more jobs and growth, and boosting investment (European Commission, 2019).

In our previous research paper, using an ordered probit model, we managed to identify the MIP indicators which were effective in crises prediction. Especially net international investment position (NIIP) was statistically significant for all crisis levels under investigation. A possible explanation may be that an increase in international assets minus liabilities (or an increase in international savings) constitutes a kind of buffer against potential crises. Catão and Milesi-Ferretti (2014), Knedlik

(2014) as well as Siranova and Radvanský (2018) have also shown that NIIP is one of the significant explanatory variables for crises. Positive and stable values of NIIP (and also current account balance) are important for macroeconomic stability of EU countries (Kološta, Kráľ and Flaška, 2018).

The aim of the paper is to check whether the NIIP components, which have the most predictive strength of crises, differ between two groups of EU countries: Central and Eastern European Countries (CEECs) and non-CEECs. Considering different economic structure of CEECs and non-CEECs it can be hypothesised that different components of NIIP will be able to predict crises in these two groups of countries.

The paper is organized as follows. Next section presents the Macroeconomic Imbalance Procedure and our two concepts of crises. Then we short describe the components of net international investment position. The following section describes the methodology, data used for model parameter estimation and finally results.

Macroeconomic Imbalance Procedure and concepts of crises

Macroeconomic Imbalance Procedure is a part of European Semester – annual cycle of economic monitoring and guidance introduced in 2011. The MIP uses a scoreboard of indicators, to screen Member States for potential economic imbalances in need of policy action. The MIP identifies Member States which need assessment whether major imbalances exist. A scoreboard of indicators with indicative thresholds serves as a filtering device for detecting *prima facie* cases of possible imbalances deserving further investigation. As compared with the surveillance framework of the Stability and Growth Pact, MIP surveillance is not equally driven by numerical rules and automatic triggers.

Since its introduction, the scoreboard was revised several times. In 2012 a headline indicator for the financial sector was added (total financial sector liabilities), In 2013, the statistical definition of a number of headline scoreboard variables was revised (definition of the REER indicator, private sector debt and credit flow) and some auxiliary indicators were added (including a set of social and employment indicators). In 2015, headline employment indicators were added.

Fourteen scoreboard MIP indicators have been set for 2020: current account balance, net international investment position, real effective exchange rate, export market share, nominal unit labour cost index, house price index, private sector credit flow, private sector debt, general government gross debt, unemployment rate, total financial sector liabilities, activity rate, long-term unemployment rate, and youth unemployment rate. For more details concerning MIP indicators see *Statistical Annex of Alert Mechanism Report 2018* (2017).

Prevention and correction of macroeconomic imbalances in the EU are based on two main pillars:

- Regulation (EU) No 1176/2011 details the procedure to detect and correct macroeconomic imbalances. This regulation applies to all Member States.

- Regulation (EU) No 1174/2011 that includes an enforcement mechanism. This mechanism culminates in financial sanctions for euro area countries which do not comply with the Macroeconomic Imbalance Procedure (MIP) recommendations made on the EU level.

The alert system for all the Member States consists of:

- Regular assessment of the risks arising from economic imbalances in each Member State, based on a scoreboard made up of economic indicators and indicative thresholds.

- Identification by the Commission, based on an economic, rather than mechanical, reading of the scoreboard of those Member States where risks of imbalances are considered to exist, in order to assess their real severity.

- An in-depth review of the general economic situation in any Member State displaying a particularly negative scoreboard.

- Possible recommendation (in the event of a real risk) from the Commission to the Member State in question to correct the imbalance, in the framework of the other policy recommendations made in the European semester (Article 121(2) TFEU).

- Opening of an excessive imbalance procedure if there is serious risk that such an imbalance may spread to other Member States, jeopardizing the proper functioning of the EMU (Article 121(4) TFEU).

- The Member State under the excessive imbalance procedure, is obliged to present a corrective action plan to the EU Council. If proposed corrective measures seem to be sufficient, the procedure is placed in abeyance, but the Member State must report periodically to the Ecofin.

- Following the recommendation from the Commission, the procedure can only be closed by the Council, which decides that the imbalance has been sufficiently reduced and should no longer be considered excessive, Euro zone members which failed to act regarding excessive imbalances might be fined (maximum 0.1% of GDP) when the Member State concerned has failed twice in a row to submit a sufficient corrective action plan, or to implement the planned measures, according to set deadlines.

The presented procedure presentation was based on: ECO/286 - CESE 799/2011, Macroeconomic imbalances; Opinion of the European Economic and Social Committee on the Proposal for a Regulation of the European Parliament and of the Council on enforcement measures to correct excessive macroeconomic imbalances in the euro area (COM(2010) 525 final - 2010/0279 (COD)) and the Proposal for a Regulation of the European Parliament and of the Council on the prevention and correction of macroeconomic imbalances (COM(2010) 527 final - 2010/0281 (COD)).

The European Semester and the MIP tool should lead to stronger synergies by facilitating policy coordination among Member States by ensuring that Council and Commission recommendations are appropriately integrated in the budgetary procedure of the Member States. That procedure should be consistent with the framework for economic policy coordination in the context of the annual cycle of surveillance.

The MIP procedure has been of interest to researchers for the last few years. However, most of the publications covered the institutional and legal nature of the European Semester and the cooperation of the EU institutions with the Member States or used various types of signal approach; an overview of these papers can be found in the report published by the Joint Research Centre (Erhart, Becker and Saisana, 2018). In general, unfortunately different studies identified different indicators useful as alarm bells. For example, Boysen-Hogrefe *et al.* (2015) found that house prices, private sector debt, and private sector credit flow are the best early warning indicators of crisis events. Furthermore, export market shares, private sector credit flow and private debt were best predictors of MIP classification. Domonkos *et al.* (2017) found that in the short run private sector debt is the best performing indicator amongst the headline indicators, complemented by current account balances in the long term. But in general, empirical works have concluded that the predictive power of the MIP Scoreboard Indicators is relatively low. Possible reasons may include no common agreement on definition of systemic banking crisis, sovereign debt crisis, currency crisis, and others, as well as different statistical approaches applied.

In our previous paper we defined economic crises as deterioration of economic situation, either in real or financial sector, causing more or less severe losses in money and social terms. We refer to Claessens and Kose (2013) who differentiate between currency crises, debt crises and banking crises. This approach is broader than proposed by Mishkin (2010) who concentrated on downturn in GDP and increase in unemployment. We proposed the concept of "multidimensional crisis" based on sev-

eral economic indicators: decline in GDP (year-on-year change), inflation (year-on-year change), devaluation or depreciation of home currency against USD (either average or end of period), local stock market decline (end of quarter against end of previous quarter) and restrictions on cash withdrawal. In addition, we track "abnormal data", and declare that a crisis is above or below a certain threshold, like De Scheemaekere, Oosterlinck, and Szafarz (2015). If a certain threshold is exceeded, it counts as a "single crisis" (1). Accordingly, "multidimensional crisis" may reach level 1, 2, 3, 4 or 5 in a quarter. If a crisis has occurred more often than once a quarter of the year, the maximum value from all quarters is taken as a crisis indicator.

We test two sets of thresholds. Set 1 relies on statistical distributions of crisis indicators and set 2 is based on an expert opinion on what a crisis is.

Set 1. We investigate the distributions of four crisis indicators in the period 2008-2017. Thresholds values are defined as mean values plus or minus one, two or three standard deviations (Table 1). Restrictions on cash withdrawals are always defined as 1 if imposed or 0 otherwise.

Table 1: Set 1 crisis thresholds (in %)

Variables	**Level 1**	**Level 2**	**Level 3**	**Level 4**
1. Decline in GDP	0	–2,84	–6.86	–10.87
2. High inflation	1.77	4.03	6.30	8.57
3. High devaluation / depreciation of home currency against USD*	0.70 0.73	5.56 6.35	10.43 11.97	15.29 17.58
4. Severe stock market decline	–0.04	–12.24	–24.44	–36.64

Source: own calculations and definitions.

*First figure refers to quarter average, second one to end-of-period value.

Set 2. Our "multidimensional crisis" in its standard expert version covers:

a) fall of GDP by more than 10% on yearly basis;

b) high inflation by 10% or more;

c) high depreciation / devaluation of home currency against USD by more than 15%,

d) severe stock market decline by more than 20% quarterly;

e) instability of banking system, manifested by restrictions on cash withdrawals.

Other thresholds, indicating more or less severe crisis, are arbitrarily set 20% lower / higher, starting from the standard version, until extreme or almost "normal" values are reached.

Table 2: Set 2 crisis thresholds (in %)

Variables	Level 1	Level 2	Level 3	Level 4 (standard)	Level 5	Level 6
1. Decline in GDP	–4	–6	–8	**–10**	–12	-14
2. High inflation	4	6	8	**10**	12	14
3. High devaluation / depreciation of home currency against USD*	6 6	9 9	12 12	**15** **15**	18 18	21 21
4. Severe stock market decline	–8	–12	–16	**–20**	–24	–28

Source: own definitions.

*First figure refers to quarter average, second one to end-of-period value.

In our previous papers we managed to:

1) identify the MIP indicators which were quite effective in crises prediction (net international investment position, nominal unit labour cost index, house price index, private sector credit flow and general government gross debt) and

2) show, that only two of five NIIP components possess systematic predictive capacity of crises: derivatives and other investment, for all 28 EU countries as a group.

Net International Investment Position

Net international investment position has been defined by the IMF as a difference between (a) financial assets [A] of residents of an economy that are claims on nonresidents and gold bullion held as reserve assets, and (b) liabilities [L] of residents of an economy to nonresidents (IMF 2009, p. 119). The main components of the international investment position are:

Direct investment (DI = direct investment abroad [DIA] minus direct investment in the reporting economy [DIL]) – category of cross-border investment associated with a resident in one economy having control (more than 50 percent of the voting power) or a significant degree of influence (from 10 to 50 percent of the voting power), directly or indirectly, on the management of an enterprise that is resident in another economy;

Portfolio investment (P = portfolio investment abroad [PA] minus portfolio investment in the reporting economy [PL]), involving debt or equity securities, other than those included in direct investment or reserve assets. Negotiability allows investors to withdraw investment readily. This feature makes portfolio investment sensitive to any signs of deterioration of economic situation and potentially an efficient indicator of upcoming crisis;

Financial derivatives (other than reserves) and employee stock options (DER = derivatives assets [DERA] minus derivatives liabilities [DERL]) consist of financial instruments that are linked to another specific financial instruments or indicators or commodities and through which specific financial risks (such as interest rate risk, foreign exchange risk, equity and commodity price risks, credit risk, and so on) can be traded in their own right in financial markets. Employee stock option is an option to buy a certain amount of company shares at a predetermined price for a specific period, offered to employees of the company as a form of remuneration;

Other investment (O = other assets [OA] minus other liabilities [OL]) is a residual category that includes positions (and transactions) other than those included in direct investment, portfolio investment, financial derivatives and employee stock options, and reserve assets. This item covers diversified subcategories, of different importance: a) other equity; b) currency and deposits; c) loans (including use of IMF credit and loans from the IMF); d) nonlife insurance technical reserves, life insurance and annuities entitlements, pension entitlements, and provisions for calls under standardized guarantees; e) trade credit and advances; f) other accounts receivable/payable; and g) SDR allocations (SDR holdings are included in reserve assets). "Other investment" is, contrary to appearances, a quite significant position, comparable and in many cases higher than direct investment and portfolio investment;

Reserve assets (R) are those external assets that are readily available to and controlled by monetary authorities for meeting balance of payments financing needs, for intervention in exchange markets to affect the currency exchange rate, and for other related purposes (such as maintaining confidence in the currency and the economy, and serving as a basis for foreign borrowing). Reserve assets must be foreign currency assets and assets that actually exist. Reserve assets consist of monetary gold, SDR holdings, reserve position in the IMF, currency and deposits, securities, financial derivatives, and other claims.

Methodology

Our model is an ordered probit model:

$$CRISIS^{*} = NIIP^{T}\,\beta + \varepsilon,$$

where:

CRISIS* is dependent unobservable crisis variable,

NIIP is the vector of selected components of net international investment position (independent variable),

β is the vector of regression coefficients.

Ordered probit model is a generalization of the probit model to the case of more than two outcomes of a dependent variable for which the potential values have a natural ordering, as "no crisis" (0), "minor crisis" (1), "big crisis" (2), and so on. Ordered probit model was previously used in literature to examine currency crises, but recently also effectiveness of economic policy responses during European semester procedure (Bricongne, Turrini and Garcia, 2019).

NIIP has been proven as a statistically significant variable in the sample of 28 EU countries, when predicting crises at all considered thresholds levels, but only two of five NIIP components possess systematic predictive capacity of crises: derivatives and other investment. Now we repeat the test separately for 11 CEECs and 17 non-CEECs.

We use all available components of NIIP according to the rule: assets (positions at the end of year), liabilities (positions at the end of year, with exception of official reserve assets, which are assets only), and net position (assets minus liabilities) at the end of the year.

First, we test the significance of every NIIP component, one by one, for 11 CEECs and 17 non-CEECs and 10 years (2007-2016), in predicting crises in years 2008-2017. We use the same methodology as in our previous paper, which produced results suggesting relevance of NIIP in predicting crises, and we expect minus sign at variables "net" and "assets" and plus sign at "liabilities", which means that rising net values and foreign assets counteract crises while increase in liabilities possibly fosters crises. Second, we test the significance of net values at once. Third, regressors are all assets and liabilities of variables constituting NIIP. We express all NIIP components as % of GDP.

We use the following data provided by Eurostat:

- direct investment, portfolio investment, financial derivatives and employee stock options, other investment (annual data, million units of national currency); net positions, assets and liabilities,
- gross domestic product at market prices, in euro,
- MIP indicators as well as
- official reserve assets available at IMF (International Reserves and Foreign Currency Liquidity), in US$ million,
- Euro Foreign Exchange Reference Rates on the last day of the year, provided by the European Central Bank.

Results

We already know that some of NIIP components have better predictive strength of crises than others. Therefore, we test the single component predictive strength using ordered probit model, where regressors are NIIP components, one by one. We use panel data, for 11 CEECs and 17 non-CEECs and 10 years (2007-2016) and crisis data, with one-year lag (2008-2017).

Table 3 shows which single variables are statistically significant and signs of their parameters, for two sets of crisis definitions, all crisis levels and two groups of EU countries.

Table 3: Signs of statistically significant parameters for different crisis sets and threshold levels (all NIIP components, one by one), for CEECs / non-CEECs.

	DI 1	DIA 2	DIL 3	P 4	PA 5	PL 6	DER 7	DERA 8	DERL 9	O 10	OA 11	OL 12	R 13
Set 1, level 1		/–**	/–**		–*/	–**/	–**/		+*/	–***/–*		+*/	
Set 1, level 2		/–*	/–*		–**/	–***/	–**/–*	/–***	/–**	–***/		+*/	
Set 1, level 3					–**/		/–**	/–**	/–*	–*/			
Set 1, level 4					–*/					–**/			
Set 2, level 1		/–*	/–*		–***/	–***/	–***/	–*/–**	/–*	–***/	–**/		
Set 2, level 2					–**/	–**/		/–**	/–**	–***/	–*/		
Set 2, level 3						–*/	/–***	/–**	/–**	–**/			
Set 2, level 4					–**/		/–**	/–*		–*/			
Set 2, level 5					–**/								
Set 2, level 6													

Source: own calculations.

The results show that:

1. only selected NIIP components allow to predict crises more or less systematically: portfolio investment, derivatives and other investment,
2. in extremely few cases the same NIIP component is able to predict crisis in both CEECs and non-CEECs,

3. portfolio flows and other investment are good predictors of crisis in the CEECs, while derivatives, much more complex instruments, are at work in more developed non-CEECs.

Second, we test a model with five net NIIP regressors at once (Table 4).

Table 4: Signs of statistically significant parameters for different crisis sets and threshold levels (all net NIIP components), for CEECs / non-CEECs.

	DI 1	P 4	DER 7	O 10	R 13
Set 1, level 1			–**/	–***/–*	/–*
Set 1, level 2			–**/–**	–***/	/–**
Set 1, level 3			/–**		/–**
Set 1, level 4				–**/	
Set 2, level 1	+**/		–***/–*	–***/	/–***
Set 2, level 2				–*/	/–***
Set 2, level 3			/–***		
Set 2, level 4			/–*		/–**
Set 2, level 5					
Set 2, level 6					

Source: own calculations.

In general, for CEECs none of net positions seem to have ability to predict "crisis"; only derivatives and other investment are useful, in case of "small" deterioration of economic situation. For non-CEECs official reserves are important, what is very strange for rather well-developed countries, and to some extent again derivatives.

Third, we test separately assets and liabilities as explanatory variables (Table 5).

Table 5: Signs of statistically significant parameters for different crisis sets and threshold levels (all NIIP components, assets and liabilities), for CEECs / non-CEECs.

	DIA 2	DIL 3	PA 5	PL 6	DERA 8	DERL 9	OA 11	OL 12	R 13
Set 1, level 1	+***/	–**/		–***/		+***/	–***/	+***/	–*/–*
Set 1, level 2				–***/	/–*	+***/	–***/	+***/	–*/–***
Set 1, level 3	/+**	/–**	/+*	/–*	/–*				/–**
Set 1, level 4			–**/				–*/	+**/	–**/
Set 2, level 1	+**/	–**/		–***/	/–*	+***/	–***/	+***/	–*/–***
Set 2, level 2	/+**	/–**	/+*	–***/–*		+*/	–**/	+*/	/–***
Set 2, level 3	/+*	/–*	/+*		/–**				/–**
Set 2, level 4	**/+***	/–*	–**/	–**/					/–**
Set 2, level 5			–**/						–**/
Set 2, level 6			–*/						–*/

Source: own calculations.

For CEECs only slight deterioration of economic situation (level 1 and 2) can be predicted. However, portfolio assets abroad (PA) and official reserves (R) have some predictive strength for serious crises (if both rise, probability of crisis is lower). In case of non-CEECs only reserves (R) play an important role, and – to some extent – direct investments from abroad (DIL). If both variables rise, crisis is less probable. Again, we would expect this association rather in less developed countries.

Conclusions

The aim of the paper was to check whether the variables constituting one of the MIP indicators, namely the net international investment position (NIIP), differ in predictive strength of crises between two groups of EU countries: Central and Eastern European Countries (CEECs) and non-CEECs. Using ordered probit model and three tests of significance of NIIP components, on the whole we were able to confirm our hypothesis, that different components of NIIP are able to predict crises in CEECs and non-CEECs and ascribe this effect to the differences in size and complexity of external capital relations of both groups of countries. In addition, we may assume that early warning crisis indicators for CEECs are portfolio investments and other investments, while for non-CEECs there are no systematically proven variables. Sometimes deterioration of economic situation in well-developed countries may be signalled by changes in official reserves, derivatives or direct investment from abroad.

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References

• Boysen-Hogrefe, J. *et al.* (2015) *An empirical evaluation of macroeconomic surveillance in the European Union*, *Kiel Working Paper*. doi: 10.1111/j.1467-6346.2007.00779.x.

• Bricongne, J.-C., Turrini, A. and Garcia, N. M. (2019) 'Macroeconomic Imbalance Procedure, Economic Reforms and Policy Progress in the European Union', *LIEPP Working Paper*, 87.

• Catão, L. A. V and Milesi-Ferretti, G. M. (2014) 'External liabilities and crises', *Journal of International Economics*, 94, pp. 18–32. doi: 10.1016/j.jinteco.2014.05.003.

• Claessens, S. and Kose, M. A. (2013) 'Financial Crises: Explanations, Types, and Implications', *IMF Working Paper*, 28(1), pp. 52–53. doi: 10.1080/00031305.1967.10479828.

• Domonkos, T. *et al.* (2017) 'Analysing the Relevance of the MIP Scoreboard's Indicators', *National Institute Economic Review*, 239(1), pp. R32–R52. doi: 10.1177/002795011723900112.

• Erhart, S., Becker, W. and Saisana, M. (2018) *The Macroeconomic Imbalance Procedure - From the Scoreboard and Thresholds to the decisions*. Luxembourg. doi: 10.2760/038148.

• European Commission (2019), *Dealing with macroeconomic imbalances*. [Online] [Retrieved January 31, 2020], https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/macroeconomic-imbalance-procedure/dealing-macroeconomic-imbalances_en.

• IMF (2009) *Balance of Payments and International Investment Positions*. International Monetary Fund. doi: 10.1007/978-3-642-00100-0_4.

• Knedlik, T. (2014) 'The impact of preferences on early warning systems - The case of the European Commission's Scoreboard', *European Journal of Political Economy*, 34(1174), pp. 157–166. doi: 10.1016/j.ejpoleco.2014.01.008.

• Kološta, S., Kráľ, P. and Flaška, F. (2018) 'Alternative measures of macroeconomic imbalances in the EU – design and verification', *E+M Ekonomie a Management*. Technical University of Liberec, 22(1), pp. 36–53. doi: 10.15240/tul/001/2019-1-003.

• Mishkin, F. (2010) *Over The Cliff: From the Subprime to the Global Financial Crisis*. Cambridge, MA. doi: 10.3386/w16609.

• De Scheemaekere, X., Oosterlinck, K. and Szafarz, A. (2015) 'Identifying economic crises: Insights from history', *Financial History Review*. Cambridge University Press, pp. 1–18. doi: 10.1017/S0968565015000025.

• Siranova, M. and Radvanský, M. (2018) 'Performance of the Macroeconomic Imbalance Procedure in light of historical experience in the CEE region', *Journal of Economic Policy Reform*, 21(4), pp. 335–352. doi: 10.1080/17487870.2017.1364642.

• *Statistical Annex of Alert Mechanism Report 2018* (2017) *Commission Staff Working Document*, European Commission.

Operational Risk Assessment For Blockchain Solutions in Supply Chains: A Conceptual Framework

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Abstract

The paper presents interdisciplinary framework for operational risk assessment for blockchain solutions in supply chains[1]. The operational risk fundamentals have been briefly described as well as supply chain risks and blockchain technology implementation possibilities in supply chains. The main part of the paper focuses on the problem of operational risk assessment in the sophisticated context of blockchain solutions in supply chains. A conceptual framework for the risk assessment idea has been presented together with the proposition of risk assessment approach for information security risk as an operational risk sub-area.

Keywords: Operational Risk, Supply Chain, Blockchain, Risk Assessment.

Introduction

Operational risk is a crucial element of total risk faced by modern institutions. In financial business this type of risk plays very important role as a part of the triple “credit-market-operational” defined by Basel Committee in its recommendations (Basel, 2003). Non-financial business is not free of operational risk at all. More to say – the rapid development of information technologies results with the operational risk reaching its highs these days. The goal of the paper is to make a foundation for a conceptual framework describing the fundamentals for operational risk assessment for blockchain solutions in supply chains. The paper focuses on information technology risk and proposes a quantitative approach for its assessment as a part of holistic view on operational risk for blockchain implementations in supply chains.

Operational Risk

The first attempts to define operational risk appeared at the end of the last century and were of negative definitions, most often treating operational risk as other risk, which does not fall within the scope of

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financial risks. However, the growing significance of the problem and its direct impact on the business resulted with the need for more detailed analysis of the causes and potential effects of this phenomenon, as well as the creation of a positive definition. The sources of these analyzes include, among the others, a survey conducted in 1999 by the British Bankers Association among entities of the banking sector. They asked about practical operational risk definitions. The answers received defined this risk as (Wawrzyniak, 2012):

- risk of fraud by employees or people outside the organization,
- risk of unauthorized transactions carried out by employees or errors caused by IT and telecommunications systems,
- risk arising from systems maladjustment, operational problems, violation of guidelines formulated by internal control, fraud and unforeseen disasters, causing unexpected losses in the organization,
- risk that should be considered in the context of correctness, efficiency and integrity of the control system and other mechanisms aimed at implementing business processes; the main elements of operational risk include processes, people, systems, business strategy and the business environment,
- exposure to financial and non-financial losses caused by unforeseen events or failures in processes and operating systems with particular emphasis on the environment, business strategy, processes, people and systems.

In June 2004, the Basel Committee on Banking Supervision published the final version of the New Capital Accord (Basel, 2003), ending in some way the discussion on the nature and definition of operational risk. The definition adopted in the regulation says that operational risk is the risk of direct or indirect loss resulting from improper or unreliable internal processes, people and systems or external events. Basel II distinguished between seven operational risk categories:

1) risk related to internal fraud; it concerns material losses caused by embezzlement, fraudulent reporting,
2) risk related to external abuse; it relates to material losses resulting from theft, physical or computer hacking made by persons not related to the financial institution,
3) risk related to human resources management and work safety; it applies to losses resulting from unlawful conduct and various forms of discrimination, as well as non-compliance with work safety rules,
4) risk related to clients, products and business practices; in this case, the losses are caused by intentional or unintentional conduct incompatible with professional practice, e.g. money laundering, conducting unauthorized transactions on bank accounts, the use of confidential information and customers, the sale of unauthorized products,
5) risk related to destruction of assets; it concerns losses resulting from acts of vandalism, terrorism or disasters,
6) risk related to disruptions in the work of systems supporting the work of a financial institution; in this case, the losses are caused by problems related to the operation of IT and telecommunications equipment and software,
7) risk related to the implementation of business processes; it concerns losses related to incorrect execution of transactions and incorrect management of business processes.

Originally, they were related to financial business but nowadays the differences between financial and non-financial institutions information systems are becoming less and less significant in the context of operational risk. The table 2 presented below shows the possible mapping of these original risk categories into risk areas in modern supply chain systems. In the other words, financial background for operational risk approach should play significant role in operational risk management in non-financial institutions nowadays.

Supply Chain Risks

The importance of information and communication technology for supply chains is widely acknowledged (Gunasekaran et al., 2004; Stadtler et al., 2005). Supply chain risk management is a sophisticated problem. It covers wide range of different risk types and does not allow for simple analytical approaches. Contemporary risk management is a cross-disciplinary process that takes a holistic approach and employs a wide range of specific methods, techniques and tools (Mullai, 2009). Risk management is becoming an integral part of a holistic supply chain management systems design (Christopher and Lee, 2004). There is diverse classification of supply chain risks found in the literature. Risk itself is often termed as deviation, disruption, vulnerability, uncertainty, disaster, peril and hazard. The taxonomy of operational risks evolved in last years. Gallagher et al. distinguish between mission, work processes and constraints (Gallagher et al., 2013). Cavinato points out five sub-chains in every supply chain and addresses them to different risk categories (Cavinato, 2004). They are:

- physical – the actual movements and flows within and between firms, transportation, service mobilization, delivery movement, storage, and inventories;
- financial – the flows of cash between organizations, incurrence of expenses, and use of investments for the entire chain/network, settlements, A/R and A/P processes and systems;
- informational – the processes and electronic systems, data movement triggers, access to key information, capture and use of data, enabling processes, market intelligence;
- relational – the appropriate linkage between a supplier, the organization andits customers for maximum benefit; includes internal supply matter relationships throughout the organization;
- innovational – the processes and linkages across the firm, its customers, suppliers, and resource parties for the purpose of discovering and bringing to market product, service, and process opportunities.

Chopra and Sodhi (2004) suggest nine categories of supply chain risks: disruptions, delays, systems, forecast, intellectual property, procurement, receivables, inventory and capacity. Mason-Jones and Towill (1998) identify risk sources related to supply chain: environment, demand, supply, process and control. Similarly, Jüttner (2005) classified risks based on supply chain basic constructs: environmental-risk, organizational risk and network risks.

All these approaches are important. However, they seem not to focus on the possibilities of risk assessment – so important for the Basel context mentioned earlier. Mixing up such terms as disruption, uncertainty, disaster or hazard makes it impossible to propose any assessment solution that would be practically useful. On the other hand, identifying operational risk and its main sub areas: people, processes and technology allows for finding out the scientific backgrounds for risk assessment possibilities described later. For this paper it has been assumed that operational risk in supply chains consists of three categories:

- risk related to people and their behavior,
- risk related to the business processes,
- risk related to the information technology solutions implemented in supply chains.

Operational risk in this context can be defined as the potential for unwanted negative consequences that arise from an event or activity. In the other words operational risk arises as an unwanted by-product of the activities dealing with core business and related to people, processes and technology.

Blockchain solutions for supply chains

Most fundamentally, a blockchain is a distributed ledger that is shared and agreed upon a peer-to-peer network. Blockchain provides four key features that can enhance integration and coordination among the members of a supply chain: transparency, validation, automation, and tokenization (Blossey et al.,

2019). Blockchain networks should not be called innovations, because they base on mathematic, cryptography and information technology well known from years. Nevertheless, they can be used to develop new technological solutions of an innovative nature. There are numbers of current supply chain limitations that can be reduced by the use of blockchain technology. These limitations and the positive impact introduced through blockchain adoption are presented in the table 1 (Litke et al., 2019).

Table 1: Supply Chain actors and their current limitations

Supply chain actor	Current limitations	Blockchain impact
Raw material / Producer	Ability to prove in a global and transparent way the origin and quality metrics of products.	Benefits from increased trust of keep track of the production raw material and value chain from the raw material to end customer.
Manufacturer	Limited ability to monitor the product to the final destination. Limited capabilities of checking quality measured from raw material.	Added value from shared information system with raw material suppliers and distribution networks.
Distributor	Custom tracking systems with poor collaboration capabilities. Limited certification ability and trust issuers.	Ability to have proof-of-location and conditions certificates registered in the ledger.
Wholesaler	Lack of trust and certification of the products' path.	Ability to check the origin of the goods and the transformation / transportation conditions.
Retailer	Lack of trust and certification of the products' path.	Track of each individual product between the end consumer and the wholesaler. Ability to handle effectively return of malfunctioning products.
End user / Consumer	Lack of trust regarding the compliance of the product with respect to origin, quality and compliance of the product to the specified standard and origin.	Full and transparent view on the product origin and its whole journey from raw material to final, purchased product.

Source: Litke et al., 2019

Blockchain as a technology that allows maintaining joint and collective information about operations (transactions) in a digital form, guaranteeing the possibility of confirming the authenticity of information and not requiring central database can find many applications in logistics and supply chain management. Although the literature on the subject indicates many different areas of application of blockchain technology in logistics, in fact each of them can be classified into one of two areas:

- Product Tracking,
- Documentation Processing.

The first area defined as Product Tracking is the ability to track the path of the product and its ingredients from the manufacturer to the end customer. The record in the form of blockchain information on the history of production and transport of goods ensures buyers that the purchased goods are delivered and produced from verified sources. This technology would also prevent information from being hidden or modified. An important aspect in this case would be information to ensure fair work practices and better protection of human rights. Blockchain can help supply chains detect unethical suppliers and counterfeit products because all information can only be recorded by authorized entities.

In the second area referred to as Documentation Processing, blockchain technology can support the collection, storage and management of data related to the documentation of operations implemented in the supply chain (especially transport documents). In this technological context, openness, transparency, neutrality, reliability and security are important for all supply chain participants (Abeyratne et al., 2016).

Blockchain technology can ensure data security and authenticity, which will reduce the cost of preventing intentional and accidental data changes, increasing risk in the supply chain and reducing business reliability (Ivanov et al., 2018).

It has to be mentioned that the process of implementation of blockchain technology in supply chains will be a challenge for many companies. The implementation of the blockchain will not only help the companies to control other entities but will also allow for controlling the organization implementing this technology (Mendling et al., 2017). When considering the implementation of blockchain technology in supply chains, two key problems of its implementation should be underlined. The first barrier deals with limited knowledge about the application opportunities of blockchain technology. This is an obstacle to the introduction of this new technology into the supply chain. Despite the growing interest in blockchain technology on the technical market, the problem is related to the limited number of real-life applications and examples of successful implementations (Mougayar, 2016). Another important issue is the fact that transparency and the ability to verify information by some organizations can be considered a competitive advantage, which will cause that they will block access to them and limit the scope of implementation and use of the blockchain (Sayogo et al., 2015). The fear of disclosure may significantly limit the full benefits of implementing blockchain technology.

Blockchain technology enables organizations to develop new tools that can significantly improve their supply chains. Blockchain ensures transaction transparency, data security and trouble-free trust, resulting in reduced costs, greater efficiency in supply chains, and increased customer confidence. Technology enables supply chain partners to share data more reliably, leading to better collaboration. The blockchain will be a truly transformative technology for the supply chain ecosystem. Supply chain managers and other network users, thanks to blockchain technology, are able to see real-time digital and physical products in their supply chains along with changes in quantities and prices. Every single part of a final product can be tracked in chronological order from the origin to the final point of sale. As all authorized users can view the same information at the same time, the goods flow and billing process is significantly improved. As a consequence, this condition translates into effective recording, acceleration of payment processes, improvement of the method of tracking shipments, and additionally limiting the likelihood of fraud due to total transparency and availability of data. Blockchain allows aggregation of data between manufacturers, distributors, buyers and financial partners. By sharing data, payments can be made as soon as the delivery is confirmed. The implementation of blockchain technology in logistics enables third-party verification, registration and coordination of transactions, which essentially eliminates intermediaries. Blockchain technology implementations definitely introduce new types of risk into supply chains world. Being often innovations and offering new possibilities they also become a source of new threats and uncertainty areas. Dealing with blockchain related operational risks will be of a great importance in future supply chain networks. The table 2 presents the key risks areas for blockchain implementations in supply chains. They are related to (in alphabetical order):

- centralization - blockchain is comprised of independent nodes; although these nodes are operating independently from each other, these nodes might be owned by a single organization or by a collaboration of organizations; competitors might be blocked from transacting on this system or risk being restricted from using certain functionalities (van der Weerd, 2019);
- compliance – the immaturity of blockchain solutions is both legal and regulatory driven problem; missing international legal standards as well as different legal status of blockchain tokens results with significant risk of participating in money laundering of terrorist financing;
- computational overhead – depending on the consensus type the has puzzle may be more or less difficult; nevertheless, computational costs will always be source for additional operational risk;

- consensus - achieving consensus in a blockchain generally involves a complex set of mathematical functions and coordination between the network nodes; if the consensus process is flawed, organizations transacting on this blockchain might be exposed to significant risks – both operational as financial,
- continuity - reaching consensus requires coordination and communication between nodes that are often spatially separated from each other and located in internal networks; the business continuity is a challenge in such environment;
- cryptographic key management – public key infrastructure as well as blockchain specific key management solutions are a target for external security attacks; operational risk arises even if the solutions use only standard protocols and algorithms; the weakest part of any blockchain deals not with the protocols but with their implementation;
- data complexity – with the rapid growth of data-driven applications, the systems for supply chain management have to deal with data complexity; to meet these challenges the blockchain systems must offer the functionalities vulnerable for security breaches;
- human attitudes – blockchain solutions do not require trusted third parties but it does not mean the human factor disappears from the operational risk view; more to say – its importance is getting more and more significant in the context of blockchain sophisticated technology;
- law and regulations – current legal issues give no clear answer for the question: what will be the legal status for blockchain technology implementations – especially in the context of tokens and their role in financial systems; legal risk plays significant role in the world of blockchain and should be treated rather as uncertainty;
- physical damage – no blockchain innovation is able to avoid the physical damage risk; however, distributed ledger technology has huge potential to mitigate such type of risk;
- privacy - unauthorized blockchain ledger transactions might result in unintended consequences such as degraded data integrity or violated privacy requirements due to the fact that personal data is accessible, and the transaction commits cannot be reverted; sensitive personal data cannot be stored directly on the blockchain;
- scalability – the consensus problem already mentioned requires coordination and communication between the network nodes that may eventually result in a lack of scalability of the blockchain network;
- smart contracts development - smart contracts are agreements between blockchain participants that are codified into the authoritative ledger; they are executed automatically when certain requirements are met; development errors in this field may result with serious information security;
- systems integration – operational risk can be found in the integration area very often as the integration processes involving people, technology and protocols not always result with secure and optimizes solutions; the variety of protocols – both standard and tailored – should be seen as a significant supply chain risk source.

Table 2: Blockchain risk areas mapped with Basel risk categories and their relevance for supply chains

Basel risk category (presented earlier) mapped for blockchain related risk area	Blockchain related risk area (alphabetical order)	Relevance for supply chains (very high, high, medium, low, very low)	Possibilities of the risk area quantitative measurement (very good, good, medium, low, very low)
1	Centralization	High	Medium
1, 2	Consensus	Very high	Medium
1, 4, 5	Continuity	Very high	Medium
2	Compliance	High	Medium
1	Computational overhead	High	Medium
1, 2	Cryptographic key management	High	Low
1, 2	Data complexity	High	Low
1, 2, 3, 4, 7	Human attitudes	Very high	Medium
1, 2, 5, 6	Physical damage	Very high	Low
1, 2	Privacy	High	Medium
1, 2, 6	Systems integration	Very high	Medium
1, 4	Smart contracts	Very high	Medium
1	Scalability	Medium	Medium
2, 3, 7	Law and regulations	Medium	Low

Source: Own research

These risks will not stop the distributed ledger technology development but they definitely have to be assessed and managed within supply chains.

Operational Risk Assessment

Operational risk defined above can be managed according to many standards and approaches. Some of them take the advantage of Basel Committee regulations, some use ISO standards and some can be described as scientific approaches. The last of these deals mainly with using sophisticated statistical methods taking the advantage of some strong assumptions. Most commonly used (and questionable alike) is that these methods use statistical distributions in order to describe the variables being assessed and evaluate some probabilities of risk events occurrence. An important question arises in such case: What is the meaning of the phrase "known probability distribution"? If an expert assumes subjective probabilities of some events (e.g. of such events that have no precedents), can this approach be considered as valid knowledge about probability distribution, or rather should we have access to sufficiently extensive past data? Due to the philosophical nature of this problem it is seldom approached by scientific publications. The variety of operational risk management solutions does not stand against the basic idea: in order to manage you have to be able to use quantitative assessment methods. Thus, the important question arises: is it possible to assess the risk dealing with people, processes and technology in a complicated environment of blockchain implemented in supply chain? The answer can be positive with a set of assumptions:

1. The operational risk problems have to be divided into individual sub-areas allowing for possible implementation of quantitative methods.
2. Every sub-area has to distinguish between:
    - low frequency and high severity risk events (LF-HS),

- high frequency and low severity risk events (HF-LS).

3. Only HF-LS for given sub-area can be practically assessed by the use of quantitative methods.
4. These methods should not focus only on standard statistical tools (probability distributions) since information technology rapid development and blockchain implementations in supply chains sophistication make them useless for business practice.

The information security risk assessment framework described below is an example of operational risk sub-area HF-LS approach that can be implemented for blockchain risk management in supply chain.

Information Security Risk Assessment

There are two types of risk events in information security sub-area: low frequency and high severity risk events (LF-HS), high frequency and low severity risk events (HF-LS). Assessing the risk dealing with LF-HS is practically impossible. Statistical approaches become useless with zero knowledge about the probability distributions. On the other hand, HF-LS can be assessed by the use of statistical tools and basic quantitative approaches alike.

The concept of information security risk has been known for a long time, however the manner of approaching the problem has significantly changed over the past dozens of years, evolving from the simple ideas of risk analysis to complex processes of risk management. To begin the discussion about information security risk, one should introduce the four key terms, i.e., resources (assets), sensitivity, threats and vulnerability. Assets are anything that is valued by an institution and should be protected for its benefit and undisturbed functioning. Sensitivity measures the weight assigned to information by its author or owner so as to indicate the need and principles of its protection. Threats are potential causes of unwanted events whose consequences can be the losses occurred in an information system, and furthermore in the institution. Vulnerabilities are weaknesses or gaps in an information system that can be used by threats, generating losses. Threats as such are intrinsic features of any system and its environment, and do not necessarily result in incidents, i.e. events that detrimentally affect system security. An incident and resulting losses can occur only when a threat exploits some vulnerability of a system. In other words, a loss results from the occurring threat, not just from the existing threat. The concept of threats strongly depends on a concept of attack – an attempt to breach security measures of a system.

Information security defined as a system state characterized by certain levels of security attributes on one hand is factually different from the concept of information security risk, on the other though the relation between both terms is evidently noticeable and significant for optimization of risk management and security management processes. Information security is about the state of the system, at the same time indicating a certain level of information security risk of this system. The indication can be more accurate if the assessments of security level in many past periods are put together. A data set delivered in this way can serve as an element of a solution oriented towards risk management. However, can a security assessment and a risk assessment be equated? In a particular case, yes, but in a general case, definitely not. A particular case is when a system under review is not subject to internal changes and external influence. Only then one may claim that the observed changes in security level correspond with the changes in information security risk level. However, this assumption is rather hypothetical and impractical so that its detailed analysis does not seem relevant. As a result, one asserts that evaluating security level and information security risk level are two different problems, although correlated, but requiring different methodologies, tools and input data, as well as oriented on different goals and attributes of output information. At the beginning of discussion about potential assessment of security level, one has to exactly distinguish the two aspects:

- a theoretical level of system security resulting from implemented solutions,
- an observed level of system security resulting from activities of its users.

The first one is relatively easy to determine. Most frequently, the theoretical level is determined by comparing security measures implemented in the system to criteria specified in one of many standards.

As a result, a defined security class is assigned to the system. Nevertheless, no answer is given to the question whether implemented measures proved effective or whether they will also prove effective in future, that is a much more important issue regarding risk management. Evaluating the observed levels of security is not intricate, especially as regards a methodological layer. Most generally, the evaluation of security level leads to a numerical summary of past data set associated with a chosen subset of the system. This is clearly a bit simplified, but fully justifiable. However, is it enough to rely the evaluation procedures solely on historical data – that is so typical when estimating risks in many areas, especially in finance – if one aims at a quantitative description of information security risk. The answer to the question asked in this form must be definitely negative as a result of the definition of information security risk as well as of practical aspects of implementation of risk management methods. However, security evaluation methods can be a significant element supporting risk assessment procedures. As mentioned, risk assessment in first place is to deliver probabilities of some events. In so doing, one should not neglect historical aspects of occurrence. In other words, each set of historical data, both as primary input and as processed by security evaluation method, represents an information basis of risk assessment methods. The latter ones are naturally created by contrasting two factual areas: information area and computation area. Information area represents historical data complemented (modified) by their expert analysis, whereas computational area comprises a manner of mathematical transformation of information area into output measures that can support information security (IS) risk management process. The concept is illustrated in the figure 1.

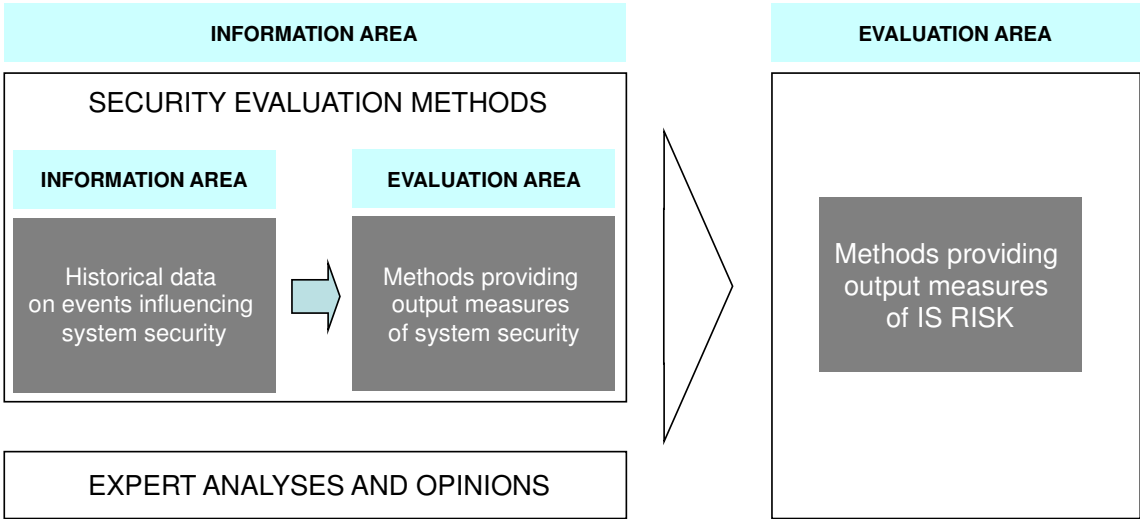

Fig. 1: A concept of coexistence of security evaluation and information security risk assessment methods

Source: own elaboration.

Formally the concept above can be written as:

$$R = \{I(M_B), O(M_B), E(M_R), O(M_R)\} \qquad (1)$$

where: R – an abstract set of output measures describing the levels of IS risk, MB – an abstract set of security evaluation methods, MR – an abstract set of IS risk assessment methods, I(MB) – the information area of an abstract set of security evaluation methods, O(MB) – the computation area of an abstract set of security evaluation methods, E(MR) – the expert area of an abstract set of IS risk assessment methods, O(MR) – the computation area of an abstract set of IS risk assessment methods.

Evidently, the following equality holds:

$$I(M_B) + O(M_B) + E(M_R) = I(M_R), \quad (2)$$

where I(MR) – the information area of an abstract set of security evaluation methods.
The following practical constraints are also important:

$$\begin{aligned} O(M_B) &\geq 0 \\ I(M_B) + E(M_R) &\geq 0 \end{aligned} \quad (3)$$

In other words, computation area of security evaluation methods is optional in the context of risk assessment, whereas simultaneous absence of both the information area of security evaluation methods and the expert area of risk assessment methods is not allowed.

Hence, can we argue that security evaluation methods represent a special type of information security risk assessment methods? The answer to such a question should be positive and justifying arguments follow:

1. When assessing information security risk, we need to assign values of probability to likelihood of occurring events, whereas the most information-bearing source enabling identification of such probabilities are historical data on system functioning, including diverse synthetic measures of security level evaluation. In other words, each security evaluation method can support the information area of a risk assessment method.
2. Cyclical and meaningful process of quantitative security evaluation naturally sets some trends that should be considered also as significant determinants of information security risk.
3. The measures of security levels are unbiased because there is no need for the use of expert knowledge, therefore in a long run the assessment process of probability values can be optimized, thus resulting in minimization of levels of assessment errors.

According to the arguments above, even the simplest way of quantitative description of security levels for blockchain solutions, temporarily implemented, can provide a basis of quantitative risk assessment tools. This is an important statement for business practice. It implies a possibility to employ existing, simple and inexpensive quantitative security evaluation methods to assess information security risk that is typically associated with practically advanced mathematical description and implementation problems. In addition, the increasing number of security measurements is followed by the increased accuracy of the method in the context of risk assessment. Thus, one deals here with a sort of enhancement of risk assessment methods. Assuming that cyclical employment of simple security level evaluation methods is sufficient for risk assessment is of course arguable. Both changes of the system, as well as of its environment will influence the need to repetitive elimination of historical measures. Thus, security evaluation methods and risk assessment methods both originate from a common set of assumptions and goals. Yet, the scope, advancement level of mathematical tools, as well as diversity of ideas and concepts are noticeably higher in case of the latter.

Blockchain management in supply chains can definitely take the advantage of above concept avoiding sophisticated statistical approaches and focus on simple evaluation data. It is worth mentioning that more and more complicated business environment should benefit from less complicated management tools.

Conclusions

The paper presents various dimensions for the title subjects as well as wide range of problems that are of a great importance for supply chains nowadays. Implementing the innovative technology – like blockchain - always deals with risk and managing this risk becomes crucial issue. A risk conceptual framework together with the information security risk assessment approach presented above may be a

background for company specific solutions that could aim at supporting the operational risk management processes.

References

- Abeyratne S. A., Monfared R. P., (2016), Blockchain Ready Manufacturing Supply Chain Using Distributed Ledger., International Journal of Research in Engineering and Technology 5 (9): 1–10.
- Basel Committee on Banking Supervision, The New Basel Capital Accord, (2003), https://www.bis.org/bcbs/bcbscp3.pdf.
- Blossey G., Eisenhardt J., Hahn G., (2019), Blockchain Technology in Supply Chain Management: An Application Perspective, Proceedings of the 52nd Hawaii International Conference on System Sciences.
- Cavinato J.L., (2004), Supply Chain Logistics Risks. From the Back Room to the Board Room., International Journal of Physical Distribution and Logistics Management, 34(5): 383-387.
- Chopra S., Sodhi M., (2004), Managing Risk to Avoid Supply-Chain Breakdown, MITSloan Management Review, vo. 46., no. 1.
- Christopher, M., Lee, H., (2004), Mitigating supply chain risk through improved confidence, International Journal of Physical Distribution & Logistics Management, Vol. 34 No. 5, pp. 388-396.
- Gallagher J., (2013), Collaborative Risk Management: "Risk Management" vs. "Managing Risk" Gallagher Higher Education Practice.
- Gunasekaran A., Ngai, E. (2004), Information systems in supply chain integration and management, "European Journal of Operational Research", vol. 159, pp. 269-295.
- Ivanov D., Dolgui A., Sokolov B., (2018), The Impact of Digital Technology and Industry 4.0 on the Ripple Effect and Supply Chain Risk Analytics., International Journal of Production Research, 1–18.
- Jüttner, U., (2005), Supply chain risk management: Understanding the business requirements from a practitioner perspective, International Journal of Logistics Management, The, Vol. 16 No. 1, pp. 120-141.
- Litke A., Anagnostopoulos D., Varvarigou T., (2019), Blockchains for Supply Chain Management: Architectural Elements and Challenges Towards a Global Scale Deployment, Logistics.
- Mason-Jones R., Towill R., (1998), Shrinking the supply chain uncertainty circle, IOM control 24(7), pp. 17-22.
- Mendling J., Weber I., Van der Aalst W., Brocke J. V., Cabanillas C., Daniel F., Dustdar S., (2017), Blockchains for Business Process Management-Challenges and Opportunities, ACM Transactions on Management Information Systems (TMIS) 9 (1): 1–16.
- Mougayar, W., (2016), The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology, Hoboken: John Wiley & Sons.
- Mullai A., (2009), Risk Management System – A Conceptual Model, (in:) Zsidisin G., Ritchie B. (eds.), Supply Chain Risk: A Handbook of Assessment, Management & Performance, Springer.
- Sayogo, D. S., Zhang J., Luna-Reyes L., Jarman H., Tayi G., Andersen D. L., Andersen D. F., (2015), Challenges and Requirements for Developing Data Architecture Supporting Integration of Sustainable Supply Chains, Information Technology and Management 16 (1): 5–18.
- Stadtler H., Kilger C. (eds.), (2005), Supply Chain Management and Advanced Planning - Concepts, Models, Software, and Case Studies, Springer.
- van der Weerd S., (2019), How will blockchain impact an information risk management approach?, Digital Auditing & Beyond.
- Wawrzyniak D., (2012), Ryzyko informatyczne w działalności bankowej, Wrocław University of Economics and Business, 2012.

The System Value of Municipal Waste - Entities, Processes, Outcomes

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Abstract

Effective waste management seems to be systemic in nature, so municipal waste – as its core business – has value that is generated by many entities and co-created in a variety of ways and, as a result, is multidimensional, at least dual (primary and secondary markets), enabling the achievement of strategic integral eco-outcomes. Municipal waste is definitely a product developed based on at least a tripartite concept of operation (in subject approach), which implies the identified business model implemented by entities of the waste management sector, in cooperation with customers/suppliers of the waste stream and other enterprises (recipients of value). The relationships of a variety of entities, including mainly the ones between the waste management sector, committed prosumers, and public benefit organizations, but also local and regional trade and service enterprises, the municipality and other companies, leads to the creation of strategic multi-value, beneficial in terms of the social good, drawing on the concept of sustainable development, through socially conscious actions incorporating the principles of integral marketing, where the supplier of waste stream components and their recipient meet, on the secondary market or in the recycle, to achieve a long-term strategic effect. The strategic effect, in turn, can also have a social, economic (including image-related) and environmental character. Accordingly, the author aims to identify the subject structure, the ways to create value and the nature of the outcomes in the broadly defined municipal waste management sector, what is crucial for the competitive position of the researched firms and, what is the most important, creates the future of next generations. Due to this, the conceptual and qualitative empirical research methods (case study) were used. In addition, the review of industry-related, Polish and international journals was carried out.

Keywords: the waste management sector, municipal waste value, municipal waste re-value, garbology, re-use

Introduction

Enterprises operating in the municipal waste management sector mainly build value in the processes of the collection and effective management of the waste stream with the use of modern technological solutions, in global perspective (Sakai, Sawell, Chandler, Eighmy, Kosson, Vehlow, 1996; Goddard, 1995; Cheremisinoff, 2003; Vergara, Tchobanoglous, 2012). Technological tools enable smart management of municipal waste[i] through the efficient separation of stream fractions, which allows for the extraction of recycling and re-use intended material, the management of the fraction obtained from bio-mechanical waste treatment, and, above all, the minimization of the amount of unproductively landfilled waste. The knowledge of the chemical composition of waste reaching the stream enhances the process of precise separation. In the process-based approach, organizational knowledge and competences paired with modern technologies adequately applied in **the processes of municipal waste separation and treatment** (Bohne, Brattebø, Bergsdal, 2008; El-Haggar, 2007) constitute one of the sub-areas of municipal waste value creation by relevant entities and manifest their *social responsibility and strategic operation* (Bilitewski, 2008; Sztangret, Sobociński, 2017; Kud, 2016; Sztangret, 2016). Furthermore, the diffusion of information and knowledge accompanying the waste stream circulation facilitates the building and maintaining of *integral relations* (Loughlin, Barlaz, 2006; Chertow, 2007) between primary and secondary market players. The conscious supplier of sorted municipal waste becomes a prosumer (Bolaane, 2006; Matysiewicz, Sztangret, 2018) and co-creator in the process of creating eco-value by a waste management sector

enterprise and delivering the offering for the secondary market. This constitutes another sub-area of municipal waste value creation, this time involving the subject-based approach, which can be seen as a *modern marketing concept* combining the management of eco-knowledge with its commercial application (Kumar, Dhar, Nair, Bhattacharyya, Vaidya, Akolkar, 2016).

The **commercial application of information**, automatically recorded by the readers installed in separators of particular municipal waste fractions, is the sub-area in the operations of the surveyed enterprises that is still significantly underused. The information contained in or on waste forming the stream obtained by a waste management enterprise, used in an effective way, can improve the separation process at the level of sorting material for treatment and sale. Additionally, it can build knowledge about purchasing and consumption behavior patterns of waste stream creators/suppliers (Iyer, Kashyap, 2007). Therefore, waste holds marketing value, which is also useful in **market research (garbology) (**Humes, 2012; Rathje, Murphy, 2001; Wagner, 2007; Tudor, Robinson, Riley, Guilbert, Barr, 2011; Matsumoto, 2011; Connett, Sheehan, 2001), which constitutes the functional approach, another interesting sub-area of municipal waste value.

The **system value of municipal waste** also includes the value created by waste in its market re-cycle, defined as the recovery of waste to the economy in its primary form, as opposed to recovering resources as a result of mechanical biological treatment or selecting materials for the secondary market. Therefore, the analysis of the sector also involves other entities (e.g. **Re-use Centers**) (McDougall, White, Franke, Hindle, 2001), implementing the concept of the circular economy (Murray, Skene, Haynes, 2015; Geissdoerfer, Savaget, Bocken, Hultink, 2017).

Therefore, the article aims to identify the subject structure, the ways to create value and the multidimensional nature (Seadon, 2006) of the outcomes in the broadly defined municipal waste management sector.

A Municipal Installation as the Researched Entities

Research Methodology

The study involves the survey of entities operating in the municipal waste management sector. So far, Regional Waste Treatment Facilities[ii] have been a major entity in this sector in Poland. Legal provisions stipulated in the amendment to the Waste Act of January 22, 2015, define a regional municipal waste treatment facility as a waste management plant with sufficient capacity to receive and process waste from an area inhabited by at least 120,000 residents, meeting the requirements of the best available technology referred to in Art. 207 of the Act on Environmental Protection, as of April 27, 2001, or the technology referred to in Art. 143 of the same Act, including the use of new, available waste treatment technologies or ensuring:

- mechanical biological treatment of municipal solid waste and the separation of the waste fraction suitable for recovery, either partially or in full, from solid waste, or
- treatment of separated green waste and other bio-waste and the production of soil conditioners or plant growth enhancers that meet the requirements set out in separate regulations, or the material subjected to composting or fermentation allowed for recovery in the R10 recovery process, meeting the requirements stipulated in the regulations issued pursuant to Art. 30 paragraph 4, or
- landfilling of waste generated in the process of mechanical biological treatment of municipal solid waste and remains from sorted municipal waste in the capacity allowing, in a period not shorter than 15 years, for the reception of waste in an amount not smaller than the one produced in the facility for mechanical biological treatment of municipal solid waste (Act of 27 April 2001. Environmental Law).

The municipal waste management region could include neighboring municipalities from different voivodships, if their regional waste management plans allowed for it (Act of 15 January 2015 amending the Act on Waste and certain other acts). Another important provision of the Act was the introduction of the concept of a transregional facility, which could be a municipal waste incineration

plant with sufficient capacity to receive and process municipal solid waste collected from an area inhabited by at least 500,000 residents, meeting the requirements of the state-of the-art technology, referred to as "a transregional municipal waste incineration plant". The **abolition of the regionalization principle** was introduced as a game-changing amendment to the Act[iii] in 2019. The Act allows for the transfer of bio-waste, unsorted (mixed) municipal waste as well as remains from sorting and mechanical biological treatment of municipal waste to facilities based throughout the country. Until the Act was amended, this had only been possible within the waste management regions defined in a regional waste management plan. Pursuant to the Act, regional waste management facilities and a transregional facility were replaced by a new entity – **a municipal facility** that is an installation for the treatment of unsorted municipal solid waste or remains from the treatment of this waste, specified on the list referred to in Art. 38b paragraph 1 point 1, meeting the requirements of the state-of-the-art technology as referred to in Art. 207, the Act of April 27, 2001, Environmental Law, or the technology referred to in Art. 143 of the Act, ensuring two of the above three requirements:

- mechanical and biological treatment of unsorted municipal solid waste and the separation of fractions suitable for recovery, partially or in full, from unsorted municipal solid waste, or
- landfill of waste produced in the process of mechanical and biological treatment of unsorted municipal solid waste and remains from sorted municipal waste.

This shows that the requirement of having sufficient capacity to receive and process waste from the area inhabited by 120,000 residents was removed from the definition of a regional waste management facility. In addition, the status of a regional waste management facility will no longer be granted to an entire facility, but only to its particular installations, hence the name: a municipal facility.

Pursuant to the amended Act, communes and municipalities – under the statutory obligation to ensure cleanliness and order in their territory, can set up and run repair and re-use centers for non-waste products or product parts as part of waste reduction policy[iv]. The fees charged for municipal waste management can be used to contribute towards the costs of setting up and running repair and re-use centers[v].

The rationale behind the amendment to the Act, in terms of its subject-matter and related liability, involved:

- increased municipal control of the municipal waste management system, including supervision of municipal waste collectors – it aims to prevent lump-sum settlements between the municipality and a municipal waste collector, for example, by linking payment for waste collection exclusively with waste transferred to treatment;
- the elimination of the need to transfer municipal waste to installations based in the region, which should increase competitiveness and eliminate monopolistic practices, such as price fixing;
- the opportunity to charge a reduced waste management fee using funds from the sale of recyclable materials collected selectively (this mechanism is optional and aims to encourage residents to sort waste);
- he flexible application of the criteria differentiating fee rates in municipalities and municipal associations

and other[vi].

The **article focuses on** municipal installations with modern technological solutions ensuring mechanical and biological treatment of municipal solid waste and landfilling of waste produced as a result of mechanical biological treatment of unsorted municipal solid waste and remains of sorted municipal waste, according to the information disclosed in the Public Information Bulletin for individual Marshal's Offices in Poland, as of 2019.

It draws on conceptual and qualitative empirical research methods (case study)[vii]. In addition, the review of industry-related, Polish and international journals was carried out.

Table 1: Basic information on the survey conducted

Specification	Characteristics
research methodology	the analysis of industry journals, websites, sponsored interviews, personal interviews
sample selection	targeted selection of typical units
sample size	entities of the waste management sector, based on the lists of municipal facilities in the Regional Waste Management Plan
	over 100 industry websites of the waste management sector
geographical scope	national scope
time scope	2016-2019

Source: own elaboration

The system value of municipal waste – the model approach

The relationships of a variety of entities, primarily the ones between the waste management sector, committed prosumers, and waste stream suppliers, but also public benefit organizations, local and regional manufacturers, retailers and service providers, the municipality and other companies involved in the waste re-cycle, leads to the creation of strategic multi-value, beneficial in terms of the social good, drawing on the concept of sustainable development, incorporating the principles of integral marketing concepts, where the supplier of waste stream components and their recipient meet, on the secondary market or in the recycle, to achieve a long-term strategic effect. The strategic effect, in turn, can also have a social, economic (including image-related) and environmental character.

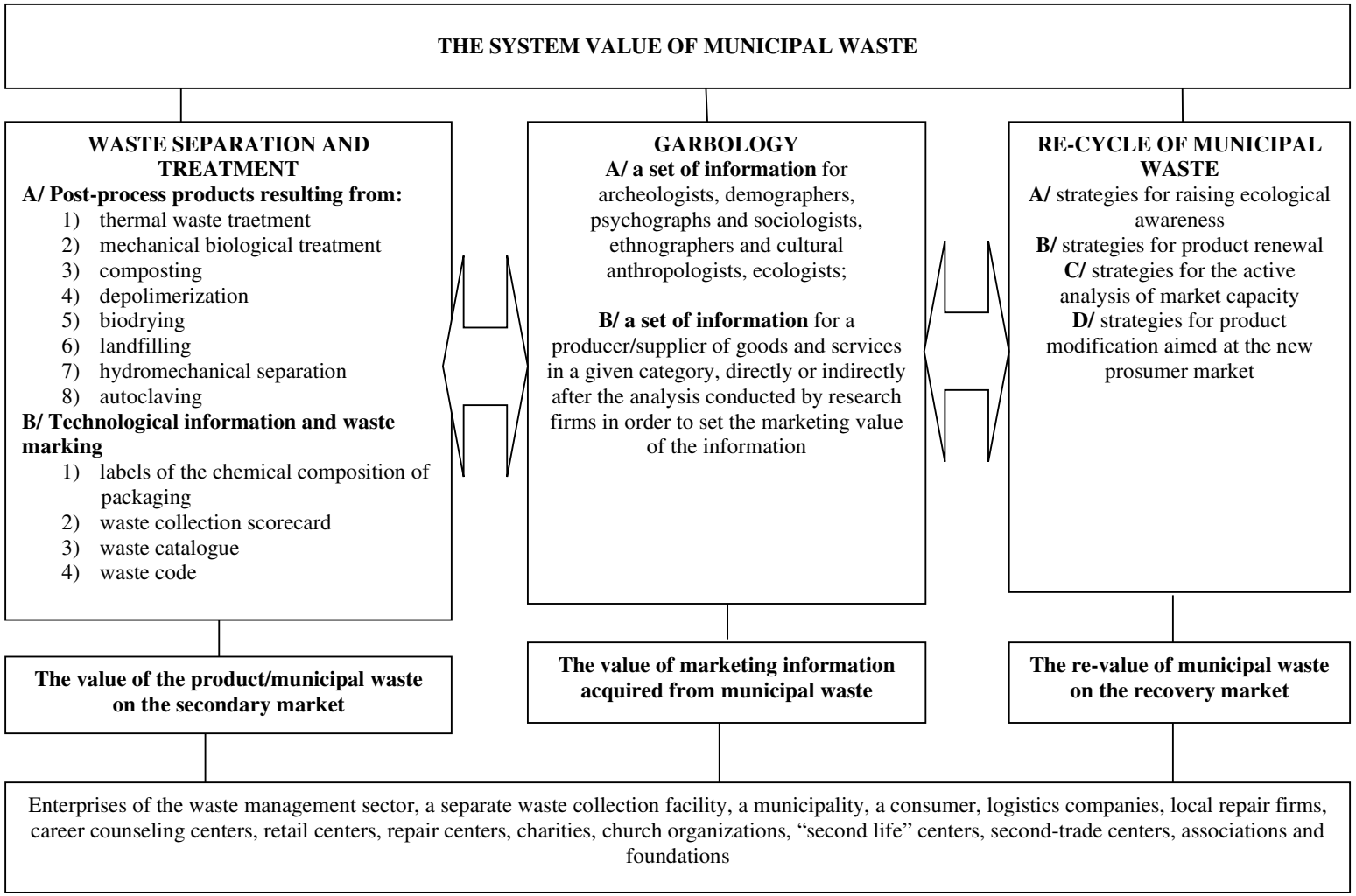

Fig. 1: The model of the system value of municipal waste

Source: own elaboration

Research results show that the system value of municipal waste stems from (Figure 1):

effective separation and treatment processes as well as the adequate recording of technological information on and labeling of waste for secondary markets;
waste-contained marketing data that can inform the decision-making processes of manufacturers and retailers and be of interest to research agencies;
eco-value acquired from the recovery process, as part of the re-cycle of waste, for the eco-prosumer and/or downmarket entities.

The subsystem of municipal waste separation and treatment

The waste management system is built based on the technologies and technological processes that allow for the management of collected municipal waste, its recycling, thermal treatment, or energy recovery, and the application of these processes requiring adequate process knowledge. Other forms of waste recovery are also acceptable – requiring pre-treatment (separation of particular fractions), which then allows for the disposal of waste through its processing. The process of municipal waste treatment in the surveyed enterprises usually includes four main elements:

A. Thermal waste treatment, involving waste oxidation (including incineration and gasification) or waste decomposition (including pyrolytic decomposition).
B. Mechanical biological waste treatment involving mechanical waste treatment and biological waste treatment combined into one integrated technological process of municipal solid waste treatment aiming to prepare waste for recovery processes, including recycling, energy recovery, thermal treatment, and landfilling.
C. Processing of separately collected green waste and other bio-waste, which involves composting (processing waste in the process of natural decomposition of organic substances by microorganisms).
D. Landfilling, which is a method of disposal used for waste which, for technological or economic reasons, has not been recovered or disposed of by other methods.

The state-of-the-art methods to reduce the amount of waste collected include:

E. Depolymerization, i.e. processing plastic waste, which involves the breakdown of hydrocarbon chains under temperature, lack of air and a catalyst, resulting in a product with new properties – synthetic paraffin oil.
F. Biodrying, taking place in heaps, covered with a semi-permeable geomembrane, in boxes providing intensive aeration. Sorted processed waste is transported to the alternative fuel production line or given away as pre-RDF28 used in energy-intensive industries, such as cement plants.
G. Hydromechanical separation, which involves separating the mixed waste stream by means of hydroseparation. The method ensures the recovery of 70-90% of materials intended for further recycling. The selected organic fraction is subjected to fermentation and then it is used to produce a soil conditioner.
H. Autoclaving, involving mechanical thermal treatment of waste. The process eliminates odors and pathogens. The technology uses three physical factors regulated automatically based on waste morphology: temperature, pressure and time. Sterilized waste is sorted mechanically. The sterile organic fraction and clean recyclable inorganic fractions are extracted from the municipal solid waste stream (Styś, Foks, 2014).

The commercial use of information – garbology

The results of the analysis of information contained in the bar code of the municipal waste label and the analysis of the contents of the garbage bin (**garbology**) have marketing value and can inform marketing decisions of businesses delivering particular products to a given market. Accordingly, they can be the subject of commercialization of knowledge in the relationships of waste management enterprises with businesses and research centers.

Contemporary waste science, called **garbology**, was started as a scientific discipline at the University of Arizona and practiced by William Rathje from 1973. The very notion of "garbology" was defined by A. J. Weberman in 1971, following the first analysis of the contents of the garbage bin of the famous musician, Bob Dylan. Similar analyses were carried out for the bins of Dustin Hoffman, Tony Perkins, John Mitchell, Jackie Kennedy and the like. Garbology is also used in technical terminology, where it is associated with waste stream management and the robotic solutions in use are called **garbologists**[viii]. This approach originated in Australia in the 1960s. Garbology, in Holden Village's broader, prosumer view, is defined as "joint sorting, separation and closing down of landfills". The use of garbology in marketing research, on the other hand, draws on its application as an investigation tool in law enforcement and corporate espionage in the 1950s. "Trash covers" analysis involved the analysis of the garbage bin and, more broadly, the analysis of files in the computer "bin" (Humes, 2012).

It should be noted that **archeology**, defined as "the scientific study of the remains such as fossil, relics and monuments of the past and man, i.e. the history of humanity," is the historical foundation of the marketing approach to garbology. Identifying, observing, analyzing the material culture of the contemporary population, it studies the remains of material existence and forms for assumptions about the behaviors of a particular civilization.

Such forms of eliciting information are part of open-source intelligence (**OSINT**), a type of industrial intelligence that involves gathering information from publicly available sources. Intelligence agents use only overt and, most frequently, ethical information collection methods (Stromczyński, Waszkiewicz, 2014). OSINT sources include:

- public life, in this case expressed in the structure and amount of waste, i.e. the content of the garbage bin or, more broadly, the composition of waste in the landfill,
- analysis of products/waste using reverse engineering, in order to achieve certain functionality, i.e. for the purpose of collecting information useful for treatment and recovery as well as marketing research.

The information obtained though the **"analysis of the garbage bin contents"** concerns the buying and consumption habits of a household, which can be the subject of comparative analysis in the cross-section of a given category (natural persons, economic entities, and institutions, from residential and non-residential areas, including industrial locations), a geographical cross-section (international, regional, local), a category of territorial unit (urban, rural), a type of residential architecture (detached houses, blocks of flats), or a time category, distinguishing "special periods" (e.g. festive seasons, vacation time, etc.).

Research into the garbage bin contents may concern the following **areas**, relevant in terms of marketing research, which, in practice, is confirmed by many studies already completed (Baguchinsky, 1999; Rathje, Murphy, 2001; Kowalski, Szczelina, 2017):

- the structure of goods purchased and consumed in a household, by the residents of a building, a housing estate, or a district, enterprises or a group thereof, in a particular zone;
- eco-habits, manifested in purchasing behaviors regarding products in disposable packaging and in willingness to sort waste;
- the amount of a consumed good in a given category in a time unit and the size of a single purchase measured, for example, with the size of the packaging;
- consumption intensity, measured with the bin filling time and the disposal frequency;
- the social level of a household;
- information on consumption habits regarding the consumption of highly processed products or natural products;
- information on preferences for local, domestic or foreign products, taking into account a country of origin;
- the degree to which purchased products go to waste: food, household appliances and electronics;

- the structure of waste, broken down into processable, re-usable and reducible, as well as ballast, i.e. civilization eco-culture and the efficiency of eco-knowledge management,
and other.

Garbological marketing research can concern both the past and the present in relation to consumer behavior and the subject of analysis (waste). Accordingly, four strategies of marketing garbology can be distinguished (Table 2).

Table 2: Strategies of the marketing garbology

		material entity/subject of analysis	
		from the past	in the present
Purchasing and consumption behaviours	in the past	pre-historical, historical and classic garbology	retrospective ethno-garbology
	in the present	strategic garbology – long-term changes in consumer behaviour	contemporary garbology, demographic, economic, social and psychological aspects

Source: own elaboration

Re-use Centers as entities involved in building re-value of waste in the market re-cycle

In compliance with the EU Directive on waste (Directive 2008/98/EC Of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, Official Journal of the European Union, L 312/3, 22.11.2008) regarding the EU's objectives in the area of the prevention, treatment and disposal of waste by 2020, **"re-use of waste"** is defined as any operation by which products or components that are not waste are used again for the same purpose for which they were conceived. **Preparation for re-use** involves checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing. Art. 17 of the 2012 Act on Waste, preparation for re-use was determined as preferred action, i.e. one that ranked higher than recycling and other forms of recovery in the hierarchy of waste management. Products accepted by re-use centers are, for example, furniture, electrical and electronic equipment, toys, rugs, carpets, dishes, ceramic and glass products, plant pots, sports equipment, books, comics, CDs, various items collected as part of charity initiatives organized for people in need from social welfare centers. Larger quantities of ceramic tiles, wallpapers, veneers, etc. that were not used during renovation works may also be collected. Additionally, doors, bathroom fittings, etc., which were removed and are fit for further use.

Re-use of waste contributes to the "extended life of a product", i.e. its **re-cycle in the market life cycle,** through its repeated use by the same or other user for the same or different purpose that is the result of waste compilation (value building) by the customer (Table 3).

Table 3: Strategies of municipal waste re-value in purpose-user dimensions

		purpose of use	
		the same	new
user	the same	strategy involving the renovation of waste	strategy involving awareness raising in the process of knowledge diffusion and/or strategy of waste modification
	new	strategy of waste replacement and/or strategy involving an active approach to unsatisfied demand (active analysis of market capacity)	strategy involving awareness raising and/or waste modification aimed to pursue an active approach to unsatisfied demand

Source: own elaboration

Each strategy can be operationalized in a number of ways. The **strategy focused on waste renovation** mainly involves the promotion of repair and maintenance services and improving the condition of products by their owners, before their ultimate disposal. Such actions may be undertaken by the owner or commissioned to special service outlets. The **strategy of waste replacement and/or strategy involving an active approach to unsatisfied demand** is particularly adequate in the market for home appliances, household electronics, computers, furniture and bicycles. Initiatives such as "give or take days", "second-hand banks", street markets, exchange through online platforms are the examples of how this strategy can be pursued. Its implementation is also achieved through furniture renovation networks, repair of electronic equipment, refrigerators, and bicycles, which, as part of an active approach to unsatisfied demand, are handed over to low-income families or – after renewal – sold to low-income customers. This can occur on an transmunicipal scale in the form of "exchange and resale centers". In order for such projects to be self-sufficient, it is recommended that most of the recovered equipment should be sold, although at an attractively low price. In addition, this eliminates the customer's sense of discomfort associated with being given something for free and reduces the risk of disappointment when the equipment quickly becomes underestimated waste. Food banks also play a role in the implementation of this strategy, as they counteract wasting food and combat hunger in certain social groups. The **strategy involving awareness raising in the process of knowledge diffusion and/or strategy of waste modification** is mainly based on pro-ecological initiatives aimed at forming social attitudes and behaviors compliant with the assumptions of waste reduction policy. Consumer "zero waste" attitudes, expressed in a particularly creative way giving second life to products treated as waste, contribute to the successful implementation of this strategy. The **strategy involving awareness raising and/or waste modification aimed to pursue an active approach to unsatisfied demand** includes activities relating to customers who make conscious purchases at re-use centers, regardless of their financial status. Consumer eco-convictions determine purchasing behavior. The examples of how this strategy is implemented include, for example, wood banks, set up in order to recover wood from construction sites and re-use it in house woodwork, artistic sculpture or as firewood, as well as "leftover paint recovery" schemes, which, when paint is mixed appropriately, can give new quality.

These strategies, implemented by **re-use centers**[ix], set up as a strategic business unit of a separate waste collection facility, include specific actions constituting the **process of re-using products** considered waste and relate to:

- waste collection;
- waste storage;

- checking whether collected waste is suitable for re-use without the need for maintenance or repair;
- the separation of products from the waste stream that are suitable for re-use (without the need for maintenance or repair);
- necessary operations in the process of preparation or re-use involving waste that requires maintenance or repair. These operations include: anti-corrosion protection, waxing, repair of damaged products by replacing damaged elements, filling, riveting, drilling, welding, grinding,
- storage of products for re-use;
- selective storage of waste originated in the treatment process.

Preparation for re-use may be conducted beyond installations and devices. This form of waste recovery is allowed under Art. 30 paragraphs 3 and 5 of the 2012 Act on Waste, as well as the Regulation on waste recovery beyond installations and devices (Annex to the Regulation, item 21)[x]. Due to the implementation of the components of the process discussed above, the organizational structure of a re-use centre can take a functional and market-oriented form (Table 4).

Table 4: Re-use centre – organizational matrix

<table>
<tr><th colspan="6">Organizational matrix, functional and market-oriented</th></tr>
<tr><td colspan="2" rowspan="2">renewal centers for a product/waste (maintenance, repair, renewal) for economic consumers in the low- and medium-price market</td><td colspan="2" rowspan="2">centers for collection and exchange of potential waste for the segment of economic consumers</td><td colspan="3">a center for the distribution of goods separated from the waste stream</td></tr>
<tr><td>products after renovation released commercially in low-price markets or eco-consumer segments</td><td colspan="2">products acquired directly from the waste stream</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>for use in an unchanged condition by less well-off consumers and eco-consumers</td><td>as components and parts of a product for the DIY / prosumer segment</td></tr>
</table>

Source: own elaboration

Undoubtedly, the re-cycle in the market life cycle of a product delays and reduces the cost that the environment incurs in the production of a new product, bought to meet the replacement demand. It also allows for the employment of the socially excluded or the long-term unemployed and activates the elderly. Finally, it helps people in need and, in this way, supports a commune or a municipality in their pursuit of the image of a socially minded entity.

Conclusion

The sector of building municipal waste value embraces a variety of stakeholders and includes primary and secondary market operators, commercial and non-profit enterprises, prosumers in various price segments and the like. The multi-value of waste, which originates in multiple stakeholder relationships, has a strategic character, due to benefits in terms of the social good, drawing on the concept of sustainable development, through socially conscious actions incorporating the principles of integral marketing, where the supplier of waste stream component and their recipient meet, on the secondary market or in the recycle, to achieve a long-term strategic effect (Figure 2).

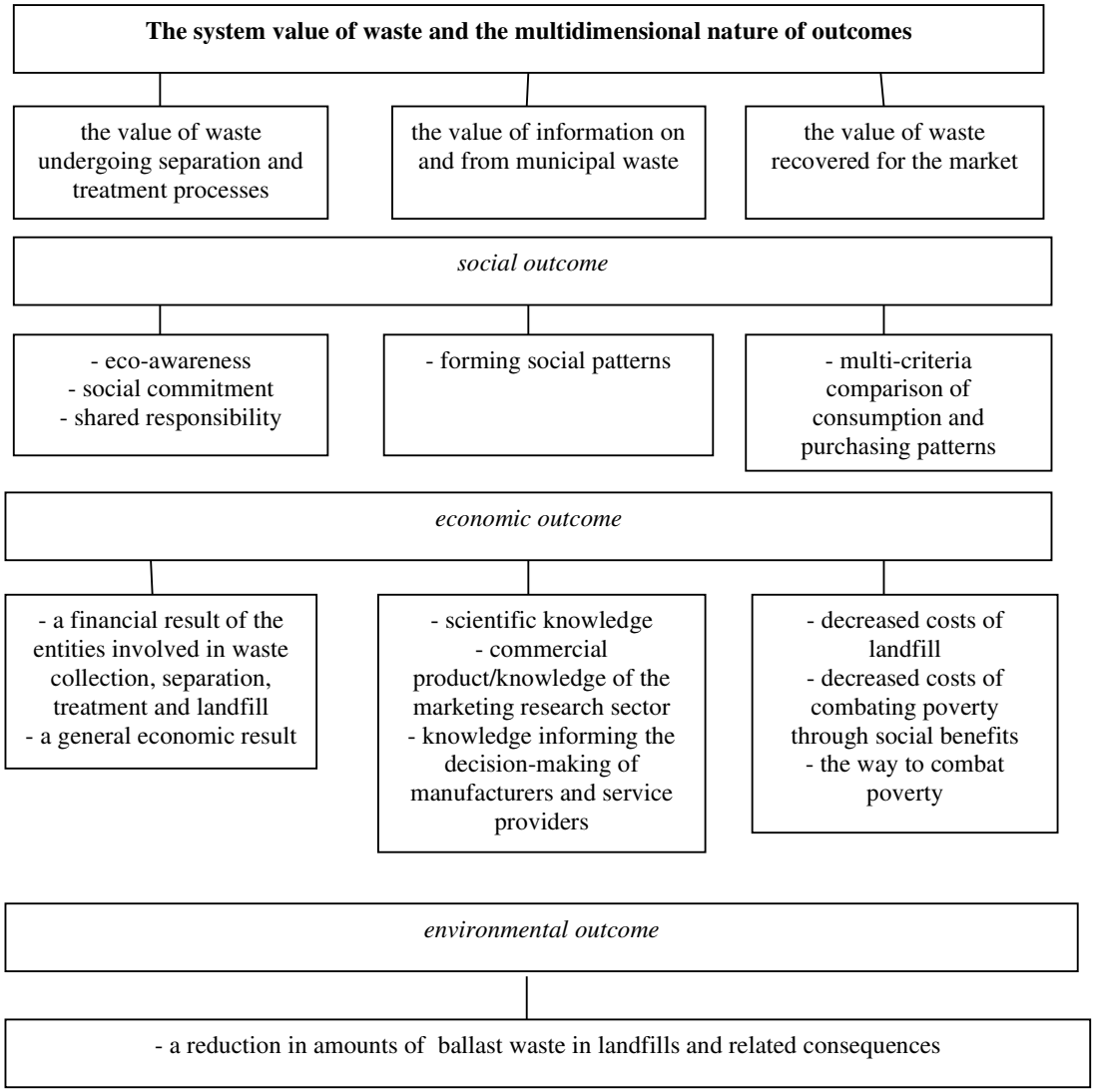

Fig. 2: The model of the system value of municipal waste in the context of the sustainable development concept

Source: own elaboration

Each of the three sub-areas of creating the system value of municipal waste, identified and discussed in the article, corresponds to a range of outcomes in the space of sustainable development: social, economic and environmental, which may offer interesting paths for in-depth research in the future.

References

1. Act of 14 December 2012 on waste (2016 Journal of Laws, item 1987 as later amended);
2. Act of 19 July 2019, amending the act on maintaining cleanliness and order in the commune and some other acts (Journal of Laws 2019.1579)
3. Act of 27 April 2001 on waste. Environmental Law (Journal of Laws, No. 39, Art. 143 and Art. 207, item 251, as later amended)

4. Act of 27 April 2001. Environmental Law (2017 Journal of Laws, item 519 as later amended); Regulation of the Minister of the Environment of 11 May 2015 on waste recovery beyond installations and devices (Journal of Laws, item 796).
5. Angell, I. and Kietzmann J., (2006), 'RFID and the end of cash?' *Communications of the ACM*. [Online], [Retrived November 9, 2016], http://beedie.sfu.ca/files/Research/Journal_Articles/Journal_Articles_misc/RFID_and_the_end_of_Cash.pdf
6. Baguchinsky, J., (1999), 'Adventures in Garbology: What Trash Can Tell Us.' Florida Gulf Coast University, [Online], [Retrived November 9, 2017], http://itech.fgcu.edu/&/issues/vol2/issue2/garbology.htm
7. Bilitewski, B., (2008), 'Pay-as-you-throw - a tool for urban waste management', *Waste management*, Elsevier Ltd. 28(12), p. 2759.
8. Bolaane, B., (2006), Constraints to promoting people centred approaches in recycling. Habitat International, 30(4), 731-740
9. Cheremisinoff, N. P., (2003), Handbook of solid waste management and waste minimization technologies, Amsterdam: Butterworth-Heinemann, p. 477
10. Chertow, M. R., (2007). 'Uncovering" industrial symbiosis', *Journal of Industrial Ecology*, 11(1), 11-30
11. Connett, P. and Sheehan, B., (2001), 'A citizen's agenda for zero waste', [Online], [Retrived March 16, 2017], http://www.grrn.org/zerowaste/community/activist/citizens_adenda_4_print.pdf
12. Das, R., (2017), 'RFID Forecasts, Players and Opportunities 2017-2027', The complete analysis of the global RFID industry, New in August 2017, [Online], [Retrived November 9, 2017], https://www.idtechex.com/research/reports/rfid-forecasts-players-and-opportunities-2017-2027-000546.asp
13. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Official Journal of the European Union, L 312/3, 22.11.2008, p. 3)
14. Directive of the European Parliament and of the Council 2010/75/UE of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Official Journal of the European Union L 334, 17.12.2010, p.17, Official Journal of the European Union L 158, 19.06.2012, p. 25)
15. Draft Act amending the act on maintaining cleanliness and order in the commune and some other acts, https://www.premier.gov.pl/wydarzenia/decyzje-rzadu/projekt-ustawy-o-zmianie-ustawy-o-utrzymaniu-czystosci-i-porzadku-w-gmina-0.html, [Online], [Retrived January 1, 2020]
16. El-Haggar and S. M., (2007), Sustainable industrial design and waste management: Cradle-to-cradle for sustainable development, Oxford: Elsevier/Academic Press, p. 424
17. European Commission, Guidance on the interpretation of key provision of Directive 2008/98/EC on waste, June, 2012;
18. Geissdoerfer, M., Savaget, P., Bocken, N.M.P. and Hultink, E.J., (2017), 'The Circular Economy – A new sustainability paradigm?', *Journal of Cleaner Production*, 143, pp: 757–768
19. Goddard, H., (1995), 'The benefits and costs of alternative solid waste management policies', *Resources, Conservation and Recycling*, 13(3-4), pp.183-213
20. Humes, E., (2012), Garbology: Our dirty love affair with trash. Penguin Group, USA-Kalifornia, p.255
21. Iyer, E. S. and Kashyap, R. K., (2007), 'Consumer recycling : Role of incentives, information and social class', *Journal of Consumer Behaviour*, 47, pp. 32-47
22. Kowalski, H. and Szczelina, M., (2017), Let's talk about garbage, [Online], [Retrived November 10, 2017], www.leststalkaboutgarbage.com
23. Kumar, S., Dhar, H., Nair, V.V., Bhattacharyya, J.K., Vaidya, A. N. and Akolkar A.B., (2016), 'Characterization of municipal solid waste in high-altitude sub-tropical regions', *Environmental Technology*. 37 (20), pp. 2627–2637
24. Loughlin, D. and Barlaz, M., (2006), 'Policies for Strengthening Markets for Recyclables: A Worldwide Perspective', *Critical Reviews in Environmental Science and Technology*, 36(4), pp.287-232
25. Matsumoto, S., (2011), 'Waste separation at home: Are Japanese municipal curbside recycling policies efficient?' *Resources, Conservation and Recycling*, 55(3), Elsevier B.V. pp. 325-334

26. Matysiewicz, J. and Sztangret, I., (2018), 'Prosumpcja w sektorze odbioru i przetwarzania odpadów komunalnych – perspektywa konsumenta', *Handel Wewnętrzny* No. 5 (376)
27. McDougall, F. R., White, P. R., Franke, M. and Hindle, P., (2001), Integrated solid waste management: a life cycle inventory. Blackwell, 2nd ed., p. 544
28. Ministerstwo Środowiska; Dokument referencyjny na temat najlepszych dostępnych technik dla przemysłowego przetwarzania odpadów; 2006 r.; [Online], [Retrived February 16, 2015], http://ippc.mos.gov.pl
29. Murray, A., Skene, K. And Haynes, K., (2015), 'The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context', *Journal of Business Ethics*, 140 (3), pp. 369–380
30. Perry, Ch., (2001), 'Case Research In Marketing', *The Marketing Review*, No 1
31. Rathje, W. and Murphy, C., (2001), Rubbish!: The Archaeology of Garbage Paperback, University of Arizona Press, Arizona
32. Regulation of the Minister of Environment of 23 April 2004 on packaging label design (Journal of Laws No. 94, item 927 as later amended) http://wlaczoszczedzanie.pl/znaki-ekologiczne/oznaczenia-produktow-ekologicznych/oznaczenie-opakowan-ze-wzgledu-na-sklad-chemiczny/ [Online], [Retrived March 15, 2017]
33. Regulation of the Minister of the Environment of 27 September 2001 on waste catalogue (Journal of Laws, No. 112/2001, item 1206)
34. Sakai, S., Sawell, S., Chandler, A. J., Eighmy, T., Kosson, D., Vehlow, J., et al. (1996), 'World trends in municipal solid waste management', *Waste Management*, 16(5-6), pp. 341-350
35. Seadon, J. K., (2006), 'Integrated waste management--looking beyond the solid waste horizon', *Waste management*, 26(12), pp. 1327-36
36. Stromczyński, B. and Waszkiewicz, P., (2014), 'Biały wywiad w praktyce pracy organów ścigania na przykładzie wykorzystania serwisów społecznościowych', *Prokuratura i Prawo*. No. 5
37. Styś, T. and Foks, R., (2014), Rynek gospodarowania odpadami komunalnymi w Polsce. Perspektywa 2030, Instytut Sobieskiego, Warszawa
38. Sztangret, I. and Sobociński, S., (2017), Ekoinnowacyjne modele biznesu na przykładzie wybranych Regionalnych Instalacji Przetwarzania Odpadów Komunalnych (RIPOK), *Modern Management Review* – Volume XXII, (January-March), Research Journal 24/1 (ed.) K. Kud, Publishing House of Rzeszów University of Technology
39. Sztangret, I., (2016), Zrównoważony rozwój przez zarządzanie wiedzą w eko-systemie interesariuszy, na przykładzie przedsiębiorstwa usług komunalnych, Wydawnictwo Naukowe Uniwersytetu Szczecińskiego, Studia i Prace WNEiZ US No. 43/2
40. Tudor, T., Robinson, G., Riley, M., Guilbert, S. and Barr, S., (2011),'Challenges facing the sustainable consumption and waste management agendas: perspectives on UK households', *Local Environment*, 16(1), pp. 51-66
41. Vergara, S. E. and Tchobanoglous, G., (2012), 'Municipal Solid Waste and the Environment: A Global Perspective', *Annual Review of Environment and Resources* 37, pp. 277–309.
42. Wagner, T., (2007), Refraining Garbage: Solid Waste Policy Formulation in Nova Scotia, *Canadian Public Policy/Analyse de Politiques*, 33(4), pp. 459-475
43. Żabińska, T. and Żabiński, L., (2007), Zarządzanie marketingowe. Koncepcje marketingu a praktyki zarządzania. Aspekty teoretyczne i badawcze, (ed), AE Katowice Publishing House

[i] Smart Waste Management is connected with such solutions, especially IT solutions, that can greatly optimize collection, separation, storage services and reduce operational costs for cities and social-cost, transitioning waste management into data-driven collection processes. IoT applications in waste management are engaging citizens and cities alike in the project of making our waste practices more sustainable. Smart Waste Management needs multistructured relations of different entities in the process of creation of strategic multi-ecovalue. Some of the SWM practices are:

1. deeply automating the categorization of waste content, in city and in the installations;
2. collection of a vast amount of data, often in real-time, and the distillation of those data into insights on which users can take action - entities of both markets: primary and secondary;

3. optimization of the route of garbage pickup trucks;
4. facilitation of more insightful, multi-pronged actions, such as planning the better distribution of garbage bins, zeroing on problems (e.g. incorrect disposal practices), or reducing waste going to the landfill (second use points);
5. managing citizens consumption, by integrating inputs from hardware units (sensors) into software applications, and creation of waste habits more sustainability.

The systemic treatment of problem is the main sign of Smart Waste Management.

[ii] Poland had 182 Regional Waste Treatment Facilities managed by 174 entities, as on 15 March 2019. The database of the facilities was compiled by UOKIK (Office of Competition and Consumer Protection) based on documents with public access (Regional waste Management Plans with amendments) and verified by the Marshal's Offices.

[iii] Act of July 19, 2019, amending the act on maintaining cleanliness and order in the commune and some other acts, Journal of Laws 2019.1579

[iv] re-use - any operation by which products or components that are not waste are used again for the same purpose for which they were conceived; Act on amending the act on maintaining cleanliness and order in the commune and some other acts, submitted in the Seym on 5.06.209; The act enforces the Directive of the European Parliament and of the Council 2008/98/WE as of 19 November 2008 on waste and repealing other Directives (Official Journal of the European Union L 312 as of 22.11.2008, pp. 3, 2) the Directive of the European Parliament and of the Council 2010/75/UE as of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Official Journal of the European Union L 334 as of 17.12.2010, p.17 and Official Journal of the European Union L 158 as of 19.06.2012, p. 25). http://orka.sejm.gov.pl/Druki8ka.nsf/Projekty/8-020-1340-2019/$file/8-020-1340-2019.pdf accessed on: 2.12.2019

[v] This act enforces:

1) the Directive of the European Parliament and of the Council 2008/98/WE as of 19 November 2008 on waste and repealing other Directives (Official Journal of the European Union L 312 as of 22.11.2008, pp. 3, 2) the Directive of the European Parliament and of the Council 2010/75/UE as of 24 November 2010 r. on industrial emissions (integrated pollution prevention and control) (Official Journal of the European Union L 334 as of 17.12.2010, p.17).

[vi] Draft Act amending the act on maintaining cleanliness and order in the commune and some other acts, https://www.premier.gov.pl/wydarzenia/decyzje-rzadu/projekt-ustawy-o-zmianie-ustawy-o-utrzymaniu-czystosci-i-porzadku-w-gmina-0.html, accessed on: 3.01.2020

[vii] The methodology is applicable due to:

1/ research concerns contemporary dynamic phenomena and the growing knowledge about them;

2/ research is related to specific contexts of these phenomena, where boundaries between the phenomena and their contexts remain blurred;

3/ the research problem is too complicated to explain causality with methods based on a survey or experiment. (Perry, 2001; Żabińska, Żabiński, 2007)

[viii] RFID (radio-frequency identification) is one of the tools used for object identification (e.g. waste), appplying elektro-magnetic fields for automatic identification and tracking of markers attached to objects. In 2014, the worl RFOD market was worth USD 8.89 billion, compared with USD 7.77 billion in 2013 and USD 6.96 billion in 2012. The figure is expected to grow to USD 18.68 billion by 2026; (Angell, Kietzmann, 2006; Das, 2017)

[ix] Solutions involving re-use centers in Poland are called: *Repair Cafe* in Piła, *Kącik rzeczy używanych* in Stalowa Wola, *Gratowisko* in Poznań, *Galeria Szpargałek* in Szczecin.

x 14 December 2012 Act on waste (2016 Journal of Laws, item 1987 as later amended); 27 April 2001 Act. Environmental Law (2017 Journal of Laws, item 519 as later amended); 11 May 2015 Regulation of the Minister of the Environment on waste recovery beyond installations and devices (Journal of Laws, item 796); European Commission, *Guidance on the interpretation of key provision of Directive 2008/98/EC on waste*, June, 2012; National Waste Prevention Programme, Warszawa 2014.

Cybercrime in The System of Economic Security Threats

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Abstract

Digitalization changes the nature of economic relations, the ways of production and promotion of goods and services, the mechanisms of interaction between contractors, and the methods of meeting consumer needs. Information and communication technologies, Internet resources and digital artifacts create new opportunities for an individual, an economic entity, and a state, while at the same time being a major challenge to global security. In the digital space, solving the problem of ensuring cybersecurity is becoming increasingly important all over the world. Today, we need to understand it, and build the capacity to deploy appropriate strategies to improve cyber security. The purpose of the study is to identify cybercrime as a new systemic threat to the economic security of an individual, firm, or state, to identify its motives and methods of manifestation, and to develop an interdisciplinary approach to leveling this threat. The relationship between economic security and the processes of digitalization of social and economic relations is established. The types of cybercrime are systematized and its specifics are specified depending on the subject against which the illegal action is being taken –an individual, a firm, or a state. The analysis of the world practice of countering cybercrime allowed us to develop a pyramid of cybersecurity and propose a set of measures to prevent criminal acts in the information space.

Keywords: Digital Economy, Cybercrime, Economic Security, Individual, Firm, State

Introduction

The current stage of development of public relations and the economy is closely related to the expansion of the Internet, the introduction of information and communication technologies and digitalization. Currently, more than half of the world's population uses the Internet, which is equivalent to 3.9 billion people. According to ITU Connect, Internet penetration will reach 70% by 2023% (ITU 2018).

Many aspects of a person's daily life, the company's production activities, and the state's management initiatives are becoming more convenient, operational, and accessible. The Internet of things, artificial intelligence technologies, automated systems for collecting information and data, robots, and e-government services are transforming the life of society. In addition, the opportunities for all economic entities to develop, achieve more ambitious financial results, and enter international markets are significantly expanding.

However, the openness and transborder nature of information systems create conditions for the vulnerability of all types of transactions, information leakage, occurrence of cyber threats, cybercrime is evolving and declining economic security of business entities from the outside. For example, in 2019, organizations in Spain (57%), the Netherlands (50%), Germany (48%), the UK (40%), and the US (38%) were mostly targeted by cyber attacks% (Hiscox Forrester Consulting 2018).

The main problem of the modern inclusive global information society is the lack of information about the nature and motives of criminal acts in the open information space, about the mechanisms of their implementation and the possibilities of preventing and reducing damage, that is, there is an important need to strengthen cyber protection.

Materials and Methods

The purpose of this study is to identify cybercrime as a new systemic economic security threat of an individual, company, or state, to identify its motives and methods of manifestation, and to develop an interdisciplinary approach to leveling this threat.

To achieve this goal, you need to search for answers to the following questions.

What is the relationship between economic security and the digitalization of social and economic relations?

What are the types of cybercrime and its specifics depending on the subject against which the illegal action is being taken?

Is it possible to prevent criminal acts in the information space and what is the mechanism for leveling them by an individual, firm, or state?

The theoretical foundations of digital transformations are formed by research of Simcoe (2015), Gilbert et al. (2016), which reflect the impact of digital technologies on factor productivity and economic growth dynamics; nature of the impact of digitalization processes on consumer welfare (Brynjolfsson 2018), growth of opportunities of economic systems of the world countries due to intensive introduction of digital technologies (Cooper and Kaplinsky, 1989); Karpunina et al., 2019b)).

Articles of Dasgupta and David (1987), Leonard-Barton (1995), Womack et al. (1990) are devoted to the analysis of information threats to the security of economic systems.

The research was carried out using methods of economic and statistical analysis, induction and deduction, grouping, and the system method.

The information base of the study was made up of publications and information materials of the European Commission, reports of analytical companies Experian, CSO, Financesonline, Verizon, IBM, ITU, Hiscox Forrester Consulting.

Results and Discussion

The concept of "economic security" is used to assess the stability and well-being of individuals, firms, and the state (table. 1).

Table 1: Content and levels of economic security

Level of economic security	Content of the concept	Economic security indicators
Economic security of the individual	it is connected with guaranteed conditions for protecting the vital interests of the individual, ensuring his full-fledged social development and social security	• human life, health, and physical and intellectual condition; • the well-being of the human social and environmental environment; • the state of resource sources of income (land, property, capital, knowledge, labor, entrepreneurship, information, etc.); • the quality of the spiritual, cultural, and socio-political environment of existence (Alabicheva 2014)
Economic security of the company	determines the state of legal, industrial and organizational relations, material and intellectual resources that ensure the reliability and stability of the company's operation, its financial and commercial success, and progressive scientific, technical, and social development	• level of intellectual and human resources support; • state of technical and technological security; state of political and legal security; • state of the information component; • level of environmental sustainability
Economic security of the state	this is a set of conditions and factors that ensure the independence of the state, its stability and stability, the ability to constantly update and improve (Abalkin 1994)	• total and sectoral labor productivity; • GDP production per person employed in the economy; • the volume of production of the industry's products per person employed in this industry; • profitability of products and assets of enterprises; • use of working time; industrial injuries; • the level of use of average annual capacity of enterprises to produce certain types of products; • specific energy consumption on production of certain products and services; • specific consumption of conditional fuel for production of separate kinds of production and works; • losses of individual minerals during mining (Petrenko 2003)

Thus, economic security is based on four key concepts:

- interests (national, state, social, organizational, personal);

- independence (of the national economy from external markets, economic policy from external influence, independence of the company in making production decisions, the individual in choosing the vector of their own development);

- competitiveness (national economy, company, individual);

- sustainability (socio-economic development of the state, company functioning, self-activity of the individual).

Digitalization of products and services reduces the distance between people and things, increasing mobility and making network effects crucial. It allows you to use specific data to meet the individual needs of consumers or companies. In turn, this opens up wide opportunities for developing innovations, investments, creating new businesses and jobs, and creating conditions for sustainable growth (European Commission 2014).

According to researchers, the size of the digital economy in the world is estimated at 11.5 trillion dollars, which is equivalent to 15.5% of world GDP, while over the past 15 years it has grown two and a half times faster than world GDP (Huawei and Oxford Economics 2017).

In the European Union alone, the added value of the ICT sector is 642 billion euros per year. The breakdown by sub-sector shows the predominance of ICT services (590 billion euros and 92% of the total value added of the ICT sector in 2016) over ICT production. At the global level, the share of value added in the ICT sector in the European Union's GDP (4%) lags behind that of its main competitors (Japan (5.8%), the United States (5.4%), and China (4.9%). The ICT sector employed 6.6 million people in 2016, mainly in the ICT services sector (excluding telecommunications-4.9 million people). The share of employment in the ICT sector in relation to total employment in the European Union in 2016 was 2.8% (European Commission 2019). Labor productivity in the ICT sector in the European Union in 2016 was 97,000 euros per employee (index 57.8), which is lower than in the United States (index 100), Japan (index 64.6), but significantly ahead of China (index 28.0).

At the same time, digitalization causes a whole range of new economic security threats of the individual, company, and state, which have social and economic consequences, expressed in the amount of damage caused. Existing threats to economic security from the digital economy can be systematized as follows (table 2).

Table 2: Economic security threats from the digital economy

Level of economic security	Threat type	Effects
Economic security of the individual	• leakage of personal data • cybercrime using Bank cards • Internet fraud • SMS fraud • Internet addiction • everyday attacks by information systems	• loss of professional reputation • economic damage due to blackmail • leakage of money from Bank cards • direct financial losses • job loss • psychological problem
Economic security of the company	• damage to information systems • cybercrime • cyber-espionage • low level of information literacy of employees	• direct financial damage • loss of competitive advantages • decline of productivity • decrease in market share and revenue

	• uncontrolled use of the Internet	• loss of trust
Economic security of the state	• cybercrime • information war • the information advantage of the lead countries • information inequality	• the instability of the economy • under-production of GDP • growth of the black cyber market • economic dependence on highly developed countries • economic inequality

From the table above, we can see that one of the most common threats to the economic security of all business entities (individuals, companies, and States) is cybercrime, cyber attacks on critical infrastructure, and offensive operations in the form of cyber fraud.

The Internet activity of individuals reflects the widespread use of digital Commerce as a way to purchase goods and services (90%) and conduct personal banking (88%) (Experian 2018). This activity becomes the main source of cyber threats. In the online interaction process, three-quarters (75%) of companies are interested in more advanced security measures and authentication processes that affect customer confidence. However, in the course of digital transactions, personal information is regularly leaked, and consumers are exposed to cyber fraud using various tools.

The analysis of the facts of cybercrime actions allowed us to identify the most common types in relation to individuals (Sergeev et al., 2020):

- fictitious online stores are a common type of cybercrime, represented by single-page sites with a unique price offer for a product. When an individual makes a money transfer, they do not receive the required product. Then the site is blocked, changes the hosting or domain name and continues its illegal activities. This type of fraud is one of the simplest methods of carrying out criminal activities on the Internet and causes great damage to the financial viability of poorly protected and uninformed citizens, taking into account their low level of information literacy.

- phishing is a more advanced type of cybercrime that aims to obtain Bank details, electronic payment card data, or data from users ' electronic Internet wallets. A phishing site is difficult to distinguish because it completely copies the original site. In this situation, the victim voluntarily enters their credentials from a wallet or Bank card and soon loses money from this carrier.

- black infobusiness is a type of cyber fraud related to the sale of information in the form of books, audio and video files, presentations, and so on. The user is supposed to buy information or mentoring and mentoring for a certain period in any field of business or science in the form of webinars, refresher courses or online schools. After transferring funds, the user either receives information that can be found on the Internet in free access, or does not receive the goods or services, and loses their money.

- cybercrime with content distribution is a type of cybercrime in which fraudsters create an archive with the information required by the user. As a rule, a simple script is triggered that replaces the name of the archive with the information requested by the user in the search engine. But when you try to unpack or download this archive, the user is asked to send a message to verify his account, so that a large amount of money is debited from his account, and you do not receive the required information.

- pyramid schemes are an illegal part of multi-level / network marketing related to the sale of goods and services through a network of independent distributors (sales agents), each of which also has the right to attract partners with similar rights. Companies appear on the Internet that sell products of extremely questionable quality, which the distributor simply cannot sell later, or use the MLM scheme to provide fictitious financial services.

In addition, the Informatization of the process of providing services to the population, the introduction of electronic services of public services, increase the likelihood of leakage of information about personal data of individuals from state and municipal information systems.

As companies make digital transformations of their operations, they become more vulnerable to the undue influence of competitors and cyber attacks initiated to seize commercial information and market share.

Every year, the number of companies affected by cybercrime is growing, this is partly due to the growth of cybercrime activities and the use of more advanced and malicious methods by criminals to damage businesses. According to the UK ICT authority, 1.76 billion records were leaked in January 2019 alone due to various data breaches around the world.

The most serious threat to companies is information leakage in order to gain certain competitive advantages. For example, data on business plans, investment projects of companies, and technologies being implemented are of interest to competitors. In order to steal business information, competitors use faulty nodes and information systems, access to web servers, industrial espionage technologies, malicious software, phishing, and use a low level of information literacy of employees. Cyber espionage provokes leakage of corporate information, causes direct and indirect financial losses for business, loss of competitive advantages, loss of customer base, and disruption of investment processes.

Nearly three-quarters of companies (72%) call cybercrime a growing problem, and nearly two-thirds (63%) report high levels of fraudulent losses. The FBI's internal crime complaints center (IC3) in the United States confirms that just over 350,000 cybercrimes were reported to it in 2018, but it is estimated that only 15% of victims report their crimes to law enforcement (CSO 2019).

The Kaspersky Lab report noted that in 2017 alone, the average cost of a data breach in North America is 1.3 million dollars for large enterprises and 117,000 dollars for small and medium-sized businesses (CSO 2017). Globally, the cost of data leakage for businesses increased by 11 percent in 2017. In the United States, the average cost of a cyber attack for businesses increased from $ 1.2 million in 2016 to $ 1.3 million in 2017. This is 10 times higher than the $ 117,000 violation cost for SMBs.

Information leakage, cybercrime and cyber espionage are also evident in public administration systems. they violate the natural information structure of markets, create conditions for conducting large speculative transactions, violate the rules of open trading on commodity, stock and currency exchanges, and contribute to the loss of normal market competition and motivation (Karpunina et al., 2020).

For example, the introduction of e-government systems, on the one hand, contributes to improving the efficiency of public administration and is accompanied by the following qualitative changes in the field of public administration: there is a decrease in labor and financial costs of public authorities when using information exchange at the interdepartmental level; the quality of services provided by the state for citizens is increasing; reduced waiting time citizens get their services by improving the efficiency of interaction through the use of ICT, which saves the expenditure of the target budget; reduced wavecontrol due to the openness of the system and possibilities of civil control of activities of the state apparatus; there is a noticeable decrease in the number of appeals of citizens to state authorities for providing different services, due to the possibility of obtaining similar services through the Internet portal of state services; the administrative burden on public administration bodies is reduced, since all necessary information is centrally stored in databases on the Internet (Karpunina et al., 2019a).

On the other hand, the issues of technical implementation of the e-government system from user positions or from the positions of the authorities responsible for its implementation cannot reflect the scale of the problems associated with the emergence of threats to the economic security of the state from their use. In this aspect, it is necessary to take into account the possible purposeful use of

information technologies and the Internet itself in order to cause harmful actions to the entire system of state administration and undermine the welfare of the national economy.

Recent trends indicate the emergence of new types of institutional traps and the formation of a new segment of the shadow economy – the "black" cyber market, which negatively affects the economic security of the entire state (Manohina 2011).

On a national scale, the development of illegitimate cybercrime technologies leads to irreversible consequences, including a lag in GDP caused by an increase in unproductive expenses associated with maintaining information systems in working order and financing the implementation of security systems, the destruction of the natural information structure of markets, the destruction of normal market motivation and competition conditions due to violations of the rules of open trading on commodity, stock and currency exchanges, large speculative transactions, and the formation of a false image of companies, overstating credit ratings (Elyakov 2009).

Overall, IBM notes that malicious or criminal cyber attacks are responsible for 48% of data breaches, human errors account for 27%, and system failures for 25%, with an average data breach size of 25,575 records (Financesonline 2019).

Thus, the methods used in cybercrime against individuals, companies, and the state as a whole are significantly differentiated (Fig. 1) (Verizon 2018).

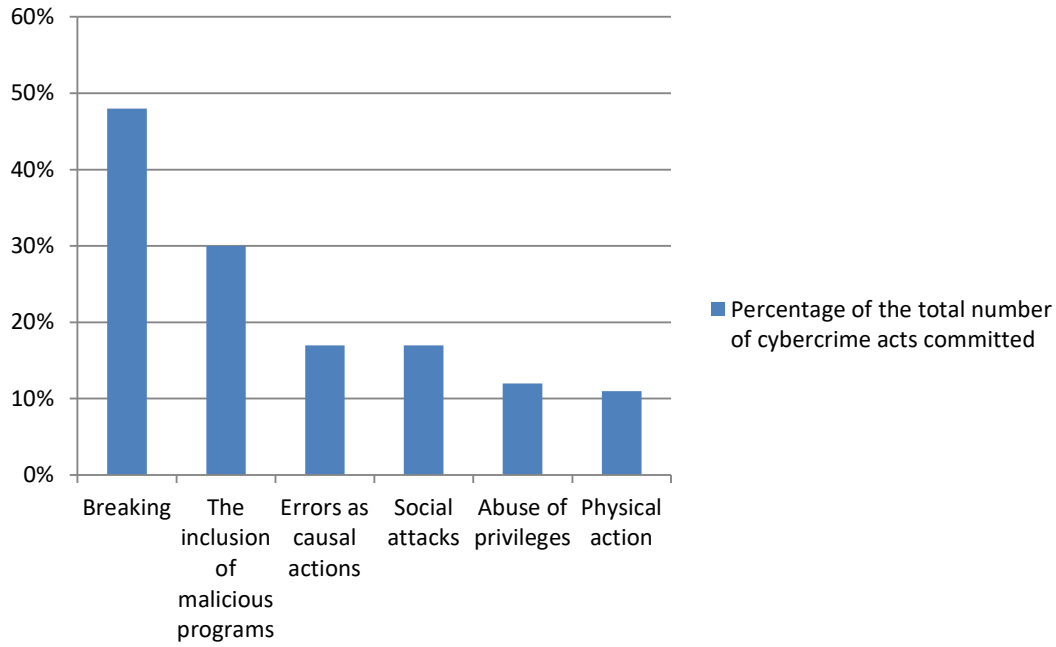

Fig. 1: Methods of cybercrime (compiled by the authors according to IBM 2019)

According to Verizon, the sectors of the economy most frequently exposed to cybercrime are: healthcare organizations (24%), housing and utilities (15%), and public sector enterprises (14%).

International statistics describing the motives and nature of cybercrime activities are as follows: 76% of cyber attacks are committed for money, 73% of offenses were committed by people outside the organization, including 50% by organized criminal groups and 12% by national or state-related entities (Verizon 2018). Приведенные факты обращают исследовательское внимание на существование условий для устойчивого роста количества преступлений и мошеннических операций в киберсреде и расширение способов и форм данных противоправных деяний.

The state's response to the emergence of cyber threats is manifested in the form of implemented state policy measures and cybersecurity programs aimed at countering and leveling these threats.

Internationally, the global cybersecurity index IDI has been developed, which is used to monitor and compare the development of information and communication technologies (ICTs) between countries and over time. A country's ranking in the Global cybersecurity index reflects the contribution of each country to the formation of a global cybersecurity culture and its integration into the core of information and communication technologies. Five main areas of cybersecurity improvement are evaluated: legal, technical, organizational measures, capacity-building measures, and cooperation (ITU 2018).

At the end of 2018, the top ten leaders included the following countries: great Britain (0.931), USA (926), France (0.918), Lithuania (0.908), Estonia (0.905), Singapore (0.898), Spain (0.896), Malaysia (0.893), Norway (0.892), Canada (0.892). These countries have a good position in risk management based on monitoring the performance of key elements of the national cybersecurity program. However, this does not guarantee full protection from cyber attacks for both business entities and the state as a whole.

Conclusions

The analysis of the attempts made to level this threat to economic security allows us to present a combination of the most effective measures to improve the security of individuals, companies and the state in the form of a pyramid of cybersecurity (Fig. 2).

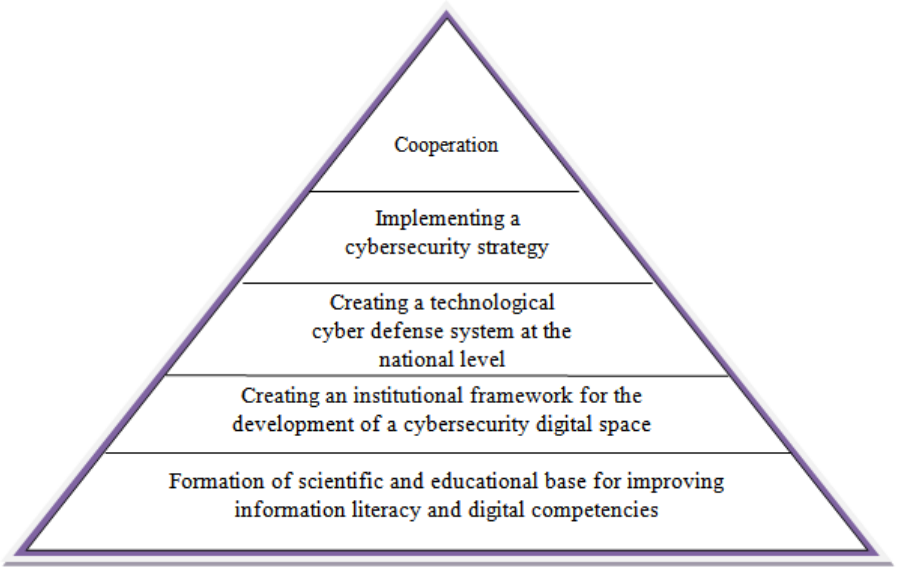

Fig. 2: Cybersecurity pyramid (compiled by the authors)

The basic level of the cybersecurity pyramid is the creation of conditions for improving the information literacy of individuals and the development of digital competencies of employees. Measures of this level are reactionary in the short term due to the rapidly worsening nature of the problem and the need to quickly reduce the negative consequences of cybercrime at all levels of management. The most effective measures to solve this problem are: the formation of motivational mechanisms for building the educational potential of the population, the preparation of information about educational programs and curricula in the field of cybersecurity, the development of differentiated trainings and courses to ensure readiness for cyber attacks for various categories of people, the organization of a public information campaign in the field of cybersecurity. In the long term requires the formation of common scientific and educational platform for continuous

improvement of human capital and training professionals for the digital economy and the national system of research and development, contributing to capacity-building of scientific and educational potential of the nation.

The second level of the pyramid is the creation of an institutional framework for the cybersecurity digital space, that is, legal institutions and structures that deal with cybersecurity and cybercrime leveling. This is a strategically important level of the pyramid, whose measures are of a long-term preventive nature and are related to the regulation of the digital space and the organization of an open discussion of lawyers, economists, technical specialists and management bodies in order to find optimal solutions to the problem of leveling cybercrime. In 2018, cybercrime legislation is applied almost all over the world. About 177 countries around the world have legislation regulating cybercrime (91%), and their number is growing from year to year (in 2017, there were only 79% of such countries) . Laws should be used as a basis for implementing strategies that ensure the sustainability of government ICT initiatives in accordance with the requirements of information technology authorities.

The creation of a technological cyber defense system at the national level based on the development of technical institutions and framework agreements on cybersecurity is the third level of the pyramid and has a long-term reactive and preventive character. In the case of technological readiness of cybersecurity services of enterprises and national agencies (in terms of the availability of technical mechanisms for combating spam, online tools for protecting against cyber attacks, blocking malicious resources), cyber protection is provided reactively. In order to achieve long-term sustainability, it is necessary to form a comprehensive technologically advanced cyber defense system, taking into account the technical capabilities of all economic entities.

The fourth level of the pyramid is organizational measures based on the development of institutions and policy coordination strategies for ensuring cybersecurity at the national level. Overall, in 2018, the majority of countries (58%) reported having a national cybersecurity strategy, whereas in 2017, only 50% of the countries studied attempted to develop and implement it. The presence of a national cybersecurity strategy is more common in European and CIS countries, and less common in the African region (14 out of 44 countries have national strategies). In addition, 91 countries have now developed a system of monitoring indicators to assess the dynamics of cybersecurity development at the national level.

Cooperation between countries and international organizations is the top of the pyramid and allows not only to create conditions for the exchange of practical and effective experience in leveling cybercrime, but also to become an open platform for discussing institutional initiatives, technological solutions and directions for further development of the system of combating cybercrime.

References

- Abalkin, L. (1994), 'Russian economic security. Threats and their reflection', *Economics problems,* 12.

- Alabicheva, M. (2014), 'Ekonomicheskaya bezopasnost' lichnosti kak strukturnaya sostavlyayushchaya ekonomicheskoj bezopasnosti gosudarstva', *Social'no-ekonomicheskie yavleniya i process*, 11, 9-14.

- Brynjolfsson, E. (2018), 'The Digital Economy, GDP and Consumer Welfare: Theory and Evidence', *OECD*, [Online], [Retrieved July 23, 2019], https://www.oecd.org/naec/Brynjolfsson_MOCE-GDP-B_OECD_2018-07-26.pdf

- Cooper, C. and Kaplinsky, R. (1989), Technology and Development in the Third Industrial Revolution, Frank Cass, London.

- CSO (2017), 'Cyber attacks cost U.S. enterprises $1.3 million on average in 2017', *Csoonline.* [Online], [Retrieved December 30, 2019], https://www.csoonline.com/article/3227065/cyber-attacks-

cost-us-enterprises-13-million-on-average-in-2017.html

• CSO (2019),'Why businesses don't report cybercrimes to law enforcement', *Csoonline.* [Online], [Retrieved December 23, 2019], https://www.csoonline.com/article/3398700/why-businesses-don-t-report-cybercrimes-to-law-enforcement.html

• Dasgupta, P. and David, P. (1987), Information Disclosure and the Economics of Science and Technology, Feiwel, G. (ed), Arrow and the Ascent of Modern Economic Theory, New York University Press, New York.

• Elyakov, A. (2009), 'Elektronnyj shpionazh', *Mirovaya ekonomika i mezhdunarodnye otnosheniya*, 8, 62-68.

• European Commission (2014), 'Commission expert group on taxation of the digital economy', *Ec.europa.eu*, [Online], [Retrieved October 23, 2019], https://ec.europa.eu/taxation_customs/business/company-tax/tax-good-governance/expert-group-taxation-digital-economy_en

• European Commission (2019), 'The EU ICT Sector and its R&D Performance', *Ec.europa.eu*, [Online], [Retrieved November 25, 2019], https://ec.europa.eu/jrc/en/predict/ict-sector-analysis-2019

• Experian (2018), 'The 2018 Global Fraud and Identity Report', *Experian*. [Online], [Retrieved December 25, 2019], https://www.experian.com/assets/decision-analytics/reports/global-fraud-report-2018.pdf

• Financesonline (2019), '51 Important Cybercrime Statistics: 2019 & 2020 Data Analysis & Projections', *Financesonline*. [Online], [Retrieved December 10, 2019], https://financesonline.com/cybercrime-statistics/

• Gilbert, C., Fernald, J. and Mojon, B. (2016), The Pre-Great Recession Slowdown in Productivity, Working Paper 2016-08, Federal Reserve Bank of San Francisco.

• Hiscox Forrester Consulting (2018), 'Cyber Readiness Report 2018', *Hiscox,* [Online], [Retrieved June 15, 2019], https://www.hiscox.co.uk/sites/uk/files/documents/2018-02/Hiscox_Cyber_Readiness_Report_2018_FINAL.PDF

• Huawei and Oxford Economics (2017), 'Digital Spillover. Measuring the true impact of the Digital Economy', *Huawei*, [Online], [Retrieved October 13, 2019], https://www.huawei.com/minisite/gci/en/digital-spillover/files/gci_digital_spillover.pdf

• IBM (2019), 'How much would a data breach cost your business?', *Ibm*. [Online], [Retrieved January 11, 2020], https://www.ibm.com/security/data-breach

• ITU (2018), 'Global Cybersecurity Index 2018', *Itu.* [Online], [Retrieved June 13, 2019], https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2018-PDF-E.pdf

• Karpunina, E., Konovalova, M., Shurchkova, J. Isaeva, E. and Abalakin, A. (2020), 'Economic security of businesses as determinants of digital transformation strategy', Popkova, E. and Bruno, S. (eds) Digital Economy: Complexity and Variety Vs. Rationality, Lecture Notes in Networks and Systems, Springer Nature, Switzerland AG.

• Karpunina, E., Moiseev, S. and Sergeev, D. (2019a), '"Elektronnoe pravitel'stvo": byt' v trende ili obespechivat' sobstvennuyu ekonomicheskuyu bezopasnost'', *Vestnik Severo-Kavkazskogo federal'nogo universiteta*, 2 (71), 43-50.

• Karpunina, E., Yurina, E., Kuznetsov, I. and Dubovitski, A. (2019b), 'Growth potential and

economic security threats in terms of digital economy ecosystem', Proceedings of The 33nd International Business Information Management Association (IBIMA), Granada, Spain, 2019, 2669-2678.

- Leonard-Barton, D. (1995), Wellsprings of Knowledge: Building and Sustaining the Sources of Innovation, Harvard Business School Press, Boston.

- Manohina, N.(2011), 'Institucional'nye lovushki i institucional'nyj vakuum v rossijskoj innovacionnoj srede', *Vestnik Saratovskogo gosudarstvennogo social'no-ekonomicheskogo universiteta*, 5 (39), 44-48.

- Petrenko, I. (2003), 'Ekonomicheskaya bezopasnost' Rossii: denezhnyj faktor', Market DS, Moskva.

- Sergeev, D., Lyubenko, O. and Savvateeva, O. (2020), 'Moshennichestvo v seti internet kak ugroza ekonomicheskoj bezopasnosti gosudarstva', *Teoreticheskaya ekonomika*, №3 (63).

- Simcoe, T. (2015), Modularity and the Evolution of the Internet, Goldfarb, A. et al. (eds), Analysis of the Digital Economy, University of Chicago Press, Chicago.

- Verizon (2018), '2018 Data Breach Investigations Report', *Verizon*, [Online], [Retrieved January 10, 2020], https://enterprise.verizon.com/resources/reports/DBIR_2018_Report.pdf

- Womack, J., Jones, D and Roos, D. (1990), The Machine That Changed the World, Rawson/Macmillan, New York.

Improving the Management of the Municipal Education System in Russia

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Abstract

The organizational structure of the municipal Executive and administrative authority is an important starting point for effective management of the municipal education system. The education management body is part of the entire system of municipal Executive power, and its status in this system significantly affects the subjectivity and quality of management decisions in relation to the municipal education system. Regional regulation of the organizational aspect of the management of municipal education systems is possible as a result of the use of a tool for evaluating the effectiveness of local self-government bodies and municipal executive authorities, as part of their management of the education system. In this work, a number of proposals are put forward for the formation and Desk control of organizational structures of municipal administrations, which do not contradict the legislation of the Russian Federation, but at the same time increase the manageability of municipal education systems by the regional authorities. The proposed changes in the order of presentation of organizational structures in terms of socio-economic efficiency will increase the information content, openness of power decisions, reduce transaction costs, reduce the distance between the local administration and the will of the population, and therefore affect the quality of life of citizens.

Keywords: The Organizational Structure of The Municipal Education System, The Executive Authorities, Management Efficiency

Introduction

The search for new mechanisms to improve the efficiency of state and municipal authorities is caused by modern economic conditions, characterized by limited resources and the need for rapid adaptation of the management process to socio-economic and political changes (Karpunina et al., 2018). Improving the effectiveness of municipal authorities in implementing regional socio-economic policies requires studying the existing conditions and factors that affect the effectiveness of the state apparatus.

The relevance of the study is determined by its focus on improving the efficiency of management of the municipal education system in order to improve the quality of life of the population. The study of the quality of the organizational structure of the administration as a starting condition for effective management of the municipal education system can reveal the reasons for stable (low or high) performance results, will provide the necessary information for making decisions to improve the management process.

In addition, the problem of non-compliance with the conditions for the organization of effective management of the municipal education system in Russia is not given due attention. This is evidenced by the system of organization of evaluation of the effectiveness of local self-government bodies in implementing social and economic policy, created at the state level. In practice, the evaluation is aimed only at achieving the result, and the conditions are not studied.

Materials and Methods

The scientific hypothesis of the study is the assumption that in Russian conditions, in order to level the negative starting conditions in the organization of management of the municipal education system, the procedure for forming (changing), registration of the organizational structure of the local administration requires standardization and state regulation without infringing the right of the subject to determine the structure of the individual.

The theoretical basis of the research is the work of Burganova (2014), Emerson (2010), Fayol (1999), Mil'ner (2016), Chandler (1962), Akoff and Emery (1972), Parkinson and Rustomji (2013).

In the study, the "organizational structure" will be understood as the structure of the management object, built taking into account the requirements of the best functioning of the system.

Creating an effective organizational structure helps to achieve the goals set for any system (Mescon et al., 1985).

Empirical studies by Bish (2001), Bicker and Daan van der Linde (2016), Blesse and Baskaran (2016), Tavares (2015) prove the relationship between the organizational structure and the effectiveness of local authorities.

Lapygin (2007) highlights the General rules for the formation of organizational structures of municipal authorities: the structure forms a list of strategic functions; duplication of functions is prohibited; the optimal management is subordination of no more than 6-7 management units.

Researchers note that control factors play a significant role in building the organizational structure of local authorities (Ouchi 1977). The principle of individualization in the construction of organizational structures of municipal authorities should not reduce the quality of interaction between divisions and the external environment (Benzer et al. (2016)), and their similarity does not negate the consideration of individual characteristics of municipalities.

The process of improving organizational structures in the field of education has its own specifics, is an important object of research in the context of increased interest in the reproduction of human capital and the basis for improving the efficiency of management of the municipal education system (Potashnik and Solozhnin (2014).

Research methods: system approach, method of comparative analysis, observations, classification, expert analysis, survey and generalization, method of analogy, differentiation. Additional sources of information are local regulations of local governments. The survey, conducted to clarify the components of the problem of diversity of local administration structures and the place of the education management body in them, was generalized using the A. Pareto method. The Kepner-Trego method was used to identify the causes of existing problems and develop alternative solutions. The link between the effectiveness of the management of the municipal education system and the

organizational structure of the local administration is proved on the basis of the results of expert evaluation and calculated statistical methods for its processing.

Results and Discussions

A sample of 100 sites of municipal administrations of the regions of the Southern and Volga Federal districts of the Russian Federation was formed to conduct research. The official websites of municipal administrations were studied: Krasnodar territory, Stavropol territory, Rostov region, the Republic of Adygea, Saratov region, Orenburg region. The coverage of municipal sites is determined in connection with the need to study the features of municipal education systems in regions where the majority of rural municipal areas (table 1).

Table 1: The scope of the research (compiled by the authors)

Region	Number of municipal districts and urban districts (GKS 2019)			Sites investigated, % (units)	The representativeness of the sample
	Municipal district	City district	Total		
Krasnodar region	37	7	44	100 (44)	+
Adygeya Republic	7	2	9	100 (9)	+
Stavropol region	26	10	36	8 (3)	_
Rostov region	43	12	55	5 (3)	_
Orenburg region	35	12 (1)	48	6 (3)	_
Saratov region	38	1 (3)	42	90 (38)	95%±5
Total	186	48	234	43 (100)	99%±10

The confidence probability for municipalities throughout Russia (2350) of the second level is 95% with a confidence interval of ±10%. The study of methods of formation and generalization of the practice of forming organizational structures with such a representative sample allows you to generalize the results to the entire General population with an error of 10%. It should be noted that the sample has a bias to the South-West of Russia. For the Volga and southern Federal districts, the confidence probability is 99% with a confidence interval of ±10%.

Analysis of the official websites of municipal Executive and administrative authorities allowed us to distinguish two forms of representation of the structure: graphic and/or list. For example, the structure of the administration of the city of Krasnodar on the site is indicated by a list method with the indication of positions, photos, surnames, names, patronymics and supervised directions at the levels of the hierarchy (Kdr 2019).

While the organizational structure of the administration of the Pavlovsky district of Krasnodar territory is presented in figure 1 in a graphical way (Pavl123 (2019)). The sample includes municipalities in which the organizational structure of the administration is presented both graphically and in a list.

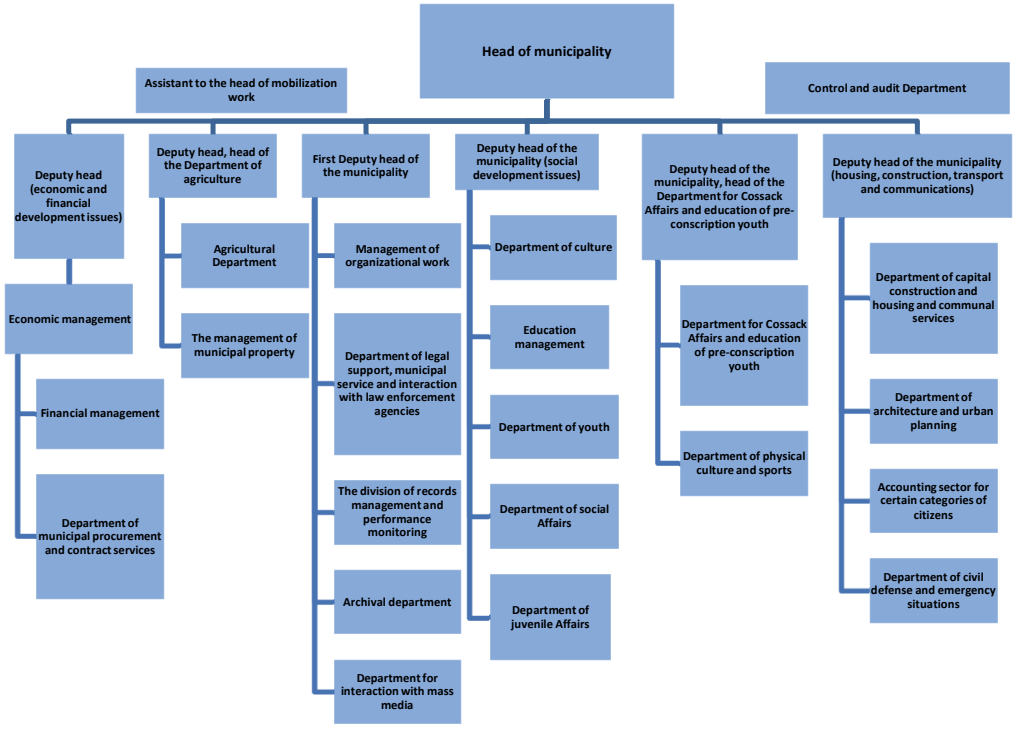

Fig. 1: An example of the structure of the municipal administration formed in a graphic way (compiled by the authors based on the materials of the official website of the Pavlovsky district of Krasnodar region) (Pavl123 (2019))

In accordance with paragraph 1 of article 131 of the Constitution of the Russian Federation (1993), the structure of local self-government bodies is determined by the population independently (Constitution 1993). However, in practice, the structure is formed by the municipal Executive and administrative authorities, and the representative body approves it. The process of changing the structure has a top-down direction. And the opinion of the population, especially employees of administrative structures, is not studied.

The analysis of graphic diagrams (organigrams) allowed us to identify common features: subordination of the education management body to the Deputy for social issues and the presence of the status of a legal entity in most of these divisions. In large urban municipalities, the governing bodies of the municipal education system have a wide range of powers with appropriate resources.

The variety of organizational structures of the municipal education system management bodies (Potashnik and Solozhnin, 2014) and their position in the structure of the local administration is not only related to the scale of municipalities and the volume of educational services provided. In addition, in some cases, the education management body is outside the structure of the local administration and does not have management links on the organogram (Zatosvetly (2019)).

The revealed variety of organizational and legal forms and provisions of education management bodies in the structure of local administrations was the basis for the expert survey of 100 employees of municipal administrations (80 % of whom are specialists of education management bodies) to identify the reasons for the low efficiency of the execution of powers. The results of the survey showed that 44 % of employees surveyed see the reason in hidden rules in the administration – rank 1 (a); 42% - in the shortcomings of the organizational structure-rank 2 (B); 7 % - in the low

performance of some employees-rank 3 (C); 5 % - in the absence of financial resources –rank 4; 2 % - indicated other reasons – rank 5 (Fig. 2).

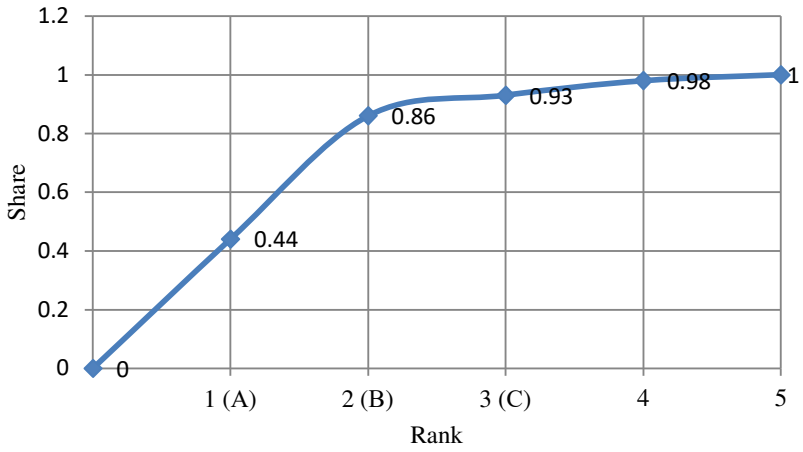

Fig. 2: Lorentz curve (compiled by the authors)

According to A. Pareto, three components of the problem cause 80% of its manifestations and consequences. In our case, two components determine more than 80% - hidden rules and shortcomings of the organizational structure and the problem of low efficiency.

Using the Kepner-Trego method, we systematize the information and prioritize the information (table 2).

Table 2: Kepner - Trego matrix for problem identification (compiled by the authors)

№	Characteristics of symptoms (manifestations) of the problem	Fixing symptoms	
		Appear	Not appear
1	2	3	4
1	The nature of the symptoms	What they are (do not represent)	
		They have an administrative (political) character: different organizational and legal form, status, conditions, opportunities and powers of the municipal education system management bodies in the presence of a single strategy for the development of the "Education" industry and requirements for the provision of educational services	They do not have General requirements for the security of the education management body
2	When did they appear	When	
		- during the formulation of performance criteria and methods of calculating indicators - in the treatment of the population to the authorities - when planning and forecasting the development of the education system in the region. Problems have a hidden internal character and are manifested: - during the implementation of projects and programs; - when performing tasks in the preparation of reports;	External manifestations are not recorded.

№	Characteristics of symptoms (manifestations) of the problem	Fixing symptoms	
		Appear	Not appear
		- when assessing the quality of the results of the municipal education system as a whole and individual elements separately; - when forming and distributing the budget for the maintenance of the education system as a whole and individual elements separately; - when interacting with administrative divisions; - when stimulating and motivating employees, when appointing (dismissing) a position; - when making decisions on the functioning and development of the municipal education system.	
3	Where did they appear	Where	
		In regions where a General concept defining the structure of the municipal education management body has not been developed, its status in the structure of the local administration. Appear: - in performance; - in the personnel of the reaction; - in assessing the population; - in the cost-effectiveness of resources and the practice of their distribution; - in saving working time; - as a clerk.	Control and Supervisory authorities do not assess the availability of resources assigned to the authorities and the creation of appropriate conditions for the management of the municipal education system
4	What do they apply to	On what	
		- on the quality of external and internal relations; - the climate in the team, job satisfaction, and work discipline; - the emergence of imbalances in the development and functioning of the region's education system, as well as in the provision of educational services	- does not affect the evaluation of the effectiveness of state bodies in managing the education system; - does not affect the assessment of the effectiveness of the heads of local administrations
5	Any changes that have occurred	Changes	
		- affect the resource provision of activities - affect the transaction costs of adapting the management system to new conditions; - on the status and motivation of employees of the education management body	- There is no quick reaction to changes to hidden rules
6.	Reason	1. different approaches to the formation of the administration structure in relation to the management of the education system, despite the unity of strategic	Administrative (legislative) drawback of a

№	Characteristics of symptoms (manifestations) of the problem	Fixing symptoms	
		Appear	Not appear
		goals; 2. weak controllability (controllability conditions for the control and predictability of the results of the system) of the municipal systems of education from the regional authorities; 3. personal interests of groups of people in the management of the administration; 4. closeness of the municipal management system (opacity of procedures for forming structures)	systemic nature. Absent: - restrictions on changes or formation of the structure in terms of time and quality; - regulated justifications for changes in the structure; - responsibility for the quality of the structure; - control of structure formation

As a result of systematization of information, it was revealed that the reason for the diversity of structures and weak regulation is the lack of unified approaches to the formation of the structure of local administration. This is due to the implementation of the principle of individualization-taking into account local conditions, as well as the policy of deliberate non-interference in structural changes in local administrations in accordance with the Constitution of the Russian Federation (Constitution 1993).

The result of identifying the reasons of the problem is alternative solutions that determine the manageability of the municipal education system (that is, its ability to perceive the effects of the management system (in this case, the super-system – a regional Executive authority in education) in order to achieve socio-economic goals (internal properties of the municipal education system) (table 3).

Table 3: Alternative solutions to the problem (compiled by the authors)

№	Decisions	Risks	Positive effect
1.	Leave as is	- increasing disparities in development; - weakening of control and manageability; - increasing differences in the quality of services; - bias evaluation of the effectiveness of activities; - General decrease in the quality of services; - the closeness, the growth of corruption; - dissatisfaction of the population	
	Alternatives		
2.	Standardize the process of forming	- bringing to the details; - the lack of competent	- development of the rules of procedure;

№	Decisions	Risks	Positive effect
	and making changes to the organizational structure	control of	- saving time, reducing corruption, violations of labor laws and management laws.
3.	Assign responsibility for the quality of the structure design	With collective responsibility, the state of affairs will not change	- reducing corruption; - improving the quality of organizational structures, forming structures based on scientific recommendations and regulatory requirements.
4.	Define requirements and improve the quality of user-oriented organigrams	Increasing the depth of questions for control and Supervisory authorities and the population due to increased openness	- elaboration of assigned functions; - time saving; - reduction of corruption manifestations; - increasing the efficiency of activities and the possibility of forming criteria for evaluating activities.
5.	Influence through an assessment of the conditions for effective management of the municipal education system	Restriction of the subject's right to individualization	- uniformity of the status of education management bodies in the region, which contributes to an objective assessment of performance; - improving the management of the municipal education system; - ability to calculate the trajectory of resource flows, which means to predict the periods of task execution

It is necessary to conduct a comparative analysis of organizational structures using local normative documents for compliance of the organizational structure (graphic or list) with the real state of affairs in order to find the most constructive structures. This analysis allowed us to identify critical areas of differences in the powers and capabilities of education management bodies, and, consequently, the conditions for managing the municipal education system (table 4).

Table 4: Connection of individual starting conditions of management with the organizational structure of the administration

№	Critical areas	A variety of conditions	Impact aspect	Relation to the administration structure
1.	Municipal service	attitude of employees of education management bodies to the municipal service (whether they are municipal employees)	motivation of employees	the education management body is located in the administration structure, usually subordinate to the Deputy head of social affairs
2.	Employer of managers	attitude to the heads of educational organizations (personnel records for Directors of educational	motivation of heads of educational organizations (management directly, without approval:	tracked by designations of links with municipal organizations (interaction or management)

№	Critical areas	A variety of conditions	Impact aspect	Relation to the administration structure
		organizations are conducted in the Department of education or in the personnel service of the administration)	administrative documents are developed faster)	
3.	Employer of employees	attitude to employees of the education management authority (who is the employer- the head of the authority or the head of the administration)	motivation of employees of the education management body (direct management of employees, management without approval, personnel and management decisions are made faster)	it is assumed if a legal entity (automatically considered if the municipal education management body is a legal entity; additional verification of personnel records and the Charter is required)
4.	The main Manager of budgetary funds	attitude to the distribution of financial resources (the education management body is the main Manager of budget funds or not for municipal educational organizations)	planning, organization of the functioning and development of the education system (disposal of financial resources of the municipal education system without approval – the effect of saving time; the possibility of using the synergy effect))	it is possible only if the relations between the authority and educational organizations are managed
5.	Founder	attitude to the disposal of the property of educational organizations (whether the educational management body is the founder of municipal educational organizations or not)	planning, organizing the functioning and development of the education system (saving time)	it is assumed that the relations between the authority and educational organizations are managed
6.	The trajectory document	document flow direction (main requests and documents from the Ministry of education of the region are sent to the education management body directly or through the administration's office)	organization of the functioning and development of the municipal education system (the effect of saving time, completeness of information, absence of errors in the distribution of responsibilities and assignments when signing documents to	it is assumed that the relations between the authority and educational organizations are managed

№	Critical areas	A variety of conditions	Impact aspect	Relation to the administration structure
			performers)	

Among the factors of efficiency of organizational structures of the local administration of the municipal education system by means of expert analysis identify: the status of legal entity of the educational authorities; a finding unit of administration; the status of municipal employees the employees of the educational authorities; the ability of HR administration and independent decision-making on the appointment, dismissal, etc. of heads of educational institutions and employees of educational authorities; the status of founder for educational institutions from the authority of education management; the status of the main manager of budgetary funds for educational organizations and support institutions (units); the presence of methodical institutions (divisions) in the body of the education management (Karpunina et al., 2019); the existence of own books in the educational authorities; the availability of other support units in the managing authority of the education; no destructive hidden rules (conflicts regulations) in the administration; development of constructive regulations for the interaction of local administration departments in the course of performing the main types of work and providing municipal services .

Using a logical analysis of the relationships between factors, as well as an extremely low number of preferences by experts (group A-employees of education management bodies, group B-other specialists of local administrations), indicators 1, 2, 5, 9 were excluded. Thus, they left 7 indicators (table 5).

Table 5: Results of ranking of organizational structure factors (compiled by the authors)

№	**Factors**	**Rank of group A experts ' responses (x_i)**	**Rank of group B experts ' responses (y_i)**	**The difference between the ranks (d_i)**	**Squared difference (d_i^2)**
1.	Status of municipal employees	5	4	1	1
2.	Personnel records management for heads of educational organizations and employees of the education management body	1	1	0	0
3.	Status of the chief administrator of budget funds for educational organizations	2	3	-1	1
4.	Availability of methodological divisions	6	6	0	0
5.	Having your own accounting Department in the education management system	3	2	1	1
6.	No destructive hidden rules in the local administration	4	5	-1	1
7.	Development of constructive regulations for interaction of local administration departments	7	7	0	0
n = 7	-	Total ranks: 28, which corresponds to checking	Total ranks: 28, which corresponds to checking	-	$\Sigma d_i^2=4$

№	Factors	Rank of group A experts ' responses (x_i)	Rank of group B experts ' responses (y_i)	The difference between the ranks (d_i)	Squared difference (d_i^2)
		the correctness of the ranking	the correctness of the ranking		

Spearman's sample rank correlation coefficient is calculated according to formula 1 and 2:

$$p = 1 - \frac{6\sum_{i=1}^{7} d_i^2}{n(n^2-1)} \approx 0{,}93 \text{ (1)}$$

где $d_i=x_i-y_i$, (2)

n- sample size.

Thus, the value of Spearman's rank correlation coefficient (p) does not exceed 1 and, according to the Chedoc scale, indicates a close relationship between the two samples presented. The significance of the correlation is explained by the similarity (dependence) of experts ' opinions on the relationship between the effectiveness of management of the municipal education system and the organizational structure of the administration. However, the correlation indicator calculated from a limited sample (population) is only an estimate of statistical regularity, since in any survey there is an element of randomness inherent in the individual (subjective) judgments of experts. The statistical significance of the correlation coefficient was verified by the student's criterion (formula 3).

$$t_p = p \cdot \sqrt{\frac{n-2}{1-p^2}} \approx 5{,}66 \text{(3)}$$

$$t_{tabl}=2{,}571 \text{ (4)}$$

The result is significant, since the table value of the student's critical distribution points (t_{tabl}) is less than the calculated value obtained (TP). In other words, the rank correlation between expert assessments of two different groups in relation Both groups of experts first put the HR inside the on education management, i.e. the ability to manage staff resource experts on and managers of educational institutions. Positions related to accounting and managing financial resources came in second and third place. The lowest number of preferences was expressed by the experts of both groups of regulation of consolidated operations within the framework of functions. to the municipal education system (external and internal) is significant.

Thus, the study allowed us to confirm the relationship between the effectiveness of management of the municipal education system and the organizational structure of the local administration (in relation to the education management body).

Designing the organizational structures of local administrations should meet the following principles: performing the functions and tasks of local self-government; cost-effectiveness; taking into account the characteristics of municipalities (the principle of individualization).

However, the frequent change of the structure of bodies of management of municipal educational system, labour turnover, changing regulations of rendering of services and execution of works or the inconsistency of functions of a real opportunity, labor law violations, a manifestation of corrupt elements are evidence of low bureaucratic culture of the municipal authorities, but the weak controllability of the municipal system of education by regional educational authorities.

Indicators of weak controllability of the issues of management of municipal system of education by regional authorities are: the lack of common approaches to the formation of municipal bodies of education management in municipalities; the lack of similarity between the status of employees of municipal bodies of education management and provision of educational authorities in the structure of the municipal administration; frequent changes in the structure of municipal authority of education

management and structure administration; turnover of staff in the municipal education authorities; unjustified change in the functional (job) responsibilities of employees.

These indicators of weak manageability are factors of inefficient activity of municipal Executive and administrative bodies for managing the education system, which are easily detected by Desk control (in accordance with table 4). Therefore, the organizational structure should be established based on the volume and content of tasks, the intensity of information flows and taking into account the material capabilities of the municipality.

The study confirmed the important role of regional regulation in the effective management of municipal education systems. As part of the strengthening of the regulatory function of regional education management bodies in many regions of Russia at the present stage of development, provisions are being developed to assess the effectiveness of municipal education management bodies. An important factor in objectively evaluating the effectiveness of Executive and administrative authorities in managing the municipal education system is the assessment of the effectiveness of the organizational structure of the municipal administration and the place of the education management body in it. An objective assessment of the effectiveness of municipal Executive and administrative bodies in managing the municipal education system by regional authorities and subsequent methodological, explanatory and control measures can serve as a tool for solving the identified problems.

Conclusions

The study confirmed the hypothesis that it is necessary to regulate the formation of organizational structures of local administrations in order to improve the efficiency of management of the municipal education system. This regulation can be implemented at the state level by indirect tools, without violating constitutional rights. The regional education management body as a competent super-system of management for the municipal body in the field of education can best influence the quality of the organizational structure. The weakening of control in the organizational and structural issues of municipal administrations, the disappearance of the "spirit of anonymity" leads to the transformation of relations between units of the administration, and a loss of purpose of the management system to integrate the activities of all components and subsystems to achieve the desired wellbeing of the population.

Creating a comfortable environment for the population on the issue of orientation in the organizational structure, as well as for effective in-house control conducted by Supervisory and other state bodies, is possible through:

1) mandatory placement of the structure on the official website of the administration with a reference to the official document that indicates the date of approval;

2) in the upper-left corner of the document, it is recommended to set the dates of all changes to the structure;

3) the structure must be represented by both a graphical and a list method;

4) in the upper-right corner of the symbol that indicates a structural division, the number of full-time positions should be indicated, and the list of organizational structures lists all employees who fill these positions;

5) the structure should not change more often than once every three years (the strategy is unlikely to change more often!), with the exception of additional staff positions or divisions that are necessary for the implementation of new municipal powers transferred from state authorities, as well as changes related to the regulation of control and Supervisory authorities;

6) the list form of the structure should reflect vacant positions with the indication of the start date of the competition for its replacement and the date of the vacancy with weekly reconciliation and updating of information;

7) unreliability of information about the organizational structure on the site should be subject to administrative punishment.

These proposals will reduce the number of unjustified structural changes that require correction of interaction regulations and job responsibilities of employees of transformed departments. Consequently, the cost of human and material resources and time to adapt to new management conditions will be reduced. In addition, certain recommendations for improving the organizational structure will help to combat personnel corruption.

References

- Ackoff, R. and Emery, F. (1972), On Purposeful Systems, Aldine- Atherton, Chicago.

- Benzer, J., Charns, M. and Hamdan, S. (2016), 'The role of organizational structure in readiness for change: A conceptual integration', *Health Services Management Research,* 30(1), 34–46.

- Bikker, J. and Daan van der Linde, D. (2016), 'Scale economies in local public administration', *Local Government Studies*, 3(42), 441-463.

- Bish, R. (2001), 'Local government amalgamations: Discredited nineteen-century ideas alive in the twenty-first', *Commentary, C. D. Howe Institute*, 150, 1-29.

- Blesse, S. and Baskaran, T. (2016), 'Do municipal mergers reduce costs? Evidence from a German federal state', *Regional Science and Urban Economics*, 59, 54-74.

- Burganova, L. (2014), Teoriya upravleniya, INFRA-M, Moskva.

- Chandler, A. (1962), Strategy and Structure: Chapters in the History of the Industrial Enterprise, MIT Press, Cambridge.

- Emerson, H. (2010), Twelve Principles of Efficiency by Harrington Emerson, Nabu Press.

- Fayol, H. (1999), Administration Industrielle et generale, Dunod.

- GKS (2019), 'Baza dannyh pokazatelej municipal'nyh obrazovanij', Gks.ru. [Online], [Retrieved July 27, 2019], http://www.gks.ru/dbscripts/munst/munst03/DBInet.cgi

- Karpunina, E., Yakunina, I. and Yurina, E. (2018), 'Realization of the National and State Economic Interests of Russia in the Conditions of Formation the 4.0 Industry' Proceedings of the 31st International Business Information Management Association Conference (IBIMA), 25-26 April 2018, Milan, Italy, 1488-1494.

- Karpunina, E., Konovalova, M., Ermolaev, K., Okunkova, E. and Yakovleva, E. (2019), 'The social dimension of the digital economy' Proceedings of the 34nd International Business Information Management Association (IBIMA), ISBN: 978-0-9998551-3-3, 13-14 November 2019. Madrid, Spain, 3688-3697.

- Krd (2019), 'Oficial'nyj sajt administracii goroda Krasnodar', *Krd.ru*. [Online], [Retrieved July 10, 2019], https://krd.ru/administratsiya/struktura-administratsii/

- Lapygin, Y. (2007), Teoriya organizacii, INFRA-M, Moskva.

- Mescon, M., Albert, M. and Khedouri, F. (1985), Management: individual and organizational effectiveness, Harper & Row, New York.

- Mil'ner, B (2016), Teoriya organizacii, INFRA-M, Moskva.

- Ouchi, W. (1977), 'The relationship between organizational Structure and Organizational Control', *Administrative Science Quarterly*, 1 (22), 95-113.

- Parkinson, C. and Rustomji, M. (2013), Business is People, Vision Books Pvt. Ltd.

- Pavl123 (2019), 'Oficial'nyj sajt Pavlovskogo rajona Krasnodarskogo kraya', *Pavl23.ru.* [Online], [Retrieved June 10, 2019],.https://pavl23.ru/item/155595

- Potashnik, M. and Solozhnin, A.(2014), Upravlenie obrazovaniem na municipal'nom urovne, Pedagogicheskoe obshchestvo Rossii, Moskva.

- Tavares, A. (2015), Reformas territoriais: Fusões de municípios e cooperação intermunicipal', de Sousa, L. et al. (eds.), A reforma do poder local em debate, ICS, Lisboa.

- Zatosvetly (2019), 'Administraciya gorodskogo okruga ZATO SVETLYJ', *Zatosvetly.ru.* [Online], [Retrieved June 10, 2019], http://www.zatosvetly.ru/about/struct.php/

- Constitution (1993), 'The Constitution of the Russian Federation (12.12.1993)', *Constitution.ru.* [Online], [Retrieved June 10, 2019], http://www.constitution.ru/en/10003000-01.htm

Non-Material Factors of Employee Motivation – Sex Aspects

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Abstract

The article is an attempt to answer questions concerning the most common intangible employee motivation factors and their evaluation by employees. In the first part of the article the authors try to find an answer to the question why people work in this way and not in any other way and discuss issues related to employee motivation and motivation. The second part presents the results of empirical research conducted in Polish micro and small production enterprises located in the Wielkopolska Region; the research concerns the most frequently occurring and most significant, from the perspective of the respondents, intangible motivation factors. The main aim of this article is to present the results of research evaluating the effectiveness of particular non-material motivation factors and trying to explain their influence on the development of motivation systems. The study analyzes concepts related to employee motivation and presents the results of own research, taking into account the gender aspect.

Keywords: Motivation to Work, Motivation Tools, Motivational Factors, Employee Sex.

JEL Classification: I25, M5

Introduction

Why do people work this way and not another way? The answer to this question has long been sought by scientists, business practitioners, psychologists and sociologists. Due to the changing environment, which causes changes in the approach to work and professional life and parallel to personal life - this question is still relevant and seems to always be. In the present times of uncertainty, attempts to minimize costs and maximize effects and growing competition, the answer to the question: what intangible elements motivate employees? Due to the current conditions on the labour market (employee's market), employees are provided with the convenience and comfort of living by meeting their financial expectations. This manifests itself in the form of remuneration and additional health insurance, company car, laptop, smartphone. However, it turns out that this is not enough to keep key human resources in the company. To this end, companies have the opportunity to apply a wide range of intangible motivation factors, which in fact have a significant impact on employees. Sociologists and representatives of the sciences of organisation and management understand motivation as influencing the employee in order to achieve behaviour in line with the needs and interests of the company. Psychologists, on the other hand, treat motivation in a subjective dimension - characteristic of every person.

The main aim of this article is to present the results of research on the assessment of the effectiveness of individual non-material motivation factors and an attempt to explain their influence on the formation of motivation systems. The study analyzes the concepts related to employee motivation and presents the results of own research, taking into account the gender aspect.

Research Problem

The Characteristics of Employee Motivation

According to Terry (in Tripathi, 2012), there are elements that companies use to achieve management objectives. Terry classifies them as „The Six M's in Management", that is people, money, methods, machines and the market. The success of a company depends on how the company manages its human resources (HR), because it is the human resources that generate profits for the organisation through the development of their professional career (Tripathi, 2012). The employer expects not only employees who are capable and competent, but also who are not afraid of hard work and achieve optimal results (Ramadanty, Martinus, 2016, p. 78-80). Hence the basic task of managers, who should stimulate high motivation of employees to act. (Hasibuan, 2009). According to Daisy, motivating employees can bring benefits and contribute to the full use of the potential of their human resources. Motivated employees are more willing to fulfil their duties and perform them more effectively (Daisy,2017, p. 165).

Each of us is motivated to meet every day. It occurs when a person feels a need and has the opportunity to satisfy it. Motivation to work is the state and energy that drives employees to achieve the organizational goals of the company. Moreover, it encourages to act and results from internal factors thanks to which an employee can give maximum effort in his work or reduce it to a minimum (Mangkunegara, 2005). In a company, motivation plays a very important role, because motivation in the form of encouragement involves generating, directing and maintaining behaviour in order to achieve the goals of the organisation (Rajhans, 2012:81).

Motivation is an ambiguous concept and is the subject of research in many sciences: psychology, sociology, the science of morality and, in general, the sciences dealing with the interpretation of human behaviour. It derives from the Latin word "motus" and the English word "move", which means "to move, move, encourage, influence and stimulate someone". As proposed by Kanfer, motivation is defined as: "Psychological processes that determine (or energize) the direction, intensity, and persistence of action within the continuing stream of experiences that characterize the person in relation to his or her work." (Lerner, Busch-Rossnagel, 1981. p. 2). According to Bartol and Martin, motivation "energizes behavior, gives direction to behavior, and underscores the tendency to persist"(Bartol., Martin, 1998). Islam and Ismail suggested that motivation is an important aspect of influencing others to work towards achieving company goals (Islam, Ismail, 2008, pp. 344-362).

In the process of motivating employees the most important thing is to choose the right motivational factors. According to the literature, these instruments are divided into tangible (monetary and non-monetary) and intangible. Financial motivation is directly related to remuneration, bonus, salary increase and monetary reward. Among the factors of material non-monetary motivation are the organization of recreation, meals subsidized by the company, additional medical care, the possibility to use a car or a company laptop. Among non-material motivating factors, employers have a whole range of possibilities, starting from increasing independence at work through equal treatment of all employees, correct relations or friendly atmosphere (Daisy, 2017, pp. 165-166).

Research Problem

The choice of an appropriate method of motivation contributes to the proper use of human resources so that employees feel satisfaction with their work (Sadłowska-Wrzesińska, Nejman, 2016, p. 399). The process of motivation uses specific motivation factors. In Poland, motivation factors are used according to various criteria.

In Poland, the criteria for dividing motivational factors are applied (Sępek, 2010, p. 103):

- scope of influence: internal (recognition, independence, development) and external (pay, promotion, feeling of security),

-form: wage (prizes, bonuses) and non-wage (oral praise, good working conditions, training, integration trips),
- impact direction: positive (reinforcing desired behaviour) and negative (penalties to motivate avoidance of behaviour considered undesirable),
- mode of influence: individual and team,
-requirements: factors satisfying basic stimuli (the body's life needs) and factors satisfying higher-order stimuli (the needs of a social and aesthetic moral type).
In the last year in Poland about 16% of employees changed jobs, a year earlier about 10%. This problem concerns the manufacturing industry to the greatest extent. It is commonly believed that this is an effect of underestimation of employees by employers; this is manifested both by low financial remuneration and lack of recognition and motivation for development and achievements (HRPolska, access 28.01.2020). The frequent change of employment among Poles is also influenced by record low unemployment. The Central Statistical Office (GUS) reported that the unemployment rate in Poland in 2018 was 5.8% (958.6 thousand unemployed), and in September 2019 it was only 5.2% (866.7 thousand unemployed). The unemployment rate is the lowest in history for 30 years. This fact makes us currently dealing with an employee-oriented labour market (CSO, access 29.01.2020).

Despite the fact that Poland is experiencing a period of dynamic economic development (the GDP per capita ratio of Poland increased by 149.8%, and for the entire European Union by 58.8%), the remuneration is still much lower than in other EU countries. According to the data of the European Statistical Office (Eurostat), the average monthly per capita salary of the entire European Union amounts to almost EUR 2,904.30 gross, or about PLN 12,560. The average of the euro zone countries is even higher and amounts to 3 094.22 euro (about 13 380 PLN). Poland is ranked 8th from the end and the average monthly salary in Poland is 982.32 euro (Eurostat, accessed 29.01.2020).

Due to unsatisfactory earnings, there is a widespread belief in Poland that job satisfaction and employee involvement can only be achieved through the use of financial incentives by employers. Immaterial factors of employee motivation are neglected by employers and are not part of the incentive system. This leads to a situation which escalates the level of stress on both sides of the relationship (employees - employers) and weakens both employees' satisfaction with work and their performance and involvement.

An additional problem of the Polish labour market is low awareness of gender equality policies among employers. In view of the growing participation of women in the labour market, including in the manufacturing sector (traditionally associated with men), new challenges arise in terms of work organisation. Women and men are exposed to different threats to the working environment and different types of requirements and stressors, even when they are employed in the same sector and perform the same profession. Gender differences in employment conditions affect both job security and the quality of relationships and job satisfaction. Many women are in low-paid, precarious jobs, which affects the risks to which they are exposed. Moreover, there is a clear link between psychosocial risks at work and health. Improving the quality of women's working life cannot be disconnected from the wider problem of discrimination at work and in society.

Research Methodology

Empirical research was conducted in Polish production companies in Wielkopolskie voivodship. The specificity of production activity (according to the Polish Classification of Activities of PKD 2007 - industrial processing), based on cooperation and teamwork, requires special solutions for human resources management. The choice of this industry was dictated by the fact that production occupies an important position in the economy of Wielkopolskie Voivodeship. Wielkopolska, located in the west-central part of Poland, is characterized by uniform economic development, a significant degree of industrialisation, high technological level, and openness to external markets. It is primarily indicated by its large and still growing production potential and high level of entrepreneurship. A significant increase in interest from foreign investors is also important. Industry occupies an important position in the voivodship's economy - it constitutes a source of income for about 1/3 of the total workforce and provides the main part of the gross domestic product produced in Wielkopolska. A characteristic feature

of Wielkopolska's industry is a clear advantage of small and medium-sized enterprises, whose advantage is high mobility and flexibility (Wielkopolska Region, 14.01.2020).

In the study, a targeted (non-probabilistic) selection of quotas was used, which made it possible to study such a number of people that the results could be obtained for the entire population. The research tool was a self-assessment questionnaire, which was checked in a pilot study. The questionnaire consisted of two parts and a tag. The first part of the questionnaire concerned the opinion about the workplace, consisted of 18 statements, in which 4 areas were identified (the questions in this part were marked with a Roman numeral and with consecutive question numbers 1-18):

- emotional factor - consisted of 6 opinions: I.1 (*I am satisfied with my work*), I.4 (*I feel confident in my employment*), I.8 (*I feel appreciated in the company*), I.16 (*my work is an overwhelming duty*), I.17 (*I feel used in my work*) and I.18 (*I think about leaving the company*),
- a development opportunity factor - consists of 4 opinions: I.2 (*work allows me to use my qualifications*), I.9 (*at work I have the opportunity for professional development*), I.10 (*I have the opportunity for promotion at work*) and I.11 (*at work I have the opportunity to present ideas and solutions*),
- organisational factor - consists of 4 opinions: I.3 (*the atmosphere in my company is good*), I.7 (I understand well how my remuneration is *calculated*), I.12 (*my work is safe, it promotes a safety culture*) and I.15 (*machines, means of work and technology allow to do the work properly*),
- cognitive factor - consists of 4 opinions: I.5 (*remuneration and bonuses are appropriate to the tasks performed*), I.6 (*the remuneration I receive motivates me to work*), I.13 (*I know the objectives of the company and identify myself with them*) and I.14 (*my company has a good reputation*).

Responses to the opinion about the workplace were based on a five-level Likert scale: 1 - no, 2 - rather no, 3 - hard to say, 4 - rather yes, 5 - yes.

The second part of the survey contained factors of motivation to work. It consisted of 34 statements, in which 3 areas were distinguished (the questions in this part were marked with a Roman numeral II together with sequentially assigned question numbers 1-34):

- Intangible motivation factors - consists of 24 factors: II.1 (*employment contract*), II.2 (*job security*), II.3 (*sense of stability and security at work*), II.4 (*certainty of receiving remuneration on time*), II.5 (*sense of fair pay*), II.6 (*equal treatment of all employees*), II.7 (*good open communication*), II.8 (*good relations with colleagues*), II.9 (*correct relations with the boss*), II.10 (*praise from the superior*), II.11 (*consultations of superiors with the crew concerning the future of the company*), II.12 *(importance of performed tasks*), II.13 (*satisfaction with performed work*), II.14 (*opinions about the company where I work*), II.15 (*fixed working hours*), II.16 (*flexible working hours*), II.17 (*compliance with labour law principles*), II.18 (*lack of mobbing and discrimination*), II.19 (*stress-free work*), II.20 (*possibility of promotion*), II.21 (*possibility of professional development*), II.24 (*integration meetings / trips*), II.32 (*fear of punishment*), II.34 (*fear of dismissal*).
- Material non-monetary motivation factors - consists of 6 factors: II.22 (*co-financing of education*), II.23 (*participation in trainings*), II.27 (*discount on the purchase of company goods*), II.29 (*holiday vouchers*), II.30 (*co-financing for the cinema, gym, swimming pool, etc.*), II.31 (*receiving a car, laptop, company phone*).
- Material monetary motivation factors - consists of 4 factors: II.25 (*salary increase*), II.26 (*receiving cash prizes*), II.28 (*share in company's profit*), II.33 (*fear of losing the bonus*),

Answers to questions related to motivation factors were scored on a scale from 0 to 4 points. The respondents' markings 3 and 4 were treated as an effective motivation factor: 0 - does not motivate, 1 - motivates me very poorly, 2 - motivates me on average, 3 - motivates me, 4 - very motivates.

Due to the selected research problem, quantitative research methods were adopted. When analysing the research results, the methods were applied statistically. Due to the fact that opinions about the workplace (5-point Likert scale) and factors motivating to work (scale from 0 to 4 points) are discrete quantitative variables, non-parametric tests were used. Statistical analysis was carried out using statistical package STATISTICA 10 EN. The collection of empirical material allowed to develop models of structural equations, because emotional, developmental, organisational and cognitive factors, as well as intangible, material and non-material non-monetary factors motivating to work are latent (hidden) variables. Their construction took place in two stages. In the first stage, by means of confirmation factor analysis (CFA), measurement models were constructed in order to select important

factor loads of hidden variables. Those variables for which the factor load is at least 0.6 were subjected to in-depth analysis. In the second stage models of structural equations were constructed. Variables significantly affecting the hidden variables obtained by means of confirmation factor analysis were selected.

The research was carried out in the years 2015-2019. Its aim was to develop a universal system of motivation of employees of micro and small production companies In order to achieve the goal, a set of motivation factors was developed, and then the relationships between opinions about the workplace and the examined motivation factors were identified. The research assumed that one of the most important resources of the organisation are properly motivated and efficient employees, and the competitive labour market forces the need to look for solutions to effectively motivate employees in small and medium-sized production companies.

For the purposes of a smaller study, the authors have presented a part of the study which includes a study of the assessment of the effectiveness of individual motivation factors, with particular emphasis on gender differences; the issue of gender is currently under discussion in social and political debates in Poland.

The study involved 449 employees, including 149 women and 300 men. The predominant age group of the respondents were employees aged 20-30 years, which constitute 39.6% of the respondents. The 31-40 age group was represented by 27.2% of people, and 22.7% of people aged 41-50. Respondents over 50 years of age constituted only 10.5% of the respondents. The main group of respondents were people with secondary education - 46.8%, followed by 26.9% with higher education and 21.8% with vocational education. The basic education was 4.5% of the respondents. 35.9% of the respondents declared that they have been working in the present company for at least 3 years, while 26% had a work experience of less than 1 year; 25.8% of people worked no longer than 1 year, and 21.6% of people - over 10 years. The remaining respondents worked for 1-3 years and constituted 16.7% of the respondents. The research indicated that more than half of the respondents (56.8%) hold executive positions, 28.3% specialist positions according to their qualifications. On the other hand, 14.9% are employees occupying managerial positions. The respondents represented the following industries: furniture production - 21.2% of the respondents, machinery and equipment production - 19.8 respondents, food production - 14.7% of the respondents and metal production - 12.2% of the respondents. The reliability of the questionnaire was checked using the alpha-Cronbach reliability test. The result indicated values in the range of 0.9 (for factors motivating to work) and 0.6 for material non-monetary factors motivating to work. Therefore, the questionnaire is characterized by satisfactory reliability of scale.

Research Results

For the purposes of the study, immaterial motivation factors were analysed.

Table 1 presents the average and standard deviations of non-material motivational factors in the scale 0-4.

Table 1: Averages and standard deviations of intangible work incentives on a scale of 0-4

Incentives to work - intangibles	Factor no	n	Average	Standard deviation
1	2	3	4	5
Employment contract	II.1	449	2,86	1,11
Security of employment	II.2	449	3,07	0,96
A sense of stability and safety at work	II.3	449	3,03	1,00
Certainty of receiving the salary on time	II.4	449	3,19	0,95
A sense of fair pay	II.5	449	2,95	1,08
Equal treatment of all employees	II.6	449	2,92	1,02
Good open communication	II.7	449	2,98	1,00
Good relations with colleagues	II.8	449	3,02	1,02
Correct relations with the management	II.9	449	2,93	1,06
Praise from your superior	II.10	449	2,73	1,14
Consultation of superiors with the crew on the future of the company	II.11	449	2,65	1,11
Validity of the tasks performed	II.12	449	2,73	1,03
Drawing satisfaction from your work	II.13	449	2,94	1,04
Opinions about the company I work for	II.14	449	2,69	1,12
Fixed working hours	II.15	449	2,84	1,17
Flexible working hours	II.16	449	2,45	1,26
Compliance with labour law principles	II.17	449	2,92	0,97
No bullying and discrimination	II.18	449	3,14	1,00
Stress-free work	II.19	449	3,02	1,00
Promotion opportunities	II.20	449	2,90	1,14
Professional development opportunities	II.21	449	2,95	1,05
Integration meetings/exhibitions	II.24	449	2,61	1,27
Fear of punishment	II.32	449	2,12	1,29
Fear of dismissal	II.34	449	2,07	1,33

Source: Own study based on empirical research results

Figure 1 graphically shows the results of empirical research on intangible motivational factors

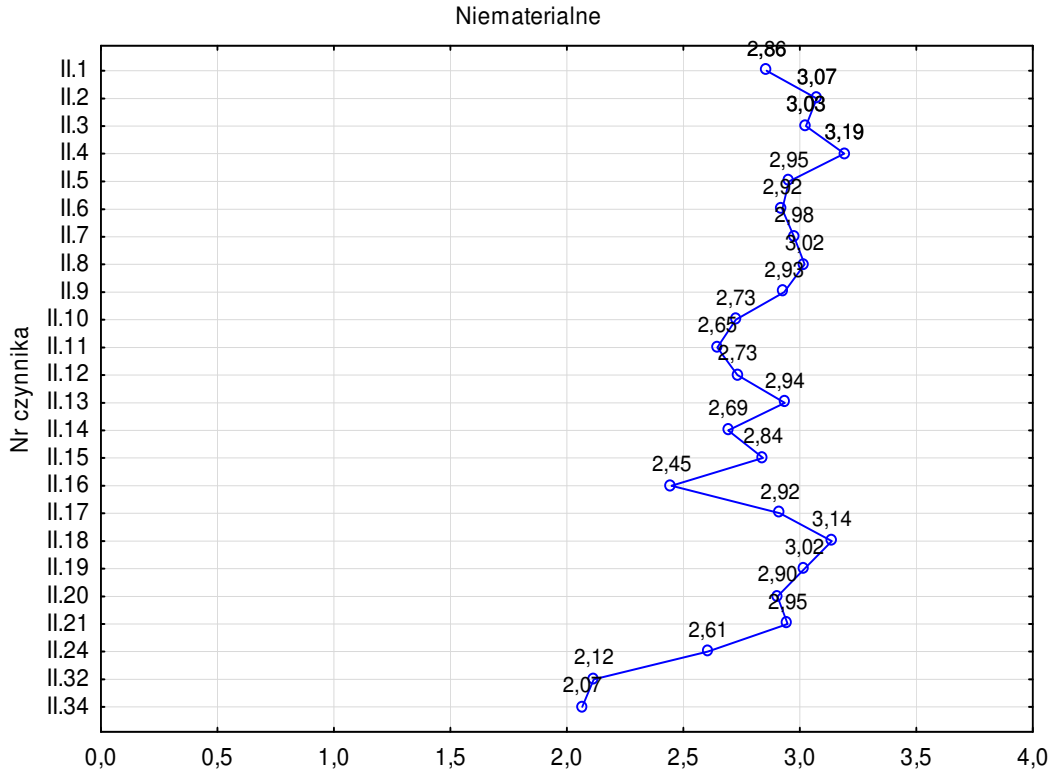

Figure 1: Non-material motivational factors for work

Source: Own study based on empirical research resultsch

Of the intangible motivational factors included in the questionnaire, respondents were most motivated by: *certainty of receiving pay on time* (II.4) - mean score of 3.19±0.95 points, *lack of mobbing and discrimination* (II.18) - mean score of 3.14±1.00 points and *certainty of employment* (II.2) - mean score of 3.07±0.96 points. The following are regarded as the least effective motivation factors: *fear of dismissal* (II.34) - average 2.07±1.33 points and *fear of punishment* (II.32) - average 2.12±1.29 points. In the further part of the article, statistically significant relationships are presented. The authors checked which of the analysed non-material motivation factors motivate women and men particularly effectively.

Table 2 presents average and standard deviations of non-material motivation factors in the scale 0-4 and Mann-Whitney test results.

Table 2: Averages and standard deviations of non-material work motivation factors

Factor number	Gender				Test Manna-Whitneya	
	Woman n=149		Malea n=300			
	Average	Standard deviation	Average	Standard deviation	Z	P
1	2	3	4	5	6	7
II.1	2,87	1,22	2,85	1,05	0,84	0,4012
II.2	3,10	1,00	3,06	0,94	0,75	0,4555
II.3	3,01	1,07	3,04	0,97	0,05	0,9625
II.4	3,28	0,90	3,15	0,97	1,28	0,1997
II.5	3,03	1,04	2,91	1,10	1,07	0,2839
II.6	3,07	0,93	2,85	1,06	1,97*	0,0488*
II.7	2,92	1,11	3,00	0,93	-0,27	0,7891
II.8	3,04	1,05	3,01	1,00	0,52	0,6024
II.9	3,03	1,09	2,89	1,04	1,73	0,0833
II.10	2,87	1,02	2,65	1,19	1,52	0,1287
II.11	2,64	1,05	2,65	1,13	-0,30	0,7647
II.12	2,77	1,07	2,72	1,01	0,57	0,5714
II.13	2,97	1,03	2,92	1,05	0,53	0,5982
II.14	2,79	1,15	2,65	1,11	1,38	0,1684
II.15	2,89	1,19	2,82	1,17	0,74	0,4593
II.16	2,46	1,30	2,44	1,25	0,24	0,8120
II.17	2,93	1,05	2,91	0,93	0,52	0,6051
II.18	3,32	0,84	3,05	1,06	2,40*	0,0164*
II.19	3,13	0,96	2,96	1,02	1,66	0,0963
II.20	3,03	1,15	2,84	1,14	2,03*	0,0421*
II.21	2,98	1,14	2,93	1,00	1,04	0,2983
II.24	2,72	1,20	2,55	1,30	1,13	0,2598
II.32	2,13	1,36	2,11	1,25	0,12	0,9033
II.34	2,01	1,42	2,09	1,29	-0,60	0,5513

** statistically significant, p<0.05*
Source: Own study based on empirical research results

Figure 2 shows the immaterial motivating factors for work.

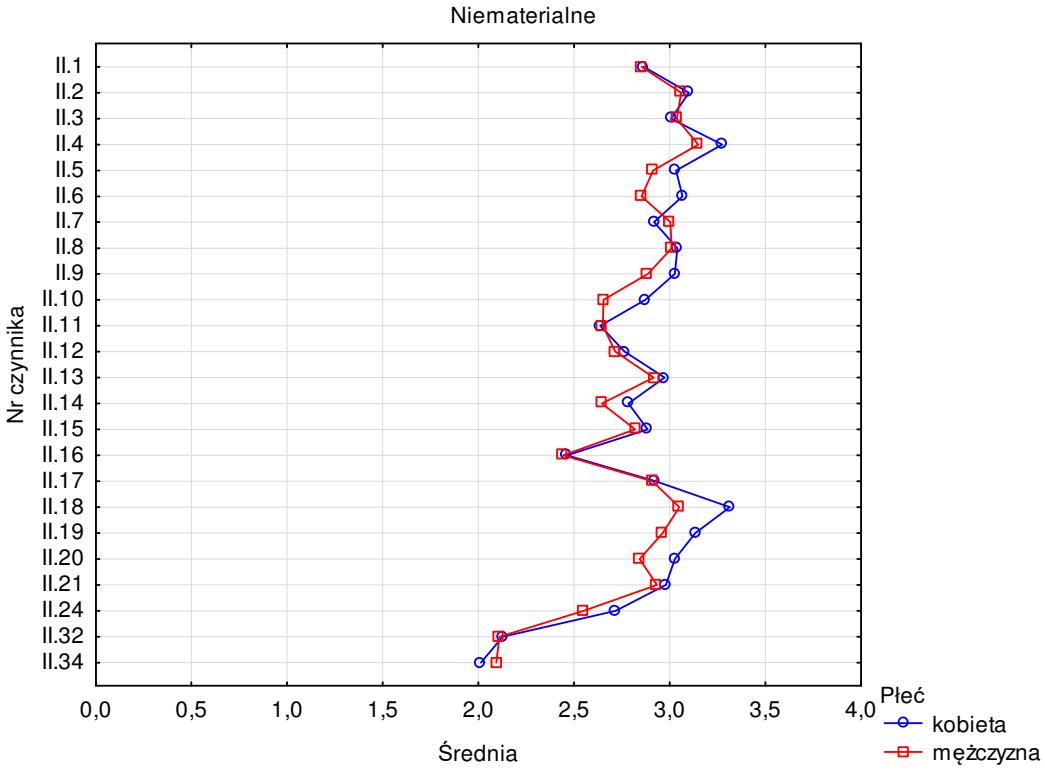

Figure 2: Non-material motivational factors for work

Source: Own study based on empirical research results

The analysis of the research results indicated that the respondents are most motivated by: *certainty of receiving remuneration on time, lack of mobbing and discrimination and certainty of employment*. For men, *good relations with colleagues, certainty of receiving pay on time, certainty of employment* have proved most effective. The most statistically significant gender differences occurred for the factor: *equal treatment of all employees* (p=0.0488). It was women who indicated this factor much more often than men. Women much more often indicated the following factors: *lack of mobbing and discrimination* (p=0.016) and *the possibility of promotion* (p=0.0421). No statistically significant differences were found for the other examined factors. For the factors: *correct relationship with the boss and stress-free work, level* p was close to the accepted level of significance. Women more often than men indicated the following factors: *correct relations with the boss* (p=0.0833) and *stress-free work* (p=0.0963).

Younger women between the ages of 20 and 30 are particularly motivated by the *absence of mobbing and discrimination* and *the possibility of promotion*. For women aged 31-40 mainly *enjoying the satisfaction of their work, stress-free work*. The factor of *equal treatment of all employees*, on the other hand, is important mainly for women in the 41-50 age group.

Women over 50 motivate most effectively: correct relations with the boss and praise from the superior. The variable related to education gave very interesting results; for women with secondary education the motivator proved to be the most effective: equal treatment of all employees, for women with higher education: *no mobbing and discrimination and the possibility of promotion.* Women with primary and vocational education are most effectively motivated by *the employment contract and the feeling of stability and security at work*.

Analysing women's length of service, it can be concluded that for women working in an enterprise between 3-10 years, the most effective were: *lack of mobbing and discrimination and the possibility of*

promotion. The factor of *equal treatment of all employees and the praise of the supervisor*, on the other hand, is important for women working in an enterprise between 1-3 years. Women with less than 1 year's seniority as the most effective factor were assessed as *stress-free work*, while women over 10 years of age were assessed as *having the most effective factor*.

Relevant data were obtained by analyzing the position held by the examined women. The factors of *lack of mobbing and discrimination*, *the possibility of promotion*, *equal treatment of all employees* and *correct relations with the management* are important motivational factors for women employed in *the executive position*. For women in specialist positions, on the other hand, the most valuable motivators are: *job security and good relations with colleagues*. Women in managerial positions value the most: *the absence of mobbing and discrimination and correct relations with the boss.*

Discussion

For the surveyed respondents - employees of micro and small production companies - the most effective non-material motivation factors are: *certainty of receiving remuneration on time, lack of mobbing* and *discrimination and uncertainty of employment*. The least effective factors in this area are *the fear of being made redundant* and *the fear of punishment.*

In Poland, job insecurity and insecurity are mentioned as one of the most severely affected stressors. The issue of psychosocial threats and their impact on the safety and functioning of people at work and the whole organisation is one of the most current areas of interest for Polish and global institutions and organisations dealing with the health and safety of employees. The European Agency for Safety and Health at Work (OSHA), in its analysis, identifies existing and 'new and emerging psychosocial risks' as the most current risks to workers, highlighting the increasing level of risk (EU-OSHA 2007; Cox, Griffiths, Leka 2005, WHO 2008). This is also confirmed by recent reports; the most interesting of these are the ESENER reports (Safety and health in micro and small enterprises in the EU: the view from the workplace).

When considering the lack of mobbing and discrimination, it is worth quoting the results of research by Zapf, who analysed the causes of mobbing at work. The author claims that bullying is a long-term stressor for employees. This view is also supported by doctors and clinical psychologists who diagnose victims of mobbing. In addition, research shows that the last decade has seen a sharp increase in the number of class actions for mobbing and discrimination in employment (Zapf, 2009). The results of Haberfeld's empirical research indicate that gender discrimination manifests itself in the assignment of employees to the workplace. The position held has a significant impact on employee pay. According to the author, discriminatory programmes should be included in the model of wage discrimination. The results of the author's research have shown that organisational variables were more important than individual variables in explaining the differences in wages between the surveyed men and women, as well as gender discrimination in wages (Haberfeld, 2017). In turn, the results of the Kunze, Boehmh and Bruch team confirm that employers should be aware that as the age gap increases, age discrimination may occur in companies, which negatively affects employee engagement (Kunze, Boehmh, Bruch, 2009) . When analysing the precarious employment factor, it is worth noting the results of the Ferrie study, which show that precarious employment is harmful to workers' health as it causes great stress. The author's observations show that the uncertainty of employment has a negative impact on the involvement of employees and the effort put into the performed tasks. In recent years this problem has been noticed and described: the lack of job security brings serious financial and social costs to the organisation (Ferrie, 2000).

It is also worth noting that in the conducted survey women much more often than men indicated such motivation factors as: *equal treatment of all employees, lack of mobbing and discrimination, possibility of promotion, correct relations with the boss, work free from stress*. The presented results confirm the results obtained by other authors analyzing similar dimensions of human functioning in the workplace. Tiwari and Mishra (2008) demonstrated a clear negative relationship between professional stress and all dimensions of involvement in the work environment. Michael, Court and Petal (2009) and Nasr (2012) also showed relationships between increased occupational stress and reduced work

commitment. Equally interesting studies were conducted by Ruck and Welch (2012) showing that the right work organisation based on good internal relations is one of the most important predictors of success for the company/organisation. Mikkelson with the team (2015) demonstrated (based on a survey of 276 respondents) that effective communication within the team and good relations with the boss are reflected in the employees' declared level of job satisfaction, motivation to work and organizational commitment. This is confirmed by the results of the analysis presented by Jacobs and co-workers (2016); these studies show that good relations: supervisor-supervisor significantly translate into the level of job satisfaction, which in turn affects effective cooperation both within the company and with external partners.

When considering the friendly atmosphere at work in the organizational context, it should be taken into account that it is related to a number of indicators of individual functioning of employees, as well as their relations with the organization. For example, Ståle Einarsen and her team have shown in their research that there is a relationship between dissatisfaction with the quantity and quality of guidance, instructions and information that employees receive from their superiors and a higher incidence of abuse in human relations, including discrimination and bullying. Elisa Dessa's study of healthcare workers showed that effective communication and good relations with the supervisor are factors preventing the development of negative consequences of stress and burnout. Lewis-Enright, Crafford and Crous, who have been conducting research for many years, are looking for reasons why women do not sufficiently represent top positions. In their view, despite continuous work by organisations to integrate women into senior management structures, little progress has been made in recent years (Lewis-Enright, Crafford and Crous, 2009).

Conclusions

Motivating employees is the most important element of human resources management, because motivated, enthusiastic and committed employees are the success of the company. Managers of modern organizations should develop motivation systems that stimulate employees to act. Unfortunately, the experience of Polish companies indicates significant barriers preventing / limiting such activities. Building an effective motivation system is a complex and time-consuming process for the company, requiring the employees to get to know: their preferences, system of values, expectations and ambitions. In recent years entrepreneurs more and more often take up this challenge, understanding that motivated human resources make it possible to achieve the development goals set for the company. Due to the fact that the process of motivation is very complex, it should be constantly monitored and improved in order to keep up with the changing external conditions (political situation, economy) as well as those concerning the employees themselves. This is another barrier which makes the scale of employers' involvement in creating motivation systems that meet employees' expectations still unsatisfactory.

The main aim of this article was to present the results of the research evaluating the effectiveness of particular non-material motivation factors and to try to explain their influence on the development of motivation systems. As the results of our own research indicate, the role of intangible factors in shaping the motivation of employees of modern enterprises is unquestionable, and failure to notice the gender differences in this respect may lead to both economic losses and loss of employee potential. It is important for the organization to have at its disposal such employees who will be able to effectively implement its objectives. The formation of such staff is not an easy task, due to the number of variables in the organization and its environment. The need to have and maintain a strong base in the form of people is a condition for the company to gain a position on the market, which is possible only if this base is properly "used". Human capital can be the source of competitive advantage of any organization and constitute the basis of the chosen strategy provided that the employees are treated subjectively.

The results presented in the presented paper confirm the reports of the researchers indicating the adverse impact of insecure employment, untimely payment of salaries and unfavourable psychosocial work environment on the perception of employees' own development and involvement in work. As in the above mentioned research papers, the results presented in this paper indicate that working in unfavourable psychosocial conditions will be associated with weaker work commitment and lower job satisfaction, while inducing higher levels of occupational stress.

The study also confirmed the existence of gender differences in the assessment of employers' motivation tools. This leads to the conclusion that designing an effective motivation system requires knowledge not only of psychology and economics, but also of social and cultural conditions of the work environment.

References

- Arnold J., Cooper C.L. and Robertson I.T. (1995) 'Work Psychology' Understanding Human Behavior in thr Workplace, Financial Times Management, London.
- Cox T., Griffiths A. and Leka S. (2005) 'Work organization and work-related stress' [w:] Gardiner K., Harrington J.M. (red.). Occupational hygiene. Blackwell Publishing, Oxford.
- Daisy R (2017) 'International Journal of Advance Research and Development', www.IJARND.com Al, Volume2, Issue6.
- Dessy E. (2009) "Effective communication in difficult situations', Preventing stress and burnout in the NICU, Early Human Development, Volume 85, Issue 10, Supplement, pp. S39-S41.
- Einarsen, S., Raknes, B.R.I. and Matthiesen, S.B. (1994) "Bullying and harassment at work and their relationships to work environment quality: An exploratory study', European Journal of Work and Organizational Psychology, 4(4), pp. 381-401.
- EU-OSHA (2007) 'Expert forecast on emerging psychosocial risks related to occupational safety and health', Luxembourg: Office for Official Publications of the European Communities.
- Eurostat [Online] [Retrieved 29.01.2020], https://finanse.rankomat.pl/poradniki/3-powody-niskie-place-w-polsce/.
- Ferrie J., E. (2001) 'Is job insecurity harmful to health? Journal Of The Royal Society Of Medicine', volume 94, February.
- GUS, [Online] [Retrieved 29.01.2020] https://stat.gov.pl/obszary-tematyczne/rynek-pracy/bezrobocie-rejestrowane/bezrobotni-zarejestrowani-i-stopa-bezrobocia-stan-w-koncu-sierpnia-2018-r-,2,73.htm.
- HRPolska, [Online] [Retrieved 28.01.2020], https://hrpolska.pl/hr/czytelnia/jak-czesto-i-dlaczego-polacy-zmieniaja-prace.html.
- Haberfeld Y. (2017) 'Employment Discrimination: An Organizational Model', Academy of Management JournalVol. 35, No. 1.
- Hasibuan, M. (2009) 'Organisasi dan Motivasi: Dasar Pemikiran Produktifitas, Jakarta', Bumi Aksara.
- Islam, R., Ismail and A. Z. H. (2008) ;Employee motivation: a Malaysian perspective', International Journal of Commerce and Management, Vol. 18, No. 4, pp. 344- 362.
- Kunze, F., Boehm, S. and Bruch H. (2009) 'Age diversity, Age discrimination, and performance consequences -A cross organizational study', International Journal of Humanities and Social Science, 3(30), 187-192.
- Lerner, R.M. and Busch-Rossnagel, N.A. (1981) 'Individuals as Producers of Their Development, A Life-Span Perspective', Academic Press, New York, NY, USA.
- Lewis-Enright K., Crafford A. and Crous S. (2009) 'Towards a workplace conducive to the career advancement of women', SA Journal of Industrial Psychology, vol.35 n.1 Johannesburg Jan.
- Mangkunegara, A. P. (2005) 'Sumber Daya Manusia Perusahaan', Bandung, Remaja Rosdakarya.
- Michael, O., Court, D. and Petal, P. (2009) 'Job stress and organizational commitment among mentoring coordinators', International Journal of Educational Management, 23.3, pp.266-288.
- Mikkelson A.C., York J.A. and Arritola J, (2015) 'Communication Competence, Leadership Behaviors, and Employee Outcomes in Supervisor - Employee Relationships', Business and Professional Communication Quarterly, September.
- Nasr, L. (2012) 'The relationship between the three components model of commitment, workplace stress and career path application to employees in medium size organizations in Lebanon', J. Organ. Culture Commun. Conflict, 16(1), pp.71–87.
- Rajhans, K. (2012) 'Effective Organizational Communication, a Key to Employee Motivation and Performance', Interscience Management Review (IMR), 2 (2), ISSN: 2231-1513, pp. 81-85.
- Ramadanty S., Martinus H. (2016) 'Organizational communication: communication and motivation in the workplace', Humaniora vol. 7 no.1 January, pp. 77-86.

- Region Wielkopolski [Online] [Retrieved 14.01.2020] http://www.wielkopolska-region.pl/.
- Ruck K. and Welch M. (2012) 'Valuing internal communication; management and employee perspectives', Public Relations Review, volume 38, issue 2, June.
- Sadłowska-Wrzesińska J., Nejman Ż. (2016) 'Organisation of safe work as a non-wage motivation factor', Przedsiębiorczość i Zarządzanie, vol.17, no.6,2.
- Sępek M. (2010) 'Employee Motivation System', Entrepreneurship and Management, 6(11).
- Sycheva I.N. , Voronkova O.Yu. , Kovaleva I.V. , Kuzina A. F. , Bannikov S.A. and Titova S.V. (2019) Motivation in Personnel Management of a Trading Enterprise Submitted, International Journal of Economics and Business Administration Volume VII, Special Issue 1. pp. 570-582.
- Tiwari, S.K. and Mishra, P.C. (2008) 'Work stress and health as predictors of organizational commitment', Journal of the Indian Academy of Applied Psychology, 34.2 2008, pp. 267-277.
- Tripathi, P. C., Reddy, P. N. (2012) 'Principles of Management', New Delhi, The McGram-Hill Company.
- WHO, PRIMA-EF (2008) Guidance on the European Framework for Psychosocial Risk Management, A Resource for Employers and Worker Representatives, Institute of Work, Health & Organisations, University of Nottingham.
- Zapf D. (2009), 'Organisational, work group related and personal causes of mobbing/bullying at work', International Journal of Manpower 20,1/2.

Microgeneration: The Democratization Accelerator in Authoritarian and Autocratic Political Spaces

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Abstract

The existence of energy sector based on the centralized concession-statist model remains one of the important reasons behind the conservation of the autocratic elements of political systems. The benefits that state structures derive from maintaining the aforementioned state result from the relationship between the ruling party and the management of energy companies whose shareholder is the State Treasury. Staffing the management of companies with their own political base by creating many vacancies for party's supporters can be regarded as the standard of system-generated dependencies. Political systems persisting in former Eastern Bloc countries remain one of the key beneficiaries of this state of affairs. This process in all its intensity manifests itself in countries operating within the borders of the former Soviet Union. One threat to this type of governance, with energy companies forming a support base for governments, is the growing popularity of microgeneration. Adoption of new solutions allowing the connection of independent electricity producers to the network harms the interests of these enterprises. A significant weakening of their position entails a serious threat of dismantling the political order maintained for years

Keywords: Microgeneration, Energy, Eastern Bloc, Energy Policy

Introduction

In the future, electric energy will be a fundamental and, most probably, the only source of power. Futuristic concepts and anticipations of the development of modern technologies do not even consider alternative solutions. A crucial concept in this context is the notion of "fuel of tomorrow." The issue of control of this kind of fuel goes beyond economic considerations as it would not be the source of revenue. It is not difficult to see the potential of political control in the distributive and manufacturing-distributive energy sectors. Due to considerable diversification with respect to the types of carriers that have been in use up to date in the combustion machines or heating, the problem of control has not been so evident thanks to many carriers being currently in use.

Universalization, which will be most probably the result of gradual elimination of various fuels in favor of electricity, will soon prove this very problem to be of vital importance. Hence, the questions related to the generation capacity of electric power and distribution thereof ought to be encouraged as a natural consequence of the assessment and recognition of the potential of control which the very first and the last link in the chain of distribution hold.

Methods being currently in use with regard to energy distribution might be considered a peculiar *signum temporis*. They reflect direction and management of modern technologies which has been undertaken up to date. Importantly, by outlining the past which has been shaping the electro-energetic systems, one might shed light into their future as well, helping to trace the evolution and identify factors that has shaped the existing system and recognize the ones which had been responsible for the

maintenance of the *status quo*. The identification of those factors has recently become the foundation in evaluating their potential social impact (Miśkiewicz 1974).

The analysis of thus selected elements with respect to the concept of prosumption of microgeneration systems, intents to identify potential political limitations and barriers to their development. Recognition of connection between indicated limits or obstacles that the development of microgeneration systems will face and prerogatives of state power responsible for reduction of the democratic dimension of the government serves to establish the role that the prosumer-households might have in the process of building of the civil society.

The applied method of the assessment of the energy-related issues might be called as *conditio sine qua non* of the current mode of anticipating only the short or middle-term outcomes – and planning the energy policy accordingly. This way of the situation assessment exposes continuity in shifts observable in the energy sector and of the circumstances behind them. Its application has helped to verify the research hypothesis, according to which a political system of a state is correlated with choices that it makes with regard to its energy sector. In order to fulfill the main objectives of the paper, a methodology based on social science research methods has been chosen, particularly systematic, institutional and qualitative comparative analyses (Sztompka 1975).

The beginnings of the power system

As aforementioned, in order to determine the future directions of the electro-energetic system, it is vital to briefly present its development from the moment of its inception to the present times – to establish its past determinants as well as these elements which continue to constitute it.

Analyzing the past of the sector, it is important to stress the decentralization in the time of its commencement. The then-structure of the sector was reminiscent of the organization of proto-states of Elam or South Mesopotamia, whose borders were established not by existence of neighboring states but by the sheer capacity of a given community to make use of the terrain (Zabłocka 1987). Agreeing on the pioneering character of the Pear Street Station (and considering T. A. Edison as the first innovator), it is nevertheless important to highlight limited scope of its powerline, which was constrained to merely several dozens of recipients and street lamps (Josephson 1959). It was not a distribution network as it is understood nowadays, however one can easily perceive it as its beginning. Each of similar power delivery systems created during the last two decades of the nineteenth century was substantially identical to the aforementioned one (Kirby and Davis 1990).

Production and often also distribution of energy was the domain of small, often family businesses created out of personal interest and passion of its founders. They frequently did not have the capital that would allow to build an infrastructure necessary for distribution of energy, thus frequently these small enterprises would solve this problem by merging (Borberly and Kreider 2001). Furthermore, they would often create syndicates aiming to reach the biggest possible number of clients or, alternatively, to increase the production of electric energy. It was the time of creation of the very first consortiums in the industry (Hughes 1977) – they were formed in order to manage the tasks too laborious or simply too expensive to be completed singlehandedly. Increasing amount of enterprises regarding both production as well as distribution had been gradually undertaken. Shareholders were comprised of companies, private entrepreneurs or even local communities.

This period can be perceived as the pioneering phase of the industry whose development resembles, in many regards, the evolution of the century-older railroad industry. Similarly, building of the infrastructure which could connect increasing amount of distant places demanded huge financial input. The fast development of energy sector accounts not only for a rapidly growing and densifying transmission grid but also for an increasing number of companies active in it and, consequently, rising competition on the market (Smil 2005). The latter grew proportionally to the market value of the industry and was progressively fierce. It had a negative impact on the smaller enterprises, which did not have enough resources to make investments allowing them to strengthen or even remain on the

market. Soon after, the first big companies appeared; the activity of these was mainly focused on the business aspects of the electric energy, both in terms of its production as well as its consumption.

These processes were similar globally – the same development could have been observed in China, Russian Empire, United Kingdom or in the United States during that period. Main differences were mainly connected with dynamics with which these events had unfolded. The same line of development could have been observed also on the territory of Poland, which was partitioned in that times. The very first power stations existed in the country in the last decade of the nineteenth century and these were private properties used to power small, private factories. Shortly after, powerhouses with slightly higher potential for energy production that intended to sell it further were created. They were functioning mainly in form of syndicates with a maximum of a couple of owners. Nevertheless, public institutions remained the main consumers of electric energy. Hence, with increasing frequency, it were cities (in rarer instances, countries) – represented by members of magistrates in regulatory bodies – who were becoming shareholders. In these instances, inspection of power plants was carried out by officials working for an institution that would be specifically brought into being for that purpose.

A Period of Dynamic Electrification

This situation started to gradually change after the first world war. The entire countries were more and more engaged in the process of electrification, seeing it as something more than a mere business opportunity or investment. In the case of states which had suffered significantly during the war, this process seemed almost indispensable. Pauperization of large masses of people was ubiquitous, and impoverishment could be seen even in the circles of the financial elites. To rebuild the economy in those countries after the conflict was too labor- and capital-intensive for the private entrepreneurs to take it solely upon themselves (Czubiński 1998). However, with the exception of the Russian Soviet Federative Socialist Republic (called Soviet Union from 1922) where, for obvious reasons, the state took upon itself entirety of the efforts of the electrification as a part of GOELRO – economic recovery and development plan, the support of the state with regard to electrification was rather indirect. One of the ways in which states provided help for entrepreneurs was giving tax exemptions as it happened, for instance, in Poland. It was still quite rare for a state to place an order or to become a shareholder in projects being realized by these enterprises, however. The latter instance has become popular in Mussolini's Italy, and, after 1933, in Nazi Germany (Skodlarski 1995). During the interwar period in Poland, the state support was to be found in the form of the aforementioned tax exemptions for private investors and legal entities investing in powerhouses or electrical grids.

Political changes which took place in countries of the so-called Eastern Bloc after the Second World War have had put an end to all private initiatives regarding energy production and distribution. These were regarded as contrary to what centrally planned economy of a socialist republic. Hence, all the countries behind the Iron Curtain had taken a similar approach towards energy production and distribution. The only exception was to be observed in Yugoslavia where Tito, under the flag of "social justice", have executed scenarios slightly different from the ones designed by Moscow. These included creation of extensive cooperatives that could be easily seen as a concept naturally allied to distributed energy, however, the vision of the centralized economy based on a hierarchical structure has, in the end, prevailed also in Yugoslavia (Olszewski 2000).

The West has not been different in that respect, though the centralization has realized by means of private enterprises either forming cooperatives or else loosely associated with one another, as aforementioned. They functioned under the auspices of a given state and, consequently, pursued these projects which ultimately served it. At that time, given the socio-economical situation and the level of technological development, the role of the state in the industry seemed irreplaceable. It was the main investor or, in some cases, a "mere" coordinator of various projects. Considering the scope of the mission of electrification, demanding huge financial investments and cooperation of a number of entities, not to mention the administrative effort, active support from a state was a condition for a successful finalization of a project (Hughes 1979).

Results were nothing short of impressive; the amount of produced and consumed energy in the post-war period globally has been increasing by a couple of percent each year. It was connected to rising number of consumers, where the so-called highly-industrialized nations took the lead; however, changes which occurred in pejoratively-called "third world countries" were also not devoid of significance. They were left behind highly-industrialized countries only in terms of quantity, but hardly in terms of quality or dynamics of developments. For this reason, the progress that took place on these terrains was more perceivable. Hence, the perception of these countries had also evolved, and all kind of socio-political consequences followed.

In the sixties and seventies, the structure of electro-energetic market was very similar worldwide. Everywhere, gigantic corporations were in control of the situation. With their strong position on the market (these enterprises were either having a monopole or by cooperation with other such entities they were sharing monopole among themselves) the giant corporations had taken over the entire sphere of either energy production or its distribution, or often – both of them. As argued in the previous sections, the reason of this development was connected to the immense amount of both labor and capital necessary for the process of electrification. Differences regarding ownership had not been significant as states were, in almost every case, becoming shareholders or else they secured their rights to make strategic decisions (thus the ones that would have an impact on a given country) in certain companies (Schramm 1990).

The shift in perception of Energy Security

The aforementioned attitude fostered conceptualization of energy security which was understood mainly in terms of stability of supply in the discussed period. Therefore, to guarantee energy security meant primarily assuring a certain level of production and providing the access to electrical grid. Costs of production did not matter as much as they do nowadays and the same applies to ecological dimension of the industry: what was important was "here and now" and short-term results. The only exception was the attitude towards nuclear power plants, which were met with suspicion in society (Weart 2012).

Dangers, besides the ones that have been outlined, were virtually not examined. All potential problems, including issues such as terroristic attacks on electro-energetic infrastructures, were marginalized. This attitude can be justified, however, given that every single blackout which occurred in this period happened due to the excess demand. This situation started to slowly change in the 80s when the aforementioned issue practically disappeared.

Consequently, the concept of energy security had been re-defined. The primary importance was given to economic aspects of the industry. Such conceptualization was again advantaging giant companies, as it was impossible to compete with them on the market. Once the environmental safety and an attitude favoring protection thereof was added to the definition of energy security alongside financial considerations, the perception of the entire problem had changed. More recently, it has begun to be increasingly difficult to reconcile this fairly new definition with entirely novel dangers such as, for example, cyberterrorism.

Renewable Energy Sources and Beginnings of Structural Changes

Structurally, the shift in the industry has started with popularisation of renewable energy sources (referred to as RES in the following part of the paper). Shifts in production of wind power and, afterward, solar energy had led to a fact that – in the first decades of the twenty-first century – these two RESs have multiplied its contribution to energy production in the developed countries each following year. It had been achieved by means of farms whose huge potential was not due to their size but quantity. Clearly, this has stood in clear opposition to the established order. The centralized system of energy production started to become maladjusted and, moreover, counterproductive. Increasing amount of enterprises tied to the industry had decided to strategically diversify its activity by creating units devoted solely to production of the RESs. After 2010, seasonal overproduction of electric energy was repeatedly felt, hence it became clear that the main issue was no more how to produce the energy but instead, what to do with the surplus thereof during the seasons when its production is at its greatest

but simultaneously demand for it is at its lowest. This situation started to expose the difficulties which reconciliation of different systematic models of energy production and distribution poses (Rabl and Fusaro 2001).

Photovoltaics

Photovoltaics is often considered a new-generation technology, a development of the last decade which is clearly associated with the twenty-first century. It is a superficial presupposition which is not entirely in accordance with truth. The last decade is unmistakably a period of intense development and use of the solar energy, which is conspicuous by its unprecedented growth rate in terms of technological advancement. However, the technology has been commercially in use for at least last fifty years. Photovoltaic farms are in use from the onset of the 60s of the previous century. Circumstances responsible for the heighten attention that the technology is getting these days are, to put it simply, complex, and should not be accessed outside of political and economic context. Certainly, the aforementioned changes in the energy sector, combined with the thwarting tensions in international relations after the Cold War has ended have prompted many enterprises to switch from military to civil production.

It is in this period that substantial reduction in prices of single panels, as well as entire installations, occurred. They were never unaffordable; however, they were not popular among private consumers either, since the product was considered luxurious and unnecessary in everyday life. It was mainly offered and advertised in the stores specialized in selling weapons and survival equipment, and whose typical clientele is usually as government-suspicious far-right wingers. The aforementioned drop in prices (which happened already in the beginning of the new millennium) turned out to be one of the most decisive factors in creation of demand, which has, in turn, led to its mass production resulting in further decrease in prices, and so it continued. This way, photovoltaic installations became one of the fastest-growing sector of the energy industry, though with respect to profitability it gives way to, more traditional, gas and oil industry. It also can not be compared to the latter in terms of market capitalization (Rapier 2016).

Phenomenon of photovoltaics is comprised of, at least, several factors. Among others, there is durability of installations; user-friendliness; as well as easy and affordable service. Nevertheless, its price remains the most pivotal one. There exists no cheaper source of electrical energy – in fact, it is even hard to imagine that something could possibly be less expensive. For instance, by making an investment of roughly seven thousand euros, an average Polish household, for example, equipped in a modern heating system, may forget about the electricity bills for the amount of time that basically constitutes a lifetime. Moreover, the amount of the energy thus produced would also suffice to charge an electric car belonging to this exemplary household, which could make up to 18 000 per year. In this respect, it is impossible to compete with photovoltaics. It probably will never be, because in the first case wind farms that may be considered potential competition are almost 50% more expensive and this difference is growing , while in the second case - structural solutions functioning in the power industry are too big ballast for it to come out with a competitive offer.

Political Systems and Microgeneration

Political system of the given country and the energy industry thereof are closely interdependent. It is a relationship of a symbiotic kind, however its hard to label it as appropriate and reconcile it with the concept of model institutional arrangements of a democratic country. In its essence, this interdependency might be seen as a precise negation of the latter. It concerns the entire energy industry considering the dominating role that mining plays in it, from the moment of extracting of the material, through its processing all the way to its distribution. The negative part in the process is played out by the state-owned energy companies. Their legally sanctioned relationship with the government, whichever political party is in power at the given moment, tends to preserve existing order. In the aforementioned relationship, the superior position should be ascribed to the human resources policy. The placement of figures associated with a dominating political party in the management of such companies has become a consolidated form of rewarding one's own political base, meaning a concrete

payoff for the activities benefiting the political fraction in a period preceding its political takeover. Placing one's own supporters in the structures of crucial state-owned companies allows for the range of opportunities such as granting financial support to pro-governmental initiatives or participation in preserving the supporting media channels and, consequently, having a direct influence over a significant amount of workers and their families being a huge electorate.

The concept of prosumerism of energy is threatening the interests of the players in the energy industry controlled by the state – and to be precise, by the political parties in power. Every single kW produced outside of these companies decreases their incomes which, in turn, affects their economic condition whereas the latter is a reflection of the potential of a given company and its utility as perceived by those in power. Lower profit or complete lack thereof reduces the chance to create positions in these companies which complicates development of the political capital or even creates a potentiality for its loss. It also narrows down the opportunity to influence society.

In the political realm of the states struggling with a deficit of democracy, micro-installations, micropower plants, as well as the microgeneration, are all undesirable elements. Circumstances which determine this state of affairs are among others, the model ownership and structure thereof that does not allow to employ the people associated with the ruling political fraction. Moreover, they do not support creation of the advantageous, from the perspective of a government that is, initiatives, such as giving support to the endeavors indicated by it. Together with the possibility of the grassroots demands or postulates considering, for instance, infrastructural investments, etc., that the popularisation of microgeneration might lead to must be also taken into consideration. Hence, the conclusion is that the existence of microgeneration in the form of household microgeneration installations, wind or photovoltaic farms was tolerated as long as these were isolated cases. Popularization of these technologies has resulted in a significant change of attitude towards them. This shift in sentiments is definitely not caused by the need to stabilize the system by establishing bigger generational units since their presence does not stand in a way of microgeneration. Rigid coordination of the latter is very much desirable and might be seen as a way of transitioning from the centralized to the distributed energy system.

The model of "energy democracy" and photovoltaics

The presence of huge electro-energetic concerns justified only by their identity and potential laying at their disposal in the public sphere is contrary to the equality being the basis of democracy. It is not a "natural order" resulting from the relationship between the state and the industry even though it started to be perceived as such. Stronger position of these companies is comprised of many elements such as, to mention just a few, its human and financial capital. The crucial factor is their aforementioned relationship with the world of politics. The resulting arrangements are behind the legal and institutional structures created in order to benefit these big players and it remains their biggest asset on the market and in financial structures as such.

This kind of status quo is disagreeable; popularisation of photovoltaics nourishes the rebellion against it. In this context, "energy cooperatives" might serve as an inspiration. They have appeared in Europe relatively recently, the oldest ones operating in Germany are roughly 10 years old. In the beginning, they used small wind farms stabilized by biogas plants. Thus produced energy had powered small communities comprised of a dozen to a couple dozen households. Even though connected with the state-owned electric networks, they were in fact completely independent. In several instances, either by creating new distribution lines or re-appropriating the existing they have also taken over the distribution of the energy. Nevertheless, these were investments which continued to be too costly for individuals. Moreover, they required an integrated local society – a group of people from the direct neighborhood capable of forming of a collective.

The appearance of photovoltaic cells which do not require huge financial expenses on the market has significantly reduced the necessity of participation of a larger group of people in the endeavor. Minimalization of the required assets allows for the energy independence individuals, even the less wealthy ones. A bulk of representatives of the middle class had recently turned into "prosumers."

Projects of "virtual energy plants" together with attempts to re-define the mode of cooperation with professional energy producers had appeared, but it had stumbled upon the barrier preventing thus conceptualize "energy democracy" which has been political defiance to these ideas. This attitude might be considered an infringement of the statutory rights in the form of exclusion from participation in the decisions executed by a government (Dahl and Stinebricker 2007).

Conclusions

The process of "democratization of the energy" might be seen as a global phenomenon characteristic of the most developed economies. It is a *signum temporis*, and is largely a result of popularization of photovoltaics which is the cheapest investment in the context of non-professional energy production. The pace with which it has established itself on the market puts into question the point of the further existence of centralized, concession-based and statist model of the current energetic industry. The recipients of the latter remain to be the states that used to be a part of the Soviet Union – with the exception of the states that belong to the European Union and Georgia, these do not meet the standards of the modern democracy. Benefits from centralized energy productions are the outcome of relationships between a ruling party and the management of corporations, whose shareholder is the State Treasury. Accepting novel solutions which would require connecting independent producers of electric energy to the electrical grid is contrary to the interests of the aforementioned companies. Potential weakening of their position which could follow is a serious risk to the established political order. Hence, all the initiative and pro-civil movements which promote and realize the idea of prosumerism are struggling with a number of legal and administrative obstacles. Moreover, these ideas are not supported by the existing law, which might be seen as a defense of the existing system against the phenomenon that threatens it.

References

Borberly, A. and J. F. Kreider. (2001) Distributed Generation: The Power Paradigm for the New Millennium. CRC Press, Boca Raton.

Czubiński, A. (1998) Europa XX wieku, Wydawnictwo Poznańskie, Poznań.

Dahl, R. A., and B. Stinebrickner (2007) Współczesna analiza polityczna. Wydawnictwo Naukowe Scholar, Warszawa.

Hughes, T. P. (1977) 'Managing Change: Regional Power Systems 1910-30' *Business and Economic History*, Vol. 6, 52-68.

Hughes, T. P. (1979) ,The Electrification of America: The System Builders', *Technology and Culture* (20), 124-61.

Josephson, M. (1959) Edison, McGraw Hill, New York.

Kirby, R. S., and F. A. Davis (1990) 'Engineering in History' *Courier Dover Publications*, 357-361.

Miśkiewicz, B. (1974) Wstęp do badań historycznych, PWN, Warszawa.

Olszewski, W. (2000) Dzieje powszechne XX wieku, t. 1., Poznań.

Rabl, Ari, and Peter Fusaro. (2001) "Economic and financial aspects of distributed generation." *Distributed Generation: The Power Paradigm for the New Millennium*, 203.

Rapier, Robert. (2016) "The 25 biggest oil and gas companies in the world." *Forbes. Retrieved February* 2020.

Schramm, Gunter. (1990) "Electric power in developing countries: status, problems, prospects." *Annual review of energy* (15) 1 307-333.

Skodlarski, Janusz. (1995) Zarys historii gospodarczej Polski do 1939 roku. Wydawn. Nauk. PWN, Warszawa.

Smil, V. (2005) Creating the Twentieth Century: Technical Innovations of 1867-1914 and Their Lasting Impact. Oxford University Press, Oxford.

Sztompka, P. (1975) Analiza systemowa w naukach politycznych, Metodologiczne i teoretyczne problemy nauk politycznych, (red) Kazimierz Opałek, Warszawa.

Weart, Spencer R. (2012) The rise of nuclear fear, Harvard University Press,.

Zabłocka, J. (1978) Historia Bliskiego Wschodu w starożytności, Wrocław.

Behavioral Trend in Contemporary Accounting – The Essence and Subject-Object Scope

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Abstract

Behaviourism in accounting has been recognized as a significant trend influencing its development and addressing human resources behaviour, which affects significantly the functioning of accounting in an enterprise. The variety of behavioural problems to be analysed in accounting encourages specifying the subject-object scope based on the behaviour of enterprise stakeholders. The inclusion of e.g. the right to choose in accounting for the application of some instruments (methods), creative activities and voluntary disclosure of additional information (including non-financial information) contributes to the development of the scope of behavioural research. Further development of the behavioural trend in accounting can be observed, e.g., in knowledge-based enterprises, which emphasize the unique role of the human factor (their capital) and behaviours influencing the decisions made as well as the interpersonal relationships between internal and external stakeholders. Behaviourism in accounting, apart from the traditional research areas, also refers to the contemporary accounting challenges, e.g., the aspects of social responsibility, invisible assets and intellectual capital.

Keywords: Behavioural Trend In Accounting, Subject Of Behavioural Trend In Accounting, Object Of Behavioural Trend In Accounting

Introduction

The beginnings of behaviourism in accounting refer primarily to management accounting, which is not subject to legal regulations and standardization, whereas the respective processes implemented in an enterprise depend on operational and strategic decisions taken by the human factor (e.g. manager). Perhaps for this reason management accounting was considered the appropriate research area to discuss human behaviour in accounting. However, since the aspect of voluntary and creative approach appeared in financial accounting manifested, e.g., by the possibility of an individual accounting policy development and implementation in an enterprise and preparing additional (frequently optional) statements/reports extended by the non-financial information, the development of behavioural trend in this research area can also be observed.

Contemporary accounting, in the author's opinion, represents integrated retrospective and prospective accounting (Burzym, 1990) created by the behaviour (decisions) of human resources and their intellectual capital. The interests of modern accounting are influenced by, e.g., the development of knowledge-based economy, which contributes to its scope gradual extension by invisible (undisclosed) assets in accounting and intellectual capital, which determine yet another research area in accounting. Therefore, when considering behaviourism in accounting, the components of invisible property should also be included, e.g. brand, image, reputation, customer relations, because their creation and existence depend on the behaviour presented by both internal and external stakeholders.

The purpose of the article is to present the behavioural trend evolution in accounting, based on which its subjective and objective scope as well as the main research areas will be determined. Scientific divagations will be supported by the analysis of the subject literature, descriptive method and the author's considerations in the scientific and practical perspective, based on the deduction method.

Behavioural Trend in Accounting – The Essence and Evolution

Behavioural trend, in economic sciences, resulted from the criticism of market efficiency and market participants' rationality. H.A. Simon (1955), as the creator of the bounded rationality theory, proved that the capacity of human mind is too small in relation to the arising problems to be able to solve them in a rational way. People, encountering internal limitations (due to mental imperfections) as well as external ones (resulting from the environment and social interactions), are unable to access all information relevant to a given problem, thus also incapable of processing this information accurately. This means that people are rational in, nothing less than, a limited way (Czerwonka and Gorlewski, 2008). H.A. Simon (1955) stated that a human being does not strive for the optimal choice of the action variant, but rather settles for the satisfying option. This choice is a consequence of the tendency towards preferring a particular action variant under the influence of formulated expectations and the defined goals.

Based on the author's own research covering accountants (survey on a sample of 119 people), carried out in the period May – June 2017, among students of economic universities studying the specialty of accounting and the students of post-graduate courses educating candidates for chief accountants (including working accountants) it was found that, e.g., the accountants usually locate their dilemmas around such decisions as: an optimal choice or a satisfying choice – 71.4%.

The concept of bounded rationality has become the background for the development of behaviourism in economic sciences (economics and finance). The most important studies which undermined the classical concept of human rationality were created in the 1970s (Tversky and Kahneman, 1974; Kahneman and Tversky, 1979). The theory of perspective provided grounds for behavioural finance and the research results confirmed the hypothesis that a human being is emotional, fallible and vulnerable to environmental influences. Thus, the psychological aspect of making business decisions cannot be considered fully rational. The theory of perspective has changed the existing approach to *homo oeconomicus* and set the new standards for rational action. It was found that in the decision-making process, investors are guided by emotions, hence, quite frequently their decisions depend on a coincidence or the form of presenting the problem. The subjective approach to profit value will be less positively felt when compared against the subjective feeling of loss once it is incurred. If the decision-making situation is presented in the way that the decision maker feels the loss, he/she will show a tendency to risk in order to minimize such loss. If the result is approached as a profit, then the decision-maker will be willing to avoid taking risks and choose a more reliable, even though less profitable solution (Kahneman and Tversky, 2012; Kahneman and Tversky (ed.), 2009).

In global terms, behavioural accounting has been developing since the second half of the 20th century, in Poland it was noticed no sooner than at the end of the 20th century. Currently, an increased interest in the problems of behavioural accounting is observed in Poland (Artienwicz, 2018a). In the sixty years history (since 1960) of behavioural accounting development, its various stages (e.g. inception, weakening, revival) can be distinguished. E. Jaworska (2015), based on the research by K.T. Trotman et al. (2011), J.G. Brinberg and J.F. Shieldsa (1989), J.G. Brinberga et al. (2007) identifies five phases in the development of behavioural accounting:

- phase I (1960-1970) – research is focused on, e.g., the impact of management control and budgeting on behaviours, the impact of accounting information on internal and external users;
- phase II (1979-1980) – methodological foundations were developed, the research is focused on information mainly (form, type and amount of information), models of influence on an individual decision-maker, information processing in accounting;
- phase III (1980-1990) – research confirms that people are characterised by limited rationality, behavioural limitations and heuristics represent, among others, major subjects of interest;
- phase IV (1990-2000) – attention is focused on correlations between specialist knowledge and accounting behaviours, the research addresses, e.g., learning functions, decision support systems;

- phase V (since 2000) – the conducted research is subject to diversification and specification and covers, e.g., beliefs and probability assessments, knowledge structure (invisible assets and intellectual capital represent an important element of knowledge in a modern enterprise), group decision making.

Behavioural accounting is the youngest and the least known representative of the behavioural trend among economic sciences (Caplan, 1989; Helmann, 2013). The conducted pioneering research in the development of behavioural accounting should be highlighted, including e.g.:

- C. Argyris (1952), who, within the scope of management accounting, analysed behaviours of employees and management in the budgeting process. The research addressed behaviours of internal managers in organizational units, their interests in developing budgets and the impact of remuneration on the motivation behind making optimal decisions for an economic entity;
- C. Devine (1960), who emphasized behavioural aspects in accounting, arguing that most accounting theories are based on unsubstantiated assumptions regarding human behaviours;
- E.H. Caplan (1966) who showed that understanding behavioural theory is important for the development of theory and practice in management accounting.

It has been adopted that in recent decades the penetration of behavioural trend into the science of accounting is a natural implication of its dominance in economics and finance, which coexist and cooperate with accounting within economic sciences. Behavioural research was of great importance in the development of accounting as a science, because until their application, accounting was perceived as a descriptive and analytical discipline alone. Since the beginning of the research focused on various users of information in the accounting system, including behaviours of managers and their subordinates, it has become an empirical discipline (Szychta, 2008). Behavioural research in accounting covers the behaviours of those involved in its functioning, rejecting the assumption of economic rationality in behaviour, because accounting is approached as a human activity consisting of values and intuition. It can be concluded that the behavioural trend in accounting analyses factors and situations that contradict full rationality.

In the author's opinion, behavioural accounting (also referred to as *behavioural accounting research*) or actually behavioural trend in accounting, represent all scientific and practical problems of retrospective and prospective accounting considered from the perspective of human behaviour, which is an internal and external entity involved in its existence and functioning. In order to implement these assumptions, the instruments available in accounting and psychology should be used and supported by the function of their modification to obtain proper information.

In the opinion of M. Nowak (2016), the term "behavioural accounting" translated into Polish means "behaviour in accounting", which has been replaced by a more meaningful term (shorthand expression) – behavioural accounting, commonly used in various circles. Behaviourism in accounting or behavioural trend in accounting stand for the expressions reflecting the essence of this phenomenon better, because it is not a new type of accounting ("accounting is one"), but another area that supplements the research on accounting as a practical science. Behavioural accounting, as part of economic sciences, does not fully comply with the rules of behavioural school (e.g. experimentalism, optimism), however, as part of social sciences extends the research by the aspects relevant from an accounting perspective (Seligman et al., 2003). The author opts for using the phrase "behavioural trend in accounting". In the study the term "behavioural accounting" will be used in the context of a shortcut, mainly due to its widespread use by many authors in the subject literature.

M. Balachandran (1985) believes that behavioural accounting stands for the application of the concept of social sciences to certain areas of research in accounting, e.g. budgeting, decision making, audit and financial reporting. A. Riahi-Belkaoui (2004) states that behavioural accounting introduces human aspects to accounting, and its main purpose is to explain and predict human behaviour in all possible accounting contexts. The author also expresses an opinion that behavioural accounting

should cover the widest possible areas of the accounting system in which all stakeholders, not just the users of information generated by accounting, participate.

Accounting is practical science, therefore, behavioural trend in accounting is a scientific and practical possibility to apply the assumptions and instruments of behavioural sciences in accounting. Behavioural trend in accounting can be interpreted as an attempt to explain and predict human behaviour in the context of accounting, such as: the usefulness of data from financial statements, the impact on addressees' decisions related to using the alternative accounting procedures or the influence of culture and language on the interpretation and application of accounting standards as well as many other issues (Breitkreuz, 2009). N. Artienwicz (2018b) defines behavioural accounting as "an interdisciplinary trend in accounting and social and behavioural sciences, which expands the classical approach of accounting by human aspects, allowing better understanding of these elements of human behaviour resulting from the individual characteristics and also the environment which affects the decision making processes in all contexts and in accounting processes".

E.A. Hendriksen and M.F. van Breda (2002) identify correlations between behavioural accounting and the positive theory in accounting, highlighting their descriptive approach to accounting research. The positive theory based on empirical research allows predicting stakeholders' behaviour, which can be referred to the behavioural trend in accounting. Empirical studies based on the hypotheses of the positive theory are of significant importance because they explain the economic consequences of using specific accounting solutions and show how important it is for various stakeholders for whom achieving the set goals depends on the decisions taken in accounting (e.g. by management).

"This theory helps in predicting the reactions of market participants to the actions of managers and also the behaviour of financial statements' users in response to information these statements disclose" (Szychta, 2015). However, there are significant differences between positive and behavioural accounting. Behavioural approach to accounting implies that all knowledge about the examined object is contained in the sensory-external (empirical) observation of its behaviour. Its research subject is focused on the behaviour of individuals. In turn, the positive approach to accounting is concentrated on the study of collectively (aggregate level), therefore it relates more to the decisions taken by an enterprise than the decisions of individual persons. Its essence is to explain and predict the accounting practice, whereas statistical methods are used to make inferences. To sum up, the integration between behavioural accounting and positive accounting is small. The subject literature, practically, does not offer models showing how individual decisions are aggregated and become enterprise decisions. Both branches of theory also differ in the assumptions about human cognitive abilities (Nadolna, 2012). Methodological foundations of behavioural accounting stem primarily from psychology and sociology, while positive accounting is the component of mainstream accounting.

Traditional accounting theories do not take human behaviour into account, assuming that accountants, auditors and other persons representing significant resources of the accounting system act in a rational manner. The decisions taken in accordance with legal regulations, standards and practical guidelines were regarded as rational accounting behaviour. This standpoint was verified under the influence of behavioural trend, because the decisions made in accounting are correlated, e.g., with the human thinking process and the views/opinions of the responsible professionals, whereas each individual person is subject to numerous limitations in his/her rationality being subject to many influences of various internal and external factors.

Behavioural accounting, to maintain the essence of accounting and behavioural research, should take into account the observation of internal and external stakeholders' behaviour, as well as analyse the processes influenced by such behaviours within the framework of accounting functioning in a given enterprise. These processes may refer to changes in the assets disclosed in accounting (e.g. equity and foreign capital) as well as in invisible property undisclosed in accounting (invisible assets and intellectual capital). Most often, behavioural accounting is not limited to behaviour, but more broadly understood as any behaviour of a person who has contact with accounting and remains in a relationship with accounting (Lord, 1989).

The research on behaviourism in accounting addresses simultaneously the scientific and practical sphere, and falls within the scope of accounting understood as a practical science, which is confirmed by M. Nowak (2016) presenting a proposal of the term behavioural accounting for science and practice. Behavioural accounting in a scientific context refers to a science focused on searching for and formulating laws which govern human behaviour related to the creation and functioning of accounting in an enterprise and the implementation of its fundamental principles. The subject of behavioural accounting research covers the problems related to the behaviour of people involved in the accounting system ("from the system entry to its exit"), i.e. accountants, auditors and managers. This "science is seeking to demonstrate the laws which govern accounting behaviours of those who implement accounting, work in the field of accounting, the providers of accounting data or the addresses of accounting information" (Nowak, 2015). The behavioural approach in accounting is also focused on studying the relationship between information and the behaviour of different individuals/groups (Hendriksen and van Breda, 2002).

The skilful application of management accounting can influence employee behaviour in a way which can result in the reduction of costs and expenses, increased revenues, inflows, better financial result, and the respective tasks will be implemented in accordance with the planned budgets. "In the case of management accounting, the deliberate use of accounting as an instrument designed to trigger a specific behavioural response will occur" (Nowak, 2015), i.e. actions of the people involved, e.g., management at different levels, management board, employees. The behaviours and tasks carried out as part of management accounting may also affect external stakeholders, e.g. clients. Their purchasing decisions depend on the level of prices determined through price calculations and profit and loss accounts. The main research area of management accounting is the measurement using the appropriate instruments and their submission to the decisions made. In turn, behavioural accounting addresses the behaviours associated with this measurement and refers to people: measuring, using it and providing the necessary data for its implementation.

The Subject and Object of Behavioural Trend in Contemporary Accounting

The scope of behavioural research in accounting is diverse. The behavioural accounting domains most frequently cited in the subject literature are listed below:

- J.G. Birnberg and J.F. Shields (1989), who distinguished five main research areas: 1) managerial control, 2) accounting information processing, 3) accounting information system design, 4) audit and 5) organizational sociology;
- E.H. Caplan (1989), who identified six general research areas in behavioural accounting: 1) financial accounting; 2) management accounting; 3) audit; 4) human resources accounting; 5) social accounting; 6) accounting information systems and human information processing;
- E. M. Bamber (1993), who proposed four research domains: 1) audit, 2) financial accounting, 3) management accounting and 4) accounting system;
- J.G. Birnberg (2011), who stated that the object (research subject) is the most important in the conducted research. He distinguished the following objects: unit, small groups, organizations and environmental conditions.

Based on the current trends which characterize modern knowledge-based enterprises and taking into account the current achievements of behavioural accounting, the author identified the following research areas in the behavioural trend of contemporary accounting: 1) organization of accounting, 2) retrospective accounting, 3) prospective accounting, 4) invisible property accounting, 5) tax accounting, 6) computerization in accounting, 7) audit in accounting.

In the areas of retrospective accounting (understood more broadly than financial accounting) and prospective accounting (understood more broadly than management accounting) the following problems can be analysed, e.g.: behaviour of stakeholders in the context of the enterprise core business and corporate social responsibility, including financial and non-financial information. In the author's opinion, special attention should be paid to the area of invisible property accounting, referring to invisible assets and intellectual capital (in a modern knowledge-based enterprise) and

their relationship with stakeholders' behaviourism. Taxes, the process of accounting computerization and organization as well as auditing require separate research.

The analysis of behavioural trend in accounting confirms that it mainly covers the problems of management accounting. It primarily addresses the following issues (Artienwicz, 2018b):

- budgeting (budget preparation, approval, implementation and control) and its impact on the behaviour of people in an entity;
- budget and the level of employee involvement including the reward system in the context of budgeting;
- participation in the budgeting process (M. Tiller (1983) analysed the degree of difficulty of budgetary targets and their impact on performance. M.D. Shields et al. (2000) analysed the impact of stress on the influence of budgeting effects on behaviour);
- leadership in the budgeting process (D. Otley and B. Pierce (1995) analysed the leadership style in the companies providing accounting services);
- tendency to create budget slack (D.E. Stevens (2002) analysed the impact of reputation and ethics on creating budget slack, using manipulation in the level of information asymmetry between superiors and subordinates in terms of productivity. He analysed the reputation of subordinates and their ethical doubts regarding budget slack);
- intentional distortion of costs and revenues;
- the impact of leadership styles on budget stress levels;
- the impact of internal audit on performance.

Decision-making (e.g. in the budgeting process) is influenced by behavioural factors at an individual and enterprise level. Among these factors the following are listed (Bek-Gaik, 2001): conflicts of interest which may occur between the company goals (e.g. maximizing goodwill) and the employee's personal goals (e.g. maximizing salary, power); irrational behaviour of the decision-makers (e.g. a tendency to withhold information selectively in accordance with their own prejudices, rejecting information incompatible with their beliefs, the tendency of decision-makers to collect excessive information).

N. Artienwicz (2018b) analysing behavioural research in accounting identifies, apart from management accounting, also the following areas: financial accounting, auditing and tax aspects. Behavioural issues in financial accounting concern, e.g.:

- the role of accounting in disclosing information to its addressees;
- the impact of valuation methods on stakeholder decisions;
- the scope and forms of the information disclosed on stakeholders' decisions (A. Abdel-Khalika (1973) analysed the impact of the aggregation level of figures in financial statements on the judgment and decisions made by credit inspectors. L. Dong et al. (2016) examined the form of data presentation and its impact on the decisions of financial reports users, in particular the investors' reactions to unusual items affecting the company financial result. J. Han and Hun-Tong Tan (2007) analysed whether the form of management forecasts has impact on the method of estimating company profits by investors presenting high and low knowledge level. L.M. Sedor (2002) in her research focused attention on the narrative form of the presented management board plans regarding future profits and their impact on the reactions of market participants);
- the analysis of non-financial information disclosed in reports/statements, e.g., the impact of the message presented in the management board's letter by the company President (optimistic or pessimistic) on the decisions taken by the stakeholders;
- the chief accountant's influence on creating the accounting policy;
- the impact of the applied impression management techniques (e.g. self-promotion in company reporting) on investors' decisions;
- the influence of management on the chief accountant's choices;
- the impact of personality on the choices made in accounting (Cewińska et al., 2017).

Within the framework of financial audit, behavioural research addresses, e.g.: auditor's expert knowledge and experience; ethical and moral issues; the influence of moods and emotions on the auditor's work. In terms of taxation, behavioural studies include, e.g.: compliance with ethics by tax specialists; relations of tax specialists with clients; tax manipulation and creation; taxpayers' behaviour in the context of tax audits and penalties for non-compliance with tax regulations.

As part of the distinguished research areas referring to the behavioural trend in accounting, their subject and object can be defined. The main subject takes the form of human resources and their intellectual capital, in particular both internal and external stakeholders of the enterprise. In turn, the object consists of human behaviours, among which the following can be distinguished, e.g.: external and internal behaviours, individual and group behaviours, interpersonal and intergroup behaviours (interactions) and the respective factors influencing these behaviours. Table 1 presents the subject and object of the behavioural current in accounting.

Table 1: The subject and subject of behavioural trend in accounting

<table>
<tr><th colspan="2">Subject of behavioural accounting</th></tr>
<tr><td colspan="2">Human resources (and their capital – knowledge, skills, experience),
which influence the functioning of the accounting system and also remain under its influence</td></tr>
<tr><td>Internal stakeholders
e.g. employees, management, management board, managers</td><td>External stakeholders
e.g. clients, suppliers, financial institutions, banks</td></tr>
<tr><th colspan="2">Object of behavioural accounting – behaviours</th></tr>
<tr><td colspan="2">1. Human behaviour (e.g. accountant's, manager's) affecting the functioning of enterprise accounting. Individual and internal behaviours.
2. Human behaviour (e.g. investor's/investors') under the influence of accounting information related to the enterprise activities. Individual and group, external behaviours.
3. Interpersonal behaviour (e.g. employee/employees – manager, employee – client/clients) affecting the activities carried out in the enterprise accounting. Individual and group, internal and external behaviours.
4. Behaviours presented by suppliers (entry into the accounting system) and addressees (exit from the accounting system) of the information. Individual and group, external and internal behaviours.
5. Behaviours influencing the creation of the traditional enterprise property and the invisible property in accounting (e.g. brand, image and reputation).
Synthetic characteristics of behaviour:
– Behaviours can present the following nature: a) internal and external, b) individual and group, c) interpersonal and intergroup (interactions).
– Behaviours, thinking processes and decisions are covered by the research.
– Behaviours result from, e.g.: emotions, commitment, preferences, personality traits, views, knowledge or ignorance, competences and physical abilities.
– Factors influencing behaviour – physiological, cultural, social, psychological, environmental, organizational</td></tr>
</table>

Source: author's compilation based on (Artienwicz, 2018; Caplan, 1989; Korzeniowska, 2018; Siegel and Ramanauskas-Marconi, 1999).

The subject and object scope diversity within the behavioural trend in accounting results from many of its research areas determining mutual subject-object correlations (e.g. accountant's behaviour in the course of preparing financial statements, manager's behaviour during strategic planning, sales department employees' behaviour when promoting a new product and developing customer relations). Table 2 presents examples of the subject-object correlations within the behavioural trend in accounting.

Table 2: The subject-object correlations within the behavioural trend in accounting – examples

Subject	Object
Accountants Managers	Accounting policy – the right to choose instruments regarding, e.g.: – reducing or increasing costs/revenues, – creating, using and releasing provisions, – creating revaluation write-offs for fixed and current assets, – estimating fair value
Investors Clients External auditors Statutory auditors	Behaviours resulting from the company image creation, e.g. a positive one: – higher dividends expected by investors, – contracts execution continuity, price reductions and better products expected by customers. The opinions of external auditors and statutory auditors regarding the quality of the enterprise accounting – reliable or manipulated opinions
Managers	Financial result management, e.g.: – non-infringement of the integrity of the financial statements, – realization of managers' personal interests, without violating the accounting law. Strategies for influencing the results focused on investors: – smoothing profits, – avoiding to report losses, – presenting higher profit level compared to the previous year, – increasing the loss when it is obvious, e.g. during a financial crisis
Investors Managers Clients	Financial reporting and additional reporting, including: – object scope and forms of disclosure, – managers' interference in preparing statements and reports to achieve personal benefits, – non-financial information as an extended information offer for investors and clients, – manipulation/creation of financial and non-financial information

Source: author's compilation.

From the perspective of behaviourism in the area of financial accounting, one of the most important issues is the development of financial statements constituting the information base for the interested stakeholders before making a decision. In terms of financial reporting in behavioural terms, the following problems requiring solutions may arise (Masztalerz, 2010), e.g.: do the disclosed information affect the valuation of shares and can they be used by investors to generate profits; which disclosed information is of the greatest importance to investors and has the greatest impact on their decisions.

Extending reporting by additional and voluntary forms of financial and non-financial information disclosure in order to create the enterprise reputation and image is accompanied by human behaviour influenced by environmental incentives (e.g. success of a competitive company). M. Mazurska (2014) notes that the developing, so-called narrative reporting makes sense only if it takes into account (analyses) how the addressees respond to the information disclosed in those reports.

In the accounting practice, one can observe both an increase in demand for non-financial information and an increase in the supply (disclosure) of such information by the enterprises concerned. S. Arvidsson (2011), based on the carried out research, concluded that the most common reasons for the disclosure of non-financial information by companies is, e.g., the desire to improve the understanding of an enterprise by stakeholders. Unfortunately, the phenomenon of extended and voluntary disclosure of information (in particular non-financial information) by enterprises has negative effects too – a violation of the principles of human and business ethics. An important motivation to distort this information may its manipulation in favour of the company, e.g. in order to maintain the stakeholders' support (Merkl-Davies et al., 2011).

Referring to the behavioural instruments in economic sciences, it can be stated that the cognitive process in behavioural accounting, following which the decisions are made, can also take the form of heuristics, i.e. inducing the mind by the elements used in the course of the thinking process (e.g. attention, memory) to use mental shortcuts in comprehensive analytical processes (Nofsinger, 2006).

Mentally, the heuristics formulated by R.H. Thaler (1980), called *mental accounting*, refers to the accounting (accounting principles) which is not integrated with traditional accounting. Mental accounting refers to a situation when investors think of all of their transactions separately rather than as a single investment. People are not able to approach money originating from different sources in an equal way. They keep in mind their "general ledger", which is divided into individual categories marked as profit or loss. People try to achieve profit or neutrality on each of their accounts in line with the theory of perspective. In the human mind, the information about inflows and expenses is assigned to separate "mental accounts".

The application of heuristics does not guarantee results' correctness and the decisions made may not be rational or optimal. Different types of heuristics are distinguished in the subject literature (Nęcka et al., 2006) and among the most widely described heuristics the following can be distinguished: representativeness, accessibility as well as anchoring and adjustment (Tversky and Khaneman, 1974). Most often, the effects of cognitive heuristics in accounting have impact on such actions as (Jaworska, 2015): estimating or assessing current information, forecasting future results, evaluating and reviewing the probability of achieving a specific result, choosing between possible courses of action.

Heuristics (cognitive propensities) in behavioural accounting can be referred to the behaviour of both external and internal stakeholders of an enterprise. Heuristics related to the perception of reality in human behaviour may refer to the components of invisible property, e.g.: a) frame effect – developing a product brand, b) anchoring error – reference to a retrospective image, c) halo effect – strengthening customer relationships. Table 3 shows the reference of some heuristics to the selected examples within the behavioural trend of accounting.

Table 3: Selected heuristics in the behavioural trend of accounting – examples

Selected heuristics	Behavioural trend in accounting – examples
Frame effect	Problems are analysed in the wrong context, e.g. too narrow or too wide. When developing a product brand, the decisions made are often based on the belief of being right, infallible, refer to the events from the past, reject information inconsistent with the adopted assumptions.
Anchoring error	People get strongly attached to the initial suggestion (so-called anchor) and accept it subconsciously. Decisions are based on some information, its modification, which they adjust to it in order to prepare an answer or issue an opinion. An anchor can take the form of referring to a retrospective (positive) image of an enterprise which is supposed to hide current failures and losses from public opinion.
Hallo effect	People, having noticed a positive quality of a person, an object or a phenomenon stretch such opinion and become convinced of their other positive qualities. The halo effect allows developing business relationships with clients.
Self-perception theory	People, by observing their own behaviours in different circumstances, learn themselves. When making new decisions, they recall earlier behaviours, thus forming certain habits. It can be used by an accountant in the process of preparing the annual financial statement.
Representativity error	People formulate conclusions based on very few and erroneous observations, although representing some typical features. It is used in the enterprise accounting policy, especially in its creative part, where there is a possibility of the so-called right to choose.

Source: author's compilation based on: (Tversky and Kahneman, 1991; Polowczyk, 2012).

Stakeholders often prefer the following principles while making decisions: loss aversion, risk aversion, fear of the unknown and defence of the *status quo*. The aversion to change is the greater the more decision options are presented to stakeholders at the same time. The multitude and diversity of variants can result in the so-called decision paralysis, consisting in the inability of making optimal choices (e.g. by an accountant). Behavioural problems in accounting may relate to a wide variety of issues, e.g.: business costs and factors which cause them, corporate governance in relation to the quality of financial information, corporate social responsibility, compliance with business ethics, assessment and control of managers, relationships between an employer and employees, motives for certain behaviours and making decisions in various situations, personalities and attitudes of managers in various types of entities, e.g. listed companies and budgetary entities.

Conclusion

The evolution of accounting in a modern enterprise defines the research areas within the behavioural trend of accounting. In each research area, the research subject and object, as well as the mutual subject-object correlations, resulting from human behaviours and factors which influence them, including the enterprise goals, should be defined. The variety of issues raised within the behavioural trend of accounting does not facilitate, e.g., developing a standard object scope and defining a closed catalogue of subjects. For the knowledge-based enterprises, the behaviours of stakeholders creating invisible assets and intellectual capital are of particular importance.

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References

- Abdel-Khalika, A. (1973) 'The Effect of Aggregating Accounting Reports on the Quality of the Lending Decision: An Empirical Investigation', *Journal of Accounting Researsch*, vol. 11, 104-138.
- Argyris, Ch. (1952). 'The Impact of Budgets on People', Controllership Foundation, New York.
- Artienwicz, N. (2018a) 'Problematyka psychologiczna w polskich artykułach naukowych z obszaru rachunkowości – analiza publikacji', *Zeszyty Teoretyczne Rachunkowości*, tom 100 (156), 11-29.
- Artienwicz, N. (2018b) 'Rachunkowość behawioralna', CeDeWu, Warszawa.
- Arvidsson, S. (2011) 'Disclosure of Non-financial Information in the Annual Report: A Management-team Perspective', *Journal of Intellectual Capital*, vol. 12 (2), 277-300.
- Balachandran, M. (1985) 'Behavioral Accounting: An Introduction', *Behavioral & Social Sciences Librarian*, vol. 4 (2/3), Winter 1984-85/Spring, 21-27.
- Bamber, E.M. (1993) 'Opportunities in Behavioral Accounting Research', *Behavioral Research in Accounting*, vol. 5, 1–29.
- Bek-Gaik, B. (2001) 'Aspekty behawioralne w procesie budżetowania kapitałowego', [w:] 'Ewolucja polskiej rachunkowości na tle rozwiązań światowych', Micherda, B. (red.), Wydawnictwo Akademii Ekonomicznej w Krakowie, Kraków, 25-31.
- Birnberg, J.G. (2011) 'A Proposed Framework for Behavioral Accounting Research", *Behavioral Research in Accounting*, vol. 23 (1), 1–43.

- Birnberg, J.G., Luft, J. and Shields, M.D. (2007) 'Psychology Theory in Management Accounting Research', [in:] 'Handbook of Management Accounting Research', Chapman, C.S., Hopwood, A.G., Shields, M.D. (eds.), Elsevier, Amsterdam, vol. 1, 123-130.
- Birnberg, J.G. and Shields, J.F. (1989) 'Three Decades of Behavioral Accounting Research: A Search for Order', *Behavioral Research in Accounting*, vol. 1, 23-74.
- Breitkreuz, R. (2009) 'Behavioral Accounting vs. Behavioral Finance: A Comparison of the Related Research Disciplines', GRIN Verlag, München.
- Burzym, E. (1990) 'Rola i funkcja rachunkowości w roku 2000', *Zeszyty Teoretyczne Rady Naukowej*, tom 16, 5-43.
- Caplan, E.H. (1966) 'Behavioral Assumptions of Management Accounting', *The Accounting Review*, vol. 41 (3), 496-509.
- Caplan, E.H. (1989) 'Behavioral Accounting: A Personal View', *Behavioral Research in Accounting*, vol. 1, 109-123.
- Cewińska, J., Grzesiak, L., Kabalski, P. and Kusideł, E. (2017) 'Holland's Personality Types versus Preferences in Accounting'*, Zeszyty Teoretyczne Rachunkowości*, tom 93 (149), 23-59.
- Czerwonka, M. and Gorlewski, B. (2008) 'Finanse behawioralne', Oficyna Wydawnicza SGH, Warszawa.
- Devine, C.T. (1960) 'Research Methodology and Accounting Theory Formation', *The Accounting Review*, vol. 35, (3), 387-399.
- Dong, L., Wong-On-Wing, B. and Lui, G. (2016) 'Are Investors Influenced by Accounting Presentation Format and Announcement Prominence of Special Items?*', Advances in Accounting Behavioral Researsch*, vol. 19, 69-95.
- Han, J. and Tan, Hun-Tong (2007) 'Investor's Reactions to Management Guidance Forms: The Influence of Multiple Benchmarks*', The Accounting Review*, vol. 82 (2), 521-543.
- Helmann, A. (2013) 'Behavioral Accounting', Nova Science Publishers, NewYork.
- Hendriksen, E.A. and van Breda, M.F. (2002) 'Teoria rachunkowości', Wydawnictwo Naukowe PWN, Warszawa.
- Jaworska, E. (2015) 'Poznawcze aspekty formułowania sądów i podejmowania decyzji w rachunkowości behawioralnej – wybrane zagadnienia', *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, nr 389, 130-138.
- Kahneman, D. and Tversky, A. (1979), 'Prospect Theory: An Analysis of Decisions under Risk', *Econometrica*, vol. 47 (2), 263-91.
- Kahneman, D. and Tversky, A. (2012) 'Wybory, wartości i normy interpretacyjne', [w:] 'Pułapki myślenia. O myśleniu szybkim i wolnym', Kahneman, D. (red.), Media Rodzina, Poznań, 581-604.
- Kahneman, D. and Tversky, A. (red.) (2009) 'Choices, Values and Frames', Cambridge University Press, New York.
- Korzeniowska' D. (2018) 'Przedmiot badań rachunkowości behawioralnej', *Zeszyty Teoretyczne Rachunkowości,* tom 98 (154), 147-165.
- Lord, A.T. (1989) 'The Development of Behavioral Thought in Accounting, 1952-1981', *Behavioral Research in Accounting*, vol. 1, 124-149.
- Masztalerz, M. (2010) 'Użyteczność sprawozdań finansowych w świetle finansów klasycznych i behawioralnych', *Zeszyty Teoretyczne Rachunkowości*, tom 57 (113), 41-56.
- Mazurska, M. (2014) 'Paradygmat homo oeconomicus a rachunkowość behawioralna', *Studia Oeconomica Posnaniensia,* vol. 2 (4), 88-101.
- Merkl-Davies, D.M., Brennan, N.M. and McLeay, S.J. (2011) 'Impression Management and Retrospective-Sense-Making in Corporate Narratives: A Social Psychology Perspective', *Accounting, Auditing and Accountability Journal*, vol. 24 (3), 315-344.
- Nadolna' B. (2012) 'Studium przypadku jako metoda badawcza rachunkowości zarządczej', *Zeszyty Naukowe Uniwersytetu Szczecińskiego, Finanse, Rynki Finansowe, Ubezpieczenia*, nr 45, 131-146.
- Nęcka, E., Orzechowski, J. and Szymura, B. (2006) 'Psychologia poznawcza', Wydawnictwo Naukowe PWN, Warszawa.
- Nofsinger' J.R. (2006) 'Psychologia inwestowania', Helion, Gliwice.

- Nowak, M. (2015) 'Rachunkowość zarządcza, rachunkowość behawioralna – dwie strony tego samego medalu', *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, nr 374, 154-161.
- Nowak, M. (2016) ‚Semantyka terminu „rachunkowość behawioralna', *Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach*, nr 300, 150-160.
- Otley, D. and Pierce, B. (1995) 'The Control Problem in Public Accounting Firms: An Empirical Study of the Impact of Leadership Style', *Accounting, Organizations and Society*, vol. 25 (5), 405-420.
- Polowczyk, J. (2012) 'Zarządzanie strategiczne w przedsiębiorstwie w ujęciu behawioralnym', Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań, 61-67.
- Riahi-Belkaoui, A. (2004) 'Accounting Theory', Thomson Learning, London.
- Sedor, L.M. (2002) 'An Explanation for Unintentional Optimism in Analysts' Earnings Forecasts', *The Accounting Review*, vol. 77 (4), 731-753.
- Seligman, M.E.P., Walker, E.F. and Rosenham, D.L. (2003) 'Psychopatologia', Zysk i S-ka, Poznań.
- Shields, M.D., Deng, F.J. and Kato, Y. (2000) 'The Design and Effects of Control Systems: Tests of Direct and Indirect Effects Models', *Accounting, Organizations and Society*, vol. 25 (2), 185-202.
- Siegel, H. and Ramanauskas-Marconi, H. (1999) 'Behavioral Accounting', South Western Publishing, Cincinnati, OH.
- Simon, H.A. (1955) 'A Behavioral Model of Rational Choice', *The Quarterly Journal of Econmics*, vol. 69 (1), 99-118.
- Stevens, D.E. (2002) 'The Effects of Reputation and Ethics on Budgetary Slak', *Journal of Management Accounting Researsch*, vol. 14 (1), 153-171.
- Szychta, A. (2008) 'Etapy ewolucji i kierunki integracji metod rachunkowości zarządczej', Rozprawy Habilitacyjne, Wydawnictwo Uniwersytetu Łódzkiego, Łódź.
- Szychta, A. (2015) 'Pozytywna teoria rachunkowości jako koncepcja głównego nurtu badawczego', *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, nr 388, 176-188.
- Thaler, R.H. (1980) 'Towards a Positive Theory of Consumer Choice', *Journal of Economic Behaviour and Organization*, no. 1, 39-60.
- Tiller, M. (1983) 'The Dissonance Model of Participative Budgeting: An Empirical Exploration', *Journal of Accounting Researsch*, vol. 12, 183-206.
- Trotman, K.T., Tan, H.C. and Ang, N. (2011) 'Fifty-Year Overview of Judgment and Decision-Making Research in Accounting', *Accounting & Finance,* 51 (1), 278-360.
- Tversky, A. and Kahneman, D. (1974) 'Judgment under Uncertainty: Heuristics and Biases', *Science*, vol., 185 (4157), 1124-1131.
- Tversky, A. and Kahneman, D. (1991) 'Loss Aversion in Riskless Choice: A Reference Dependent Model', *Quarterly Journal of Economics* , vol. 106 (4), 1039-1061.

Analysis of The Perception of Sustainability from the Perspective Of Entrepreneurs and Consumers in The Food Industry in Slovakia

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Abstract

Sustainability as an aspect of the circular operation of business models should be a core aspect of the business-making. The article presents the results of the research whose main aim is to analyse the level of perception of sustainability's importance in Slovakia. The level of awareness in this field in the Slovak market is low compared to the situation abroad. However, companies are starting to actively address this issue. What are they actively doing for sustainability and what do they plan to add? Can sustainability be a new trend that will reflect in the customers' preferences? The article is focused on the analysis of the environment and activities related to this issue in the Slovak market. The methodological approach was based on the identification of substantial results based not only on the secondary data processed but also on the primary research in the field of food companies in Slovakia and their perception of sustainability. The secondary and primary data inputs were processed in the form of case studies in which mutual relationships were revealed using the method of comparison. One of the main findings of the article shows the high awareness of the need for responsible approach, regarding the fact that 100% of the researched companies are minimizing the amount of waste being produced and almost 77% of them are planning to implement structured waste management.

Keywords: Sustainability, Food Management, Perceived Sustainability, CSR – Corporate Social Responsibility

Introduction

The current situation of sustainability and global challenges is a topic that concerns both the end consumers and companies. The pressure for change in the environmental burden comes not only from the European Union but also from the customers. Consumers are becoming aware of the impact of their purchasing choices and are actively addressing not only the quality and price of the products they purchase but also their origin, composition, or side effects. Companies are therefore forced to *centrally and locally change their activities.*

Partial objectives of this article include: *(1) analysis of the current state of the issue in Slovakia; (2) identification of the attitude of companies towards this topic; as well as (3) gathering the information on what solutions are available.* These pieces of information will be collected via the market analysis within the food industry. The secondary data inputs obtained from the literature sources will actively support the theoretical foundations and the environmental analysis will provide information on external influences. These data inputs will be compared with the research conducted in Slovak companies, focusing on the perception of sustainability as an aspect of business-making and its active implementation.

Theoretical Background

Sustainability is already leaving the private environment and is becoming a public matter. Therefore, this topic includes the description of *sustainability in general, sustainability in relation to the food industry, and sustainability from the consumers' perspective.*

Sustainability and Its Form in The Food Industry

Sustainability can be viewed from several perspectives. When we talk about the sustainability of a product, we focus on whether the product is recyclable or whether it is produced in an environmental-friendly manner (Kim, Ko, 2012). Korten (2001) stated that the world has come closer to unity and people can find new social values for humanity. This opinion humanly describes the need for sustainability, not just within the *business models* but within an overall approach to the business-making. Consumption strongly depends on what is being offered. It is necessary to think whether the food that reaches consumers is sustainable and whether the companies producing it are building their business models responsibly (Ranta, Aarikka-Stenroos, 2008). However, this aspect also has a significant impact on consumers who are starting to look for values in the goods available.

According to Cambridge dictionary, sustainability is: *"the idea that goods and services should be produced in ways that do not use resources that cannot be replaced and that do not damage the environment"* (Demjanovičová, 2018). Strand (2006) then worked with the **concept of CSR** and sustainability. In addition to the CSR Implementation Adviser, he also conducted business ethics research. His work is a foundation for large companies that are trying to put CSR into practice. He focuses on the need for sustainability applications in mainstream companies. *"The sustainability and networking of stakeholders are essential. One without the other is almost unreachable"* (Strand, 2006). While companies are trying to follow the CSR practices and apply them to their daily activities, the overall outcome is influenced by the stakeholders who fail to comply with the agreed CSR parameters. This idea is also supported by the opinion of Ferenc, et al., (2017). Strand also points out that if the principles of sustainability are not entrenched in the whole structure of a company, they are ineffective (Strand, 2014).

Kucharčíková and Mičiak (2018) build on several definitions of sustainability in relation to *sustainable development.* Sustainability has a subset of activities that are specific to it. Hence, an organization may apply some of the values of sustainable development, but it still does not have to get to the state of a sustainable organization. Following this, the conditions that need to be met to achieve food sustainability are: *"a sustainable increase in yields on the supply side and an improvement in the use of agricultural products at different stages, including a reduction in losses and wastage between the farm gate and the consumers plate"* (Esnouf et al., 2013).

The food industry has an impact on the environment within the whole production chain, from growing through processing to distribution and the end of the products' lifespan (Borghi et al., 2014). This statement is supported by Lafontaine et al. (2012) and Parent and Lavallée (2011). They emphasise that at the international level an integrated evaluation of sustainability needs to stem from the life cycle of products.

Consumers' Behaviour

The customers' behaviour is the feedback for the companies in relation to innovation but also to the plans for future growth. If a company knows the consumer preferences, it can effectively set its activities. It is essential to know the consumers and to understand their reactions and behaviour related to purchasing.

The entire business-making is focused on the consumers. It is therefore important for the companies to understand their consumers and meet their needs (Csengeri, 2020). In relation to the food industry, the aim of quantification of environmental properties of food and beverages also includes the

communication of this information towards consumers. Via this process, the consumers become encouraged to make *sustainable decisions* (Jungbluth et al., 2000).

The creation of a product or service that will meet the customers' needs is not only connected to the product itself, price and promotion. Companies are also selling their values as a part of their products. The value is what is considered important. It is in the aspects to which an individual or a group attach importance. According to many authors (Hofstede, 1991; Kotter and Hesket, 1992; Hall, 1995), the values represent the core of the organizational culture (Lukášová et al., 2004). Consumers want to be a part of the product and therefore, they want to be a part of the company itself. To do this, they need to be able to identify with the company and its activities. The inner attitude of people is derived from what they focus on. Looking at an individual as a human being, the value can be defined as what s/he believes in. This perspective can be named psycho-social-behavioural (Blašková, Hriníková, 2019).

The current situation regarding sustainability and consumers' behaviour

The identification of the current state within the studied topic was performed using relevant results describing the situation at the global, European and Slovak level.

Based on the global survey from 2012, *over 56% of consumers are interested in environmental issues.* In total, 17 000 respondents were surveyed in relation to their consumer behaviour. The *Sustainable Consumption Index – Greendex, and the guilt factor related to the environmental impact of individuals* were developed. The guilt factor was highest among consumers living in the countries where the people behave the most sustainably. Regarding the extent to which consumers feel able to contribute to the change and improvement of the environment, the results were the opposite (Nadácia Pontis, online, 2013).

According to Cetelem's European Consumer Behaviour Survey's (2017) results, as many as 74% of Europeans are concerned about *future environmental changes.* This finding is supported by the importance of addressing sustainability. This was supported by further conclusions from the survey, where only *27% of respondents were optimistic about the fate of future generations* (only 21% in Slovakia). On the other hand, among the factors that would have a positive impact on the change in a given country, *the environmental management* was at a low place in the ranking (only 15% of respondents chose this factor), (Cetelem, online, 2017).

Thus, these results indicate the need for building environmental and sustainability awareness so that this factor is perceived by people as an important way of promoting the positive development of the country. *The European Environment Agency* was examining household consumption (2015). The results show that 13% of total European households' expenditures were spent on *food and non-alcoholic beverages.* The impact on environment here includes travelling to shops, storage, cooking, and waste generation (2016).

The situation in the Slovak market already reflects the need for responsibility for the *environmental impact of business activities*. Entrepreneurs realise that it is necessary to make changes in their activities. Venhartová (2019), director of the Food Chamber of Slovakia, presented the commitment to sharing best practices, fostering innovation in food production and packaging, and considerate extraction of raw materials. FoodDrink Europe, has been devoting effort towards sustainability of the food industry for a long time. It focuses on the objectives of sustainable development included in the European Green Deal. The aim of the agreement is to create an environment in which sustainability can be implemented in the food industry (Jakubčo, 2019). *"Our industry is still committed to achieving more sustainable food systems. Simply put, sustainability is the right thing for our businesses, for our society and for our planet"* (Frewen, 2019).

The GfK is engaged in regular surveys of consumers' behaviour in the Slovak Republic. A relevant finding is that in 2019, *fresh and chilled foods* accounted for up to 49% of the fast-moving consumer

goods of Slovak households (GfK, 2019). Sustainability in the Slovak Republic is also addressed by the *Sustainable Society Foundation* (2016). In 2016, they published their own *Index of Sustainable Society*. The complete structure of the index's components is shown in Tab. 1.

Table 1 : The structure of the Index of Sustainable Society

Categories	Areas	Indicators
Welfare of humanity	Basic needs	Food sufficiency
		Drinking water sufficiency
		Safe sanitation
	Personal development and education	Education
		Healthy years of life
		Gender equality
	Balanced society	Revenue distribution
		Population growth
		Good management
Quality of the environment	Natural resources	Biodiversity
		Renewable water resources
		Consumption
	Climate and energy	Energy consumption
		Energy savings
		Renewable energy sources
		Greenhouse gasses
Economic welfare	Change	Organic farming
		Savings
	Economy	GDP
		Employment
		Public debt

The resulting evaluation of countries within the indicators and relevant areas ranged from 0 to 10. The Slovak Republic achieved the best evaluation of the following indicators: *food, drinking water sufficiency, safe sanitation and renewable water resources* (Nadácia udržateľnej spoločnosti, online 2016). In terms of food sustainability, the fifth-highest value attributed to the *organic farming factor* is an interesting result (Nadácia udržateľnej spoločnosti, online, 2016).

The presented findings show that the consumers are interested in environmental issues. They also feel guilty for behaviour that damages the environment. Especially, people in Slovakia are not optimistic about future changes in relation to the environment. Specific position in the achievement of overall sustainability is held by the food industry. Here, the entrepreneurs' statements indicate their focus on sustainability. Therefore, in our research it is crucial to analyse the companies' perception of sustainability and the activities already being performed to achieve it.

Research Methods

The materials for this article were selected from primary and secondary sources of data in the studied field. The primary focus is on food companies. Specifically, 13 companies from the Slovak Republic were approached by a deliberate selection *(Sladkosti pre hostí, s.r.o., Art ateliér cafe, Aurelica coffee, Stanica Žilina-Zárečie, Miho cafe, Verticcio, Gentlejam s.r.o., Habesh coffee, LUZA SK, s.r.o., Československá pivotéka, VÁŽ SI, Le Torri, Extreme park s.r.o.)*. The primary data points were collected directly from companies' owners using the method of inquiring via a questionnaire survey. The aim of the survey was to identify the perception of sustainability by entrepreneurs. The aim

included the perception of the importance of this issue linked to the business model and the actual implementation of the concept.

The part of the secondary research is aimed at large companies. Food stores operating in the Slovak Republic were selected. These are ones of the largest retailers in Slovakia, but at the same time, they are also well-known companies performing positive activities in the field of sustainable development. These are the Tesco STORES SR, a.s., Lidl Slovak Republic, v.o.s., and METRO Cash & Carry SR s.r.o. (*The abbreviations of the types of companies from Slovak language are explained as follows: a.s. = SpA; v.o.s. = C.I.; s.r.o. = Ltd.*).

The methods used in the research that is presented in this article included the analysis, synthesis, comparison, and statistical analysis (frequencies and techniques of exploratory analysis). The method of case studies was applied in two ways: analysis of existing cases, creation of an original case. According to Yin (2017), the application of the case study method has these six elements: "the plan, design, preparation, data collection, analysis and reporting". A case study is defined as *"an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-world context"*. This method helps explain the outcomes because the analysis consists of matching empirically observed events to the theoretically predicted ones.

Results

The research results combine the part represented by examined successful cases of companies operating in the food industry and their sustainable practices with the part of an original case study created using answers in the questionnaire survey.

Analysis of Selected Cases from The Food Industry

Companies in Slovakia are already active in social responsibility and in the sustainable development within the food industry. The solutions not only address waste management but also the sustainable development issues related to minimizing waste and preventing waste generation or reducing the carbon footprint. The survey discusses specific cases of companies in Slovakia as a successful application of a sustainable approach in the food industry.

Lidl

Lidl as one of the leading food suppliers in the Slovak market represents an ideal example of a socially responsible company. Since 2004, Lidl has been demonstrating a responsible approach not only to consumption but also to its own production. It eliminates the negative impact on the environment via its own eco-products and points to the need to perceive the burden for the environment.

Table 2 : Sustainable activities – Lidl

Metrics/results achieved	Activities
9 320 hours	Employees attending training courses within tailor-made training programs
1 772 stakeholders involved	Business partners familiar with anti-corruption policy and the fight against bribery
96% of energy	Electricity from renewable sources within total energy consumption
39.7% of total number of stores	The latest LED technology installed in the stores
100% of employees	Employees receiving training on energy efficiency
432 498 of Facebook fans	Facebook fans receiving regular information about the company's responsible activities
109 articles	Articles published on internal Lidlnet, dealing with the topic of social responsibility
185 000 trees	Trees planted in the Tatra forests affected by a calamity
53 birth centres	Birth centres in Slovakia being given a new equipment for the rescue of premature babies
2 mil. €	The value of socially responsible projects realised
10 towns	Slovak towns in which modern and safe Lidl playgrounds were built
increased by 23%	The value of goods from Slovak suppliers in purchase prices increased compared to the fiscal years 2016 and 2017
100% suppliers	Suppliers being committed to Code of Ethics

(elaborated according to: Spoločenská zodpovednosť.sk, online, 2017)

"The one who stops improving, stops being good." This is the idea stated in the report on sustainable operation of Lidl company in Slovakia (Spoločenská zodpovednosť, 2017). The company has been in the Slovak market since 2004. At the beginning, it had 14 stores here, now it has 141. The company is striving for continuous improvement in relation to suppliers' networks, products or the stores themselves, including the level of work being done by the employees. Lidl has been awarded many times, getting awards such as Qudal – Top quality medal for the year 2016/2017. The company got the award related to quality in 2018/2019. It is a mark of the highest quality in the food industry in Slovakia. Besides that, Lidl also got the award of the Retailer of the year in 2016 and 2017 and 2018. In addition, Lidl got the BestBuy award for 2019/2020 in the main category – the best ratio of price and quality.

Tesco

Tesco has been in the Slovak market since 1996. During this time, the company managed to create a network of 154 stores. Nowadays, the company belongs to one of the biggest private employers with more than 10 000 employees.

Table 3: Sustainable activities – Tesco

Metrics/results achieved	Activities
since 2017, as the 1st retail store in Slovakia	Measurement and transparent disclosing of the data on food waste
decrease in the food waste by 52%	Achievement of the OSN 12.3. objective for the sustainable development
report with detailed data on the food waste	Measurement of the total amount of food waste and detailed evaluation of its structure
donated food overall – increase by 533% in comparison with the previous period	Donated food surplus (for people's needs or as the feed material for animals)
donated food for people's needs – 1 792 tons – annual increase by 211%	Food donated to the Food bank of the Slovak Republic

donated food for animals – 2 043 tons	Food donated as the feed material for animals
132 stores	Stores engaged in the donation of food to the Food bank of the Slovak Republic

(elaborated according to: SITA, Tlačová agentúra (Press agency), online 2019)

Tesco has received the Via Bona award in 2017 for the contribution to the fulfilment of sustainable development goals. It is one of the most prestigious awards in Slovakia. It is being given by the Pontis foundation as acknowledgement for the most responsible companies in the Slovak market (teraz.sk, online 2018).

Original Case Based on Survey Among CEOS Of Companies from The Food Industry

The findings obtained from the analysis of the secondary data sources were followed by the creation of an original case from the food industry in Slovakia. The creation was preceded by the design of a questionnaire survey and its distribution to selected entities. These entities included companies from the Slovak Republic that are actively engaged in the food industry. The survey's results are captured using tables and charts below.

The first question in the above-mentioned survey was focused on the identification of the perceived importance of individual elements of sustainability within the food industry. The results from answers to this question are displayed in Fig. 1.

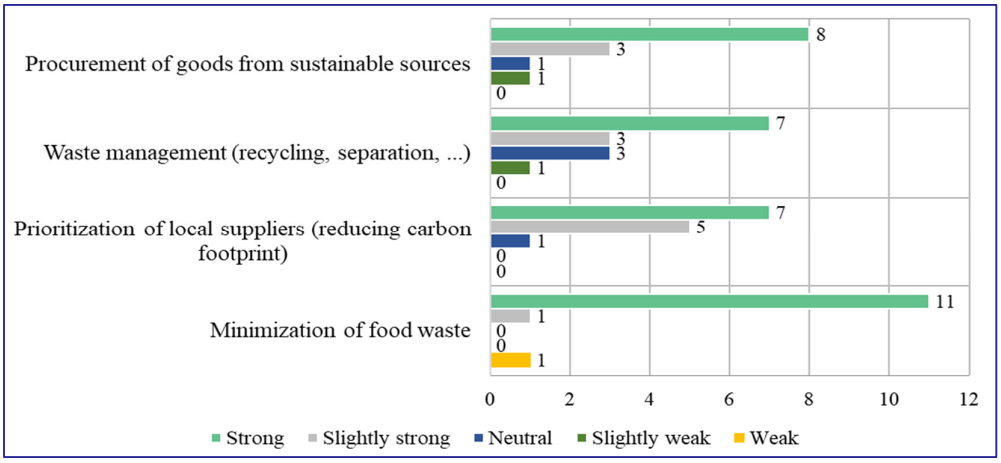

Figure 1 : The level of perceived importance of sustainability elements

Thus, the results show that the most important element of sustainability from the entrepreneurs' perspective based on the greatest number of the highest value assigned (strong) is the *Minimization of food waste*. Within the same context, it can be stated that the second place in the ranking is taken by the *Procurement of goods from sustainable sources*.

Subsequently, the Tab. 4 was created, showing the *total score* of perceived importance of the individual sustainability elements, besides the above-mentioned values (listed in Fig. 1). Based on this calculation, the *order of importance* was created for the sustainability elements.

Table 4 : The order of the perceived importance of sustainability elements according to the overall score

Perceived level of importance of sustainability elements	Weak	Slightly weak	Neu-tral	Slightly strong	Strong	Total score
	Frequency of answers					
Minimization of food waste	1	0	0	1	11	**60**
Prioritization of local suppliers (reducing carbon footprint)	0	0	1	5	7	**58**
Waste management (recycling, separation,	0	1	3	3	7	**58**
Procurement of goods from sustainable	0	1	1	3	8	**57**

**Total score was calculated using the assigned value: 1=week, 2, 3, 4, 5=strong*

This order indicates that the first place is still taken by the element of *Minimization of food waste*. However, the element of *Procurement of goods from sustainable sources* was shifted to the last place in the ranking created. On the other hand, the identified differences are not considerable, so it can be stated that the listed elements of sustainability are comparably important for the entrepreneurs in the food industry in Slovakia.

The second question in the survey was focused on the identification of the level at which the entrepreneurs are already actively engaged regarding the sustainability elements. The results are shown in Fig. 2.

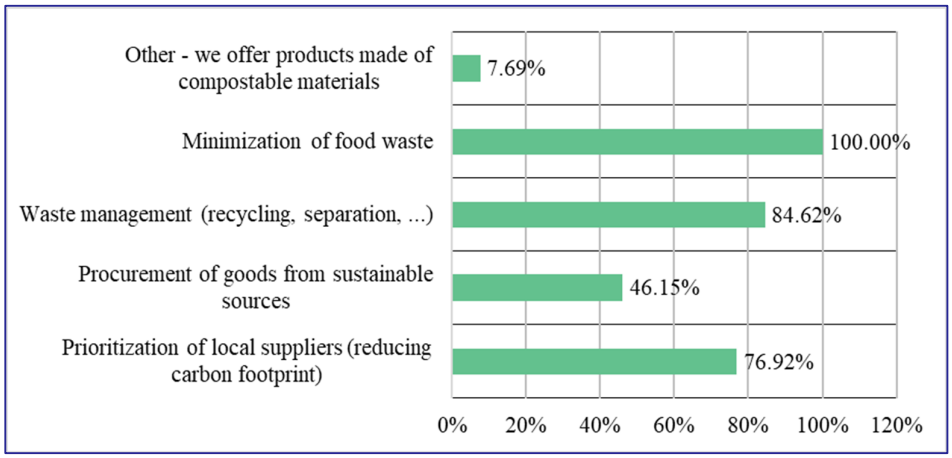

Figure 2 : Sustainability elements already applied in researched companies

In connection with Fig. 1 and Tab. 4, it can be concluded that entrepreneurs are really the most engaged in activities related to the element that they consider the most important.

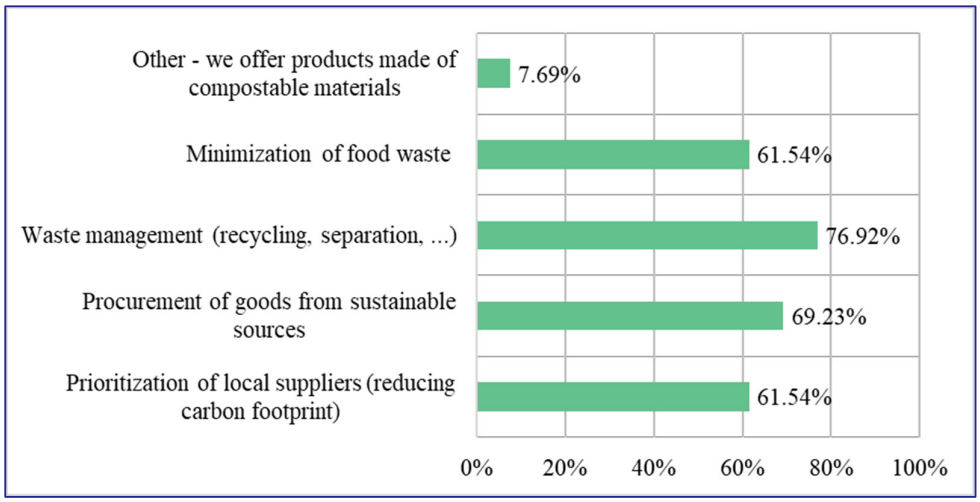

Figure 3: Planned application of sustainability elements in selected companies

Then, Fig. 3 presents the results of the third question in the survey, revealing the planned changes in relation to sustainability.

The future focus of entrepreneurs in the food industry mostly leads to the element of *Waste management*
(76.92% of respondents) and the *Procurement of goods from sustainable sources* (69.23% of respondents).

Discussion and Conclusions

The food industry belongs to main producers of the food waste. The European Commission (EC) created a plan for "Europe efficiently utilising resources" that has been implemented since 2011. The EC estimates that 90 million tons of food are being wasted every year. The most serious aspect of these results is that the food that is becoming a part of waste is deteriorated and unsuitable for consuming. A huge part of this amount ends in the waste due to improperly set laws. According to the EC's plan, the value chain of food and beverages accounts for 17% of direct emissions of greenhouse gasses. The EC's plan appeals for common effort of farmers, food industry, retailers and consumers via the manufacturing technology. The European goal is clear: decrease the disposal of edible food in the EU to one half by 2020 (eea.europa.eu, 2016).

Via the primary research, we got the outlook on the issue from the perspective of small entrepreneurs in Slovakia. The awareness of the need for the sustainable approach is high, regarding the fact that 100% of addressed companies are minimizing the waste in their business-making and almost 77% of the respondents are planning to apply structured waste management into their business model. This idea is also supported by the opinion of Hittmár, et al., (2014). Other aspects that could be considered while modifying the business model include the impact on reputation, changes in the inventory management, utilisation of modern information systems, and ethical principles (Zraková et al., 2017; Sroka et al., 2015; Stopka et al., 2016; Kubina et al., 2015). In comparison with large companies studied, the awareness is at a very good level. Small companies realise the need for a sustainable approach to the business-making and they are planning to improve within this field. The approach of the studied large companies is an ideal example of responsible business models. Consumers appreciate these activities of companies, which shows in the number of awards won by Lidl and Tesco. The results of our research are therefore aligned with Strand's results. Specifically, they corroborate the importance of CSR activities and their linkage to consumers as a significant stakeholder group.

The main contribution of our article is *an in-depth analysis* of food sustainability in the Slovak Republic based on a combination of primary and secondary sources within the real-world context. The contribution also lies in *the implications for the business model's changes.*

Limitations and Implications for Future Research

Research limitations are connected to the possible shortcomings of the case study method. These include insufficient rigorousness, application of the case study approach not in the scientific way, and the lack of quality of the study. We tackled these limitations to the best of our abilities via following the scientific procedure described in the methodology part and using our academic skills and knowledge.

Implications for future research follow the fact that our qualitative research cannot be used for general statements valid for the whole set of Slovak companies. Therefore, future research can be focused on testing the results in a quantitative research so that the validity can be expanded to a representative sample. Next opportunity is in applying the business model with values we identified in other fields.

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References

- Blašková, M. and Hriníková, D. (2019). 'Axiological management in higher education and values defined by students,' *Aksiologiceskije aspecty v sovremennych naucnych issledovanijach.* ISBN: 978-5-949-41224-4, Omsk, Russia: Omskij gosudarstvennyj universitet soobscenia, 2019, 5–14.

- Cetelem. (2017). 'L'Observatoire Cetelem, Consumption in Europe: new paths to confidence,' *Cetelem.* [Online], [06-02-2020], Available: https://www.cetelem.sk/o-spolocnosti/aktuality/prieskum-spokojnosti-zakaznikov/Contents/0/observatoire_conso_2017_gb_ss_annexes_bd.pdf.

- Csengeri L. (2020). 'Spotrebiteľský panel,' *GfK,* [Online], [05-02-2020], Available: https://www.gfk.com /sk/riesenia/spotrebitelsky-panel/.

- Del Borghi, A., Gallo, M., Strazza, C. and Del Borghi, M. (2014). 'An evaluation of environmental sustainability in the food industry through Life Cycle Assessment: the case study of tomato products supply chain,' *Journal of Cleaner Production* 78, 121–130.
- Demjanovičová M. (2018). 'Current situation in the field of management of the value of small and medium-sized enterprises through marketing activities,' *London: Sciemcee Publishing.* ISBN 978-0-9935191-7-8, 51–53. CER, 2018.

- EEA.europa.eu. (2016). 'Potravinový odpad,' *eea.europa.eu.* [Online], [06-02-2020], Available: https://www.eea. europa.eu/sk/signaly-eea/signaly-2012/zaostrene-na/potravinovy-odpad.

- Esnouf, C., Russel, M. and Bricas, N. (2013). 'Food System Sustainability: Insights from DuALIne,' ISBN: 9781107036468. Cambridge University Press, 2013, 303.

- European Environment Agency. (2015). 'Resource efficiency and waste – Consumption,' *eea.europa.eu.* [Online], [06-02-2020], Available: https://www.eea.europa.eu/soer-2015/europe/consumption.

- European Environment Agency. (2016). 'Efektívne využívanie zdrojov a likvidácia odpadu – Spotreba domácností,' *eea.europa.eu.* [Online], [06-02-2020], Available: https://www.eea.europa.eu/sk/themes/household s/intro.

- Ferenc. P., Varmus. M. and Vodák. J. (2017). 'Stakeholders in the various field and relations between them,' 12th International Scientific Conference of Young Scientists on Sustainable, 31.05-02.06. 2017, 192, 166–170. DOI: https://doi.org/10.1016/j.proeng.2017.06.029.

- Frewen, M. (2019). 'Potravinári chcú prispieť k ochrane životného prostredia,' *ekonomika.sme.sk, SITA,* [Online], [05-02-2020], Available: https://ekonomika.sme.sk/c/22281402/potravinari-chcu-prispeit-k-ochrane-zivotneho-prostredia.html.

- GfK. (2019). 'Consumer Reporter, 02/2019,' *GfK.* [Online], [06-02-2020], Available: https://www.gfk.com/file admin/user_upload/country_one_pager/CZ/documents/2019/GfK_CR_2-2019_SK.pdf.

- Hittmár. Š., Varmus, M. and Lendel. V. (2014). 'Proposal of model for effective implementation of innovation strategy to businness,' 2nd World Conference on Business, Economics and Management (BEM): Antalya, Turkey. 08.01.2014, 109, 1194–1198. DOI: https://doi.org/10.1016/j.sbspro.2013.12.611.

- Jakubčo, J. (2019). 'Potravinári chcú prispieť k ochrane životného prostredia,' *ekonomika. sme.sk, SITA,* [Online], [05-02-2020], Available: https://ekonomika.sme.sk/c/22281402/potravinari-chcu-prispeit-k-ochrane-zivotneho-prostredia.html.

- Jungbluth, N., Tietje, O. and Scholz, R.W. (2000). 'Food purchases: impacts from the consumers' point of view investigated with a modular LCA,' Int. J. Life Cycle. Assess. 5 (3), 134–142.

- Kim, A.J. and Ko, E. (2012). 'Do social media marketing activities enhance customer equity?' *An empirical study of luxury fashion brand,* J. Bus. Res. 65 (10), 1480–1486.

- Korten and David C. (2001). 'When Corporations Rule the World (2nd ed.),' Berrett-Koehler Publishers, Inc., USA, ISBN 1-887208-04-6.

- Kubina, M., Koman, G. and Kubinova, I. (2015). 'Possibility of Improving Efficiency within Business Intelligence Systems in Companies,' *Procedia Economics and Finance,* 26, 300–305. DOI: https://doi.org/10.1016/S2212-5671(15)00856-4.

- Kucharčíková A. and Mičiak M. (2018). 'Human Capital Management in Transport Enterprises with the Acceptance of Sustainable Development in the Slovak Republic,' Sustainability. DOI: https://doi.org/ 10.3390/su10072530.

- Lafontaine, M., Saad, R., Gilbert, D. and Margni, M. (2012). 'Environmental LCA of milk in Canada,' *Proceedings of the 8th International Conference on Life Cycle Assessment in the Agri-Food Sector.* 01.-04.10.2012, Saint Malo, France.
- Nadácia Pontis. (2013). 'Zodpovední spotrebitelia,' *nadaciapontis.sk.* [Online], [06-02-2020], Available: https:// www.nadaciapontis.sk/novinky/zodpovedni-spotrebitelia/.

- Nadácia udržateľnej spoločnosti. (2016). 'Index udržateľnej spoločnosti,' *Enviro portál.* [Online], [06-02-2020], Available: https://www.enviroportal.sk/pokrok-spolocnosti/index-udrzatelnej-spolocnosti.

- Parent, G. and Lavallée, S. (2011). 'LCA Potentials and Limits Within a Sustainable Agrifood Statutory Framework,' Global Food Insecurity, Springer, Netherlands, 161–171.

- Ranta V., L. Aarikka-Stenroos and S. J. Makinen (2018). 'Creating value in the circular economy: A structured multiple-case analysis of business models,' *Journal of Cleaner Production,* 201, 988–1000, [Online], [05-02-2020], Available: https://www.sciencedirect.com/science/article/pii/S0959652618324089?via%3Dihub.

- Robert K. Yin. (2017). 'Case study research design and methods,' *SAGE Publications,* 2017. 352. ISBN: 9781506336183.

- SITA, tlačová agentúra. (2019). 'Tesco na Slovensku dosiahlo jeden z cieľov udržateľného rozvoja,' *Tlačové správy.* [Online], [06-02-2020], Available: https://tlacovespravy.sme.sk/c/22128800/tesco-na-slovensku-dosiahlo -jeden-z-cielov-udrzatelneho-rozvoja.html.

- Spoločenská zodpovednosť. (2017). 'Správa o trvalej udržateľnosti za rok 2017,' *spolocenskazodpovednost.sk,* [Online], [06-02-2020], Available: https://www.spolocenskazodpovednost.sk/sites/default/files/csr-na-stiahnutie /lidl-csr-report-2017_sk.pdf.

- Sroka, W. and Lőrinczy, M. (2015). 'The Perception of Ethics in Business: Analysis of Research Results,' Procedia Economics and Finance, 34, 156–163. DOI: https://doi.org/10.1016/S2212-5671(15)01614-7.

- Stopka, O., Chovancová, M., Ližbetin, J., and Klapita, V. (2016). 'Proposal for optimization of the inventory level using the appropriate method for its procurement,' Nase More, 63 (3), 195–199. DOI: 10.17818/NM/2016/SI22.

- Strand R. (2006). 'The Stakeholder Dashboard, Greener Management International,' DOI: 10.9774/ GLEAF.3062.2006.su.00005.

- Strand R. (2014). 'Strategic Leadership of Corporate Sustainability,' *Springer – Berlin,* DOI: 10.1007/s10551-013-2017-3.

- Teraz.sk. (2018). 'Tesco získalo ocenenie Via Bona 2017,' *teraz.sk.* [Online], [06-02-2020], Available: https:// www.teraz.sk/slovensko/tesco-ziskalo-ocenenie-via-bona-2017/319168-clanok.html.

- Venhartová, J. (2019). 'Potravinári chcú prispieť k ochrane životného prostredia,' *SITA,* [Online], [05-02-2020], Available: https://ekonomika.sme.sk/c/22281402/potravinari-chcu-prispeit-k-ochrane-zivotneho-prostredia.html.

- Zraková,D., Kubina, M. and Koman, G. (2017). 'Influence of information-communication system to reputation management of a company,' Procedia Engineering. ISSN 1877-7058, 192. 1000–1005. DOI: https://doi.org/10.1016/j.proeng.2017.06.172.

Disability as The Self-Employment Stimulant for People with Disabilities in Poland And Other Countries

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Abstract

The purpose of this article is to determine the interest of people with disabilities in taking up self-employment and whether their health status and other health conditions such as various types of diseases and their intensity facilitate the decision about undertaking self-employment or remain major barriers in this respect. The research conducted by Ricardo Pagan in thirteen European Union countries, published in 2009, became the inspiration to develop this study and perform the respective research. Seeking the answer to the question of whether the disabled are willing to undertake self-employment on a larger scale than non-disabled people and whether, in this respect, their disability constitutes a barrier or a stimulant was adopted as the basic research problem. Unfortunately, Poland was not included in the research and, therefore, this study and its results may fill in the existing gap. The additional justification for taking up these problems is a significant lapse of time since the publication of Ricardo Pagan's research results. In the context of dynamic changes occurring within the last dozen or so years on the global labour market, it has become an important incentive to address it in this study. Thus, the conducted research is a part of the more extensive global research in the field of self-employment, as well as entrepreneurship of the disabled, allowing better understanding and also popularizing these problems. The article presents a descriptive and comparative analysis based on the studies covering the leading world literature and statistical data supported by the survey results conducted among over 450 self-employed Polish disabled entrepreneurs. The research timeframe covered 2014-2018, due to the significant transformations occurring on Polish labour market and the availability of consistent and revised statistical data.

Keywords: Disability, Entrepreneurship, Self-Employment.

Introduction

People with disabilities are present in all countries worldwide and constitute 10 to 15% of every population ILO (2014) and World Bank (2011). They are generally less competitive on the labour market, presenting relatively low economic activity. They are commonly included among the disadvantaged groups at risk of marginalization resulting from unemployment. Unemployment, comparing to non-disabled people, definitely limits their opportunities to participate in social life Barnes (2008). They suffer poverty and deprivation more often, they are also discriminated in the economic sphere Barnes, Mercer et al. (1999). In many countries, in particular the highly developed ones, the disabled function in the society owing to the developed social programs. Their role is focused on, e.g., reducing the distance between people with different disabilities and the able-bodied ones in diverse aspects of social and professional life. Various programs devote much space to counteracting unemployment of people with disabilities. It is widely recognized that

unemployment is the main reason for their marginalization Palmer et al (2002). Researchers also notice that the limitations experienced by the disabled impose seeking alternative, to a full-time job, forms of professional activity Blanchflower (2000), Brown (2006).

In the light of Ricardo Pagan's research results, the disabled undertake self-employment more often than the non-disabled people. The differences in self-employment, in favour of the disabled, were particularly evident in southern countries such as Greece and Portugal, i.e. the countries recording a relatively high unemployment rate. In the countries where, at that time, unemployment was a much less significant problem (Germany, the Netherlands, United Kingdom), such extensive differences were not recorded. The research conclusions also indicate that the severely disabled people (with large limitations in their daily activities) are more likely to take up self-employment than others with milder impairments or even the able-bodied individuals. It means that the health condition and the disease specificity can stimulate disabled people towards self-employment instead of working full-time. Such persons choose self-employment as an option to accept their disability and adjust it to their professional life in the context of the absence of suitable, for them, forms of employment Pagan (2009). It can, therefore, be adopted that health condition and some dysfunctions can act as an incentive to undertake the effort of self-employment and thus implementing entrepreneurial attitudesThis section should follow keywords. This section should provide background of the study and highlight research motivation.

Entrepreneurship Vs. Self-Employment – Literature Overview

The world literature covers extensively the problems of people with disabilities, including their social and labour market situation. Their particularly susceptibility to exclusion from the labour market, or their low competitiveness on this market is frequently highlighted. However, much less scientific attention is devoted to their entrepreneurship. Simultaneously, the absence of statistical data in this respect is widely emphasized Blanchflower (2000), Brown, Farrel and Sessions (2006), Hyytinen and Rouvinen (2008). The mainstream publications, however, are focused on employment and unemployment problems, rather than entrepreneurship. Some authors have adopted the measurement of entrepreneurship through the prism of self-employment as a solution to this situation.

A typical example of an entrepreneurship idea implementation is the new business entity registration, a new division of the existing enterprise, or intra-corporate activities Lumpkin (1996). Entrepreneurial attitudes are also visible in the decision-making situations involving risk and uncertainty, e.g., when deciding to purchase goods at current prices with an intention of their future resale not knowing their future prices Knight (1942). Innovative attitudes and activities of individual employees or the entire teams also represent the manifestations of entrepreneurship. They can be shown through, e.g., developing and launching new products or services, new production methods, entering new markets, attracting new suppliers and changing the industry Schumpeter (1934). Entrepreneurship and an entrepreneur are, therefore, associated with the implementation of innovative activities consisting in providing the existing resources with the new production and organizational capacity Drucker (1985).

Classical approach to the problem of self-employment in literature refers to this form of economic activity and the implementation of entrepreneurial ideas as the ultimate solution to racial, gender, ethnic or disabled people problems by arranging work for these groups Clark and Drinkwater (1998), frequently supported by the state Blanchflower (2000). Self-employment was also described as social reintegration or the program for improving qualifications and acquiring new skills useful after finishing self-employment Bruce and Schuetze (2004).

Some researchers emphasize the idea of entrepreneurship implementation through self-employment as the method to ensure greater work flexibility and better working environment adaptation to the physical possibilities resulting from disability. It refers to the working time, conditions and performed tasks Doyle (2002), Boylan and Burchardt (2002). Moreover, self-employment can serve as a potential tool for the occupational rehabilitation facilitating faster and better integration of people with disabilities on the labour market Arnold and Seekins (2002).

Disability Vs. Self-Employment – Literature Overview

The existing research shows that disability can be stimulating in taking the risk of starting and running a business and also the reason for closing it. Deteriorating health, contracting diseases or dysfunctions may prevent the disabled from performing work at the level satisfying their employer. Such individuals, unable to continue their current career path, may switch to self-employment. In turn, those who run a business, but their drastically deteriorating health prevents them from running a business can be forced to abandon self-employment and become inactive or seek employment in sheltered workshops Kendall et al. (2006); Callahan et al. (2002).

The choice of a professional career path as an entrepreneur results from the possibility of better functioning conditions and solving the disability related problems Arnold and Seekins (2002); Hagner and Davies (2002). It is also true that some employers can adapt working conditions to the capabilities of the disabled, however, it is not a rule and does not change the overall picture of their functioning at work Batavia and Schriner (2001). The self-employed disabled are exposed to various barriers hampering their functioning in the business environment. However, there is a widespread recognition of the need for their elimination to support self-employment or switching from full-time employment to this option Piggott et al (2005). The disabled choosing self-employment must also take into account that it is connected with greater stress at work as well as hard work, long working hours, emotional energy and, above all, risk Buttner (1992); Kaufman (1999). The attractiveness of self-employment can also be associated with freedom of choice and independence. The disabled often need additional facilities, e.g., work schedule flexibility resulting from their treatment and rehabilitation process Arnold and Seekins (2002); Hagner and Davies (2002). In addition, some diseases affecting the disabled virtually prevent them from functioning in the work environment (machinery, equipment, means of transport and other people). According to some researchers, people suffering from ADHD consider entrepreneurship an attractive career path allowing the work environment adjustment to ADHD symptoms (e.g. different energy levels, changes in attention focus, problems with routine activities) Shepherd and Patzelt (2018) and also Wiklund et al. (2016).

Shepherd and Patzelt present US statistics confirming that the disabled are more than twice willing to become self-employed than the non-disabled individuals. Therefore, it seems that the limitations resulting from health problems motivate them to choose the entrepreneurial career, which provides flexibility in taking care of their health needs and receiving treatment Shepherd and Patzelt (2018). Similar conclusions were also formulated by Ricardo Pagan, based on the research results from thirteen EU countries, along with identifying certain disproportions between the analysed countries Pagan (2009).

Disabled People on The Labour Market

Researchers argue that an important reason for choosing self-employment is the desire to leave unemployment and economic inactivity Shima et al. (2008), which is even more significant considering that the disabled are less competitive on the labour market comparing to non-disabled

people. On average, the disabled are characterized by lower education, no professional experience, greater absence from work, additional privileges limiting their working time, greater requirements regarding working conditions, health and personal care, lower efficiency and flexibility in the performed tasks Gramenos (2017). It can, therefore, be adopted that those attempting to leave unemployment or return to the labour market are forced to achieve it through self-employment. An additional reason is the employers' reluctance to employ them under the quota system. This system, functioning in many countries and imposing the obligation to employ a certain percentage of people with disabilities under financial penalty, in practice, may have an opposite effect to the assumed one. Employers may present negative attitudes towards the disabled and approach their employment as a compulsion rather than the expected benefits of their work Niehaus & Bauer (2013).

The situation of the disabled on the labour market and their willingness for self-employment results, to some extent, from demographic changes. Population aging and demographic crisis in many highly developed countries impose significant changes on the labour market. The disabled are becoming an increasingly attractive workforce, which may turn out a disadvantage in developing entrepreneurship among them.

In Polish law, a disabled person is recognized, pursuant to the Act dated 27 August 1997 on professional and social rehabilitation and employment of people with disabilities, a person having permanent or periodic inability to fulfil social roles due to permanent or long-term body impairment, causing incapacity for work. A disability certificate is issued for persons under 16 and for those aged 16 and over, a disability gradation certificate stating mild, moderate or severe disability.

Art. 4. (1) of the Act dated 27 August 1997 provides that severe disability describes a person with physical impairment, unable to work or able to work only in sheltered employment and requiring, to perform social roles, permanent or long-term care and assistance of other persons due to the inability of living independently. A moderate disability refers to a person with physical impairment, unable to work, or able to work only in sheltered employment or requiring temporary or partial assistance of others to perform social roles. A mild disability describes a person with physical impairment significantly reducing the ability to perform work, compared to the ability of a person with similar professional qualifications presenting full mental and physical functionality, or with limitations in performing social roles to be compensated using orthopaedic items, aids or technical means (MF,L&SP 2020).

The quoted statutory provisions, characterizing disability grading, suggest that the mildly disabled should perform the best on the labour market. In turn, the severely disabled remain at the other end, for whom the only choice is either sheltered employment or leaving the labour market.

In 2014-2018 a significant improvement in the overall situation on Polish labour market was observed. This is confirmed by the data collected under the Labour Force Survey (LFS), conducted by the Statistics Poland (SP) and the data from labour offices' records regarding the registered unemployment presented by MF,L&SP.

In the light of LFS survey results, in 2014-2018, the economic activity rate and employment rate increased, whereas unemployment measured by the unemployment rate and the number of the unemployed declined significantly (Tab. 1).

Table 1: Non-disabled and disabled people on the Polish labour market according to LFS in 2014-2018

Year	Annual report							
	Total	Economically active			Economically inactive	Economic activity	Employ-ment rate	Unemploy-ment rate
		total	employed	unemployed				
	thousand					%		
Non-disabled								
2014	20 846	16 394	14 924	1 471	4 452	78,6	71,6	9,0
2015	20 743	16 350	15 123	1 228	4 393	78,8	72,9	7,5
2016	20 394	16 183	15 187	996	4 211	79,4	74,5	6,2
2017	20 179	16 099	15 309	789	4 080	79,8	75,9	4,9
2018	19 890	16 020	15 402	627	3 869	80,5	77,4	3,9
Disabled								
2014	1901	516	434	83	1385	27,1	22,8	16,1
2015	1864	483	419	63	1381	25,9	22,5	13,0
2016	1773	476	421	55	1297	26,8	23,7	11,6
2017	1680	486	442	45	1194	28,9	26,3	9,3
2018	1625	460	426	33	1166	28,3	26,2	7,2

Source: SP – LFS, (2019) and MF,L&SP, (2019)

However, the differences in the level of economic activity referring to the disabled and non-disabled did not disappear significantly. In 2018, people with disabilities were still almost three times less economically active and worked three times less often. The unemployment of the disabled was approx. twice as high and its decline rate was slightly lower than for the non-disabled (Figure 1).

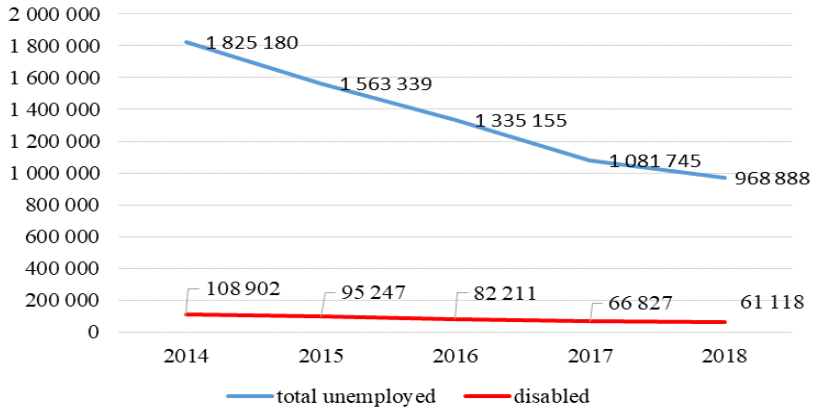

Figure 1: Total registered unemployed and disabled in Poland in 2014-2018.
Source: MF,L&SP data (2019)

In the labour offices' records, almost half of the unemployed disabled were the individuals suffering from either severe and moderate disability (Figure 2).

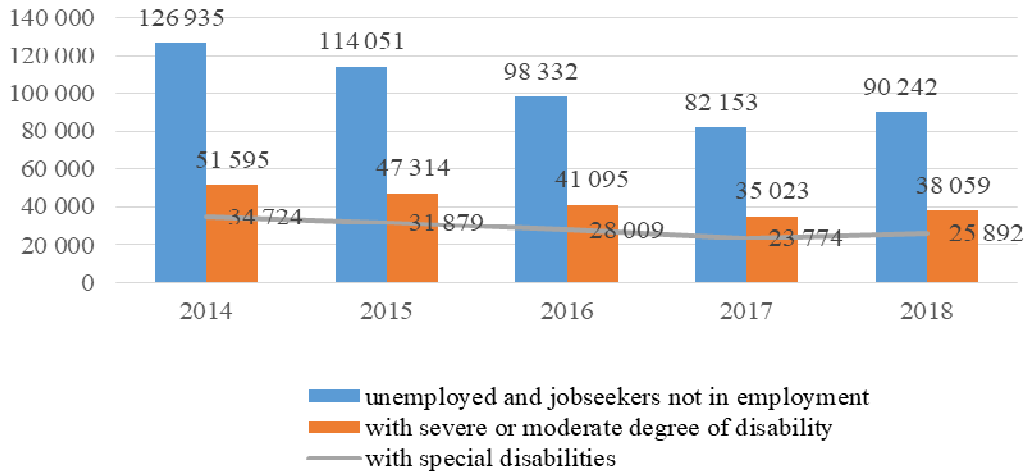

Figure 2: Total registered unemployed and jobseekers and the disabled in Poland in 2014-2018.

Source: (MF,L&SP data 2019)

In 2014 their number was almost 52 000, i.e. over 43%, whereas five years later over 38 000, i.e. over 62% of the unemployed disabled people. It shows that those with severe disability had most problems with finding a job and leaving unemployment.

Self-Employment of People with Disabilities in Poland

Based on LFS surveys, conducted in 2014-2018, there is a clear difference between self-employment of the disabled and non-disabled people, primarily in 2016-2018 (Figure 3).

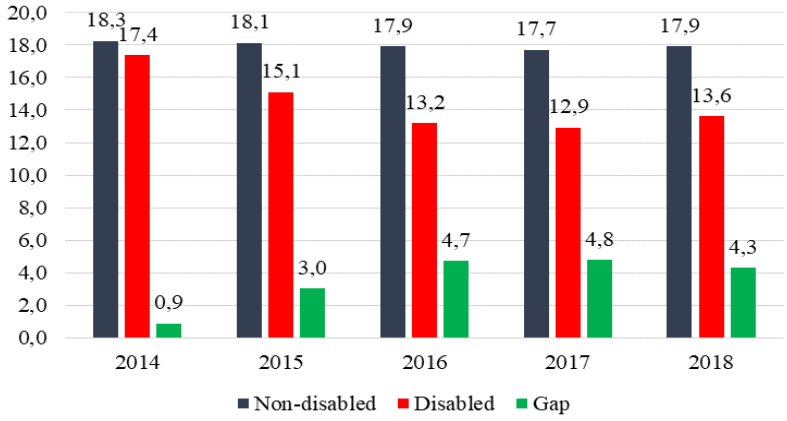

Figure 3: Percentage of self-employed disabled and non-disabled people aged 15/16 (i) and more in Poland in 2014-2018

Source: (SP –LFS 2019) and (MF,L&SP data 2019).

In 2014-2018 the percentage of self-employed non-disabled people against total employment remained at a relatively stable level ranging from 18,3% to 17,7% of total employment. In the case of the disabled it was a few percentage points (pp.) lower, reaching the lowest 13,6% level in

2018, i.e. 4,3 pp. less than for the non-disabled, in 2014 this difference was only 0,9 pp. Even greater disproportions between the self-employed non-disabled people and the total population of Poland are noticeable by referring the number of self-employed to the total population aged 15/16 and over and to the total working population (Figure 4).

Regarding the self-employed percentage against the total population aged 16 and over, the disabled are almost four times less often self-employed than the total population of Poland. Much smaller disproportions occur when comparing the self-employed to the economically active population (2,4 – 5,7 pp).

Information on self-employment of the disabled in Poland can also be obtained from PFRON (State Fund for the Rehabilitation of the Disabled). PFRON registers information about the self-employed disabled, whose percentage against those reported in LFS reaches approx. 30%. These data cover active economic entities run in the form of self-employment by persons with a valid disability certificate.

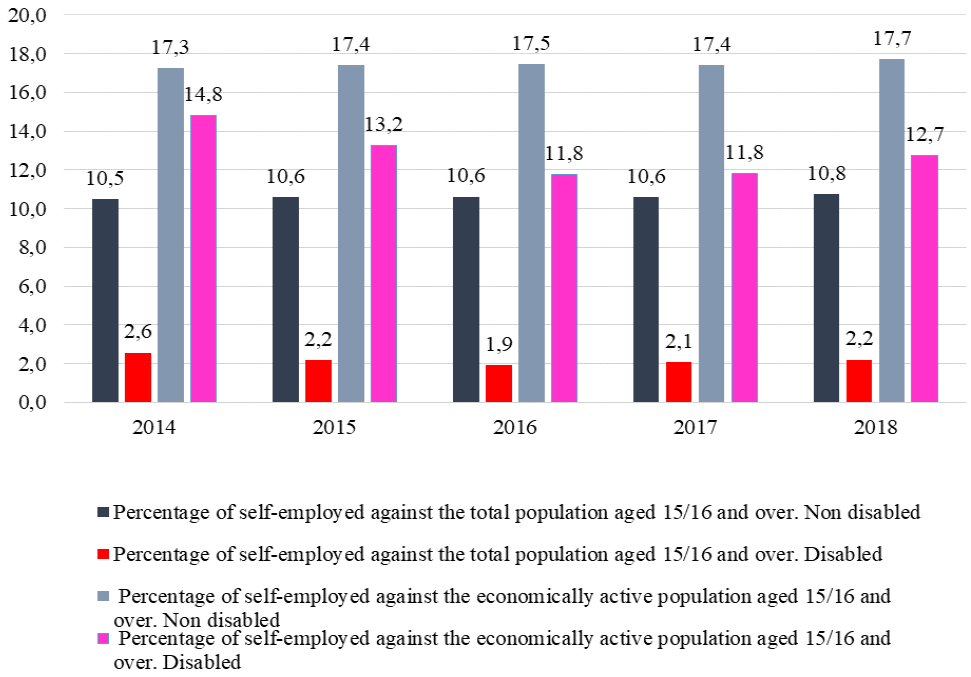

Figure 4: Self-employed against the total population aged 15-16 and over in 2014-2018
Source: (SP –LFS 2019) and (MF,L&SP data 2019).

Based on PFRON data, the number of self-employed with disabilities decreased in 2014-2018. In 2014 their number amounted to 23,978, i.e. over 10% in relation to the disabled employed full-time in sheltered workshops and working for employers in the open labour market (Tab. 2).

Table 2: Number of the disabled employees and self-employed persons registered in PFRON in Poland in 2014-2018

Year	Disabled people							
	degree of disability						Total	
	Severe		Moderate		Mild			
	employed	self-employed	employed	self-employed	employed	self-employed	employed	self-employed
2014	17 840	2 049	144 678	11 913	67 446	10 016	229 964	23 978
2015	18 819	2 003	148 988	12 188	64 648	9 173	230 298	23 364
2016	19 691	2 012	157 640	12 762	68 824	9 081	246 154	23 855
2017	20 598	2 017	159 071	12 567	69 521	8 293	249 190	22 877
2018	20 660	1 995	154 092	12 536	66 111	7 945	240 863	22 476

Source: PFRON-SODiR (2020).

In 2018, their number reached 22,476, i.e. less by over 1500 people. The self-employed constituted 9,3% of total employment registered in the Fund that year. The drop in the number of self-employed disabled people was most noticeable among those with mild disability, whose number was over 10,000 in 2014. Five years later, over two thousand less. Minor changes occurred among the severely disabled, who received the reimbursement of social security contributions resulting from their self-employment. In 2014 their number was 2049 and in 2018 – 1995, i.e. 54 less. The number of moderately disabled running their own business increased by 623 people.

The changes in the structure of self-employed disabled people, depending on the degree of disability are particularly visible in Figure 5.

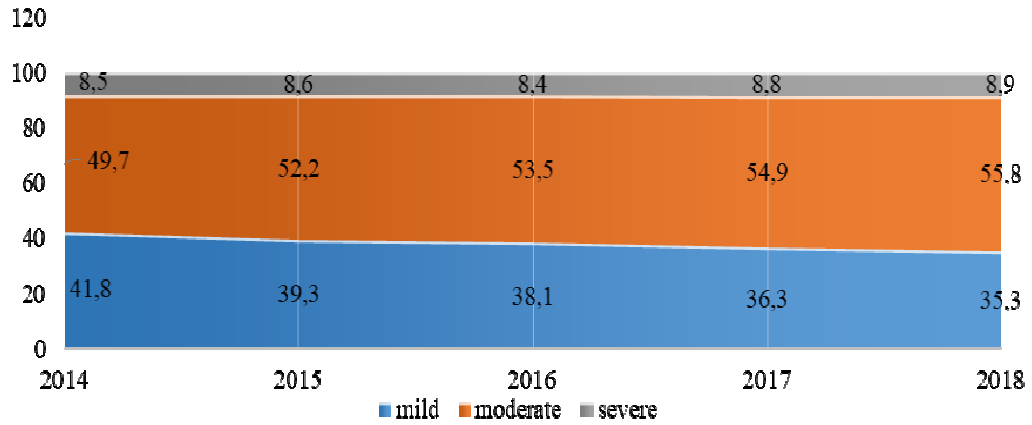

Figure 5: The structure of self-employed disabled people depending on the degree of disability based on PFRON data in 2014-2018

Source: PFRON-SODiR (2019).

The above data show that mainly the mildly disabled give up economic activity. Their share in 2014-2018 decreased by 6,5 pp. Therefore, those with the relatively smallest dysfunctions, for whom running their own company is theoretically the least problematic, most often abandon this

form of participation in the labour market. In turn, people with significant health problems, large psycho-physical impairments undertake the effort of self-employment more frequently.

Disability Vs. Self-Employment of Disabled People – Survey Results

To supplement information about the impact of disability on self-employment of the disabled, a survey was conducted in 2019 among almost 15,000 disabled entrepreneurs registered in PFRON from all over Poland. Answers were collected from 452 respondents, with 447 full answers. The answers were provided by people holding severe, moderate or mild disability certificates, and in some cases certificates of specific disabilities (ii). Disability in certain conditions does not have to prevent self-employment. If the subject and scope of economic activity is adjusted to the physical and physical possibilities of the disabled, self-employment is not only possible but, in fact, the only form of economic activity of the disabled.

In the light of the survey results, the moderately and severely disabled people – i.e. with the most severe impairments – constituted the largest group among the respondents (Figure 6).

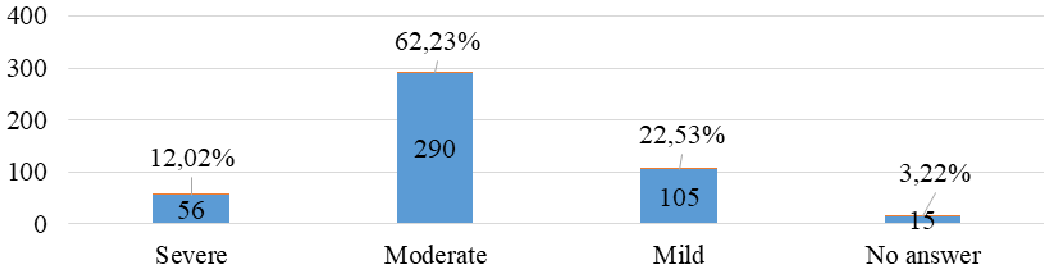

Figure 6: The disabled entrepreneurs covered by the survey according to the disability degree

Source: Survey results

The question regarding the degree of disability was answered by 451 respondents, of whom 290, i.e. over 62,2%, indicated moderate disability, and 56 severe disability (over 12%). People with the mildest disability (holding the certificate of mild disability) constituted slightly over 22,5% (105 respondents).

Among all respondents, the largest group suffered from musculoskeletal impairments (iii) (Figure 7). In the group of 450 respondents who answered the question about the type of disease, over half indicated musculoskeletal disorders (254 responses, i.e. over 54,5%) of all provided answers.

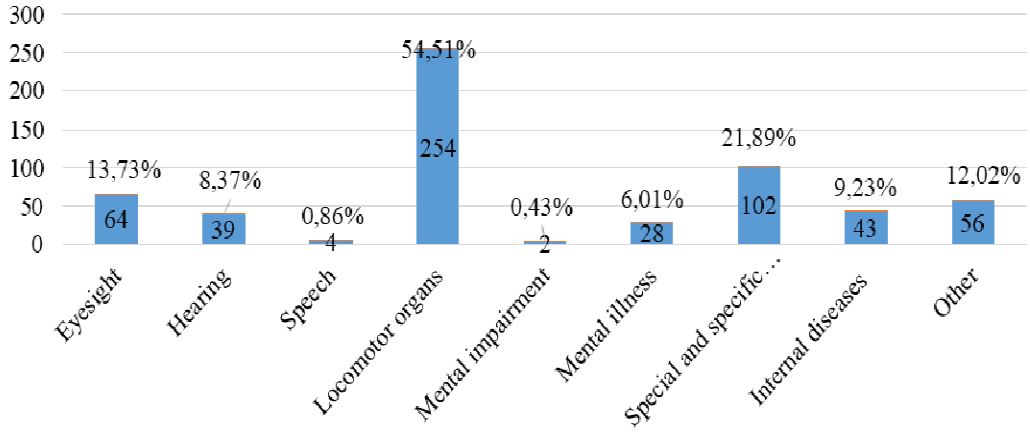

Figure 7: The disabled entrepreneurs covered by the survey according to the disability degree

Source: Survey results.

The respondents indicating internal diseases (102 indications to this type of disease – almost 21,9%) and vision impairments (64 indications, i.e. over 13,7% of all responses to this question) constituted a significant group. Mental, psychiatric and speech disorders were indicated least frequently.) The total of these three types of illnesses accounted for slightly over 7% of all the received responses.

Conclusion

In the course of conducted literature studies and statistical data analysis, the generally worse situation of the disabled on the labour market in 2014-2018 was confirmed, comparing to the non-disabled or the total population of Poland. Although the overall improvement on the Polish market also involved the disabled, it was to a much lesser extent than regarding the non-disabled people. Concerns are raised by the fact that 40% share of the registered unemployed disabled persons are those with the most severe disabilities and one-third with special diseases (iiii). People with special diseases (similarly to the specific diseases) are particularly "valuable" for employers, as their employment brings additional financial benefits (iiiii). Therefore, their large percentage among the unemployed is worrying. It could be concluded that these financial benefits are not attractive enough to balance the need for additional expenditure on their employment.

The information obtained from LFS indicates lower interest of the disabled in self-employment than in the case of non-disabled people. Therefore, in the case of Poland, the conclusions of Ricardo Pagan's research, who stated that in the surveyed 13 EU countries the percentage of self-employed disabled people was higher than the non-disabled ones were not confirmed. However, his observations about disability having a positive effect on self-employment were confirmed. Both surveys and data obtained from PFRON show that the moderately disabled constitute the largest percentage in the group of self-employed disabled people. They constitute over 62% in the entire subpopulation of the self-employed. Interestingly, a significant percentage (almost 22%) refers to those with certified specific and special diseases. It indicates that only in this way people with the most severe diseases can find a place for themselves on the labour market. Among the self-employed, the most numerous group, according to the survey results, were the disabled with musculoskeletal impairments. It shows that through self-employment they are able to use their

physical abilities best and minimize the negative effects of the dysfunctions resulting from their disability.

People with disabilities are able to function in a society and on the labour market if provided with proper conditions. Being less competitive on the labour market than the non-disabled candidates, they are forced to seek alternative, to full-time employment, forms of the labour market participation. Based on the research results and literature studies only some take up self-employment, frequently forced to do so because the available jobs fail to meet their psycho-physical needs. Sometimes the reason is the desire to become independent from the rigid working conditions and use disability as an incentive to implement the idea of entrepreneurship. Disability can be a stimulus for self-employment, however, as in the case of non-disabled people, individual predispositions will be decisive. For some people, disability will remain a barrier, whereas for others an incentive to choose the path of self-employment.

Footnotes

(i) In Poland, the economic activity research conducted by the Statistics Poland presents data for the disabled aged 16 and over, because until the age of 15 only the disability certificate is issued and from 16 years of age also the degree of disability and types of diseases. For the general population the age of 15 and over is adopted.

(ii) Specific disabilities certificates refer to the disabled diagnosed with the conditions particularly difficult to perform work: Parkinson‘s disease, multiple sclerosis, paraplegia, tetraplegia and hemiplegia, vision impairment, hearing impairment, HIV positive and AIDS, epilepsy, chronic mental diseases, mental retardation, myasthenia gravis, late complications of diabetes.

(iii) The total of 592 responses was collected, because the question allowed providing several answers, since some respondents suffered from several diseases.

(iiii) Special diseases include mental retardation, mental illness, voice, speech and hearing disorders, vision impairment, musculoskeletal impairment, epilepsy, respiratory and circulatory diseases, gastrointestinal diseases, genitourinary diseases, neurological and other diseases, including endocrine, metabolic, enzymatic disorders, infectious and zoonotic diseases, malformations, haematopoietic disorders, holistic developmental disorders such as autism or Asperger’s syndrome. Some of these special diseases are also classified as specific diseases. Both types of conditions, i.e. special and specific are additionally certified and used by employers to obtain higher wage subsidies and to reduce the quota employment rate of the disabled.

(iiiii) E.g. larger employment subsidies and/or lower mandatory employment rate under the quota system in force in Poland. Such persons require special working conditions and often additional assistant and medical care.

References

- Act dated 27 August 1997 on professional and social rehabilitation and employment of people with disabilities, *Journal of Laws 1997 No. 123* item 776,

- Arnold, N., and T. Seekins. (2002). Self-employment: A process for use by vocational rehabilitation agencies. *Journal of Vocational Rehabilitation 17:* 107–113,

- Barnes C. (2008), Mercer G. Niepełnosprawność, Sic!, Warszawa 2008, pp. 78
- Barnes C., Mercer G., Shakespeare T. (1999), Exploring Disability, Cambridge: Polity.: 12-14.
- Batavia, A.I., Schriner, K. (2001). The Americans with disabilities act as engine of social change: Models of disability and the potential of a civil rights approach. *Policy Studies Journal, 29(4)*.: 690–702.
- Blanchflower D. (2000), Self-employment in OECD countries. *Labour Economics* 7/2000: 471–505.
- Blanchflower, D., Oswald A. (1998). What makes an entrepreneur? *Journal of Labour Economics 16*, No. 1.
- Boylan, A., Burchardt T. (2002). Barriers to self-employment for disabled people, Report for the Small Business Services. London: Department of Trade and Industry.
- Brockhaus, R. (1980). The effect of job dissatisfaction on the decision of start a business. *Journal of Small Business Management 18*, No. 1: 37–43.
- Brown, S., Farrel L., Sessions J.(2006),. Self-employment matching: An analysis of dual earner couples and working households. *Small Business Economics* 26, no. 2/2006: 155–172.
- Bruce, D., and H. Schuetze. (2004). The labour market consequences of experience in self-employment. *Labour Economics 11*: 575–598.
- Buttner, H. (1992). Entrepreneurial stress: Is it hazardous to your health. *Journal of Managerial Issues 4*, No. 2: 223–240.
- Callahan, M., Shumpert, N., & Mast, M. (2002). Self-employment, choice and self-determination. *Journal of Vocational Rehabilitation, 17(2*), 75–85.
- Clark, D., and S. Drinkwater. (1998). Ethnicity and self-employment in Britain. *Oxford Bulletin of Economics and Statistics 60*: 383–407.
- Doyle, A. (2002). A realistic perspective of risk in self-employ employment for people with disabilities. *Journal of Vocational Rehabilitation 17*: 115–24.
- Drucker, P. F. (1985). Innovation and Entrepreneurship: Practice and Principles. New York, USA: Harper Business.
- Grammenos S. (2017) ANED - Academic Network of European Disability Experts, European comparative data on Europe 2020 & People with disabilities. *Final report January 2017*.
- Hagner, D., & Davies, T. (2002). "Doing my own thing": Supported self-employment for individuals with cognitive disabilities. *Journal of Vocational Rehabilitation, 17(2)*, 65–74.
- Hyytinen, A., and P. Rouvinen. (2008). The labour consequences of self-employment spells: European evidence. *Labour Economics 15*: 246–271.

- ILO (2014) International Labour Organization (ILO), Achieving Equal Employment Opportunities for People with Disabilities through Legislation Guidelines, Geneva 2014.
- Kaufmann, P. (1999). Franchising and choice of self-employment. *Journal of Business Venturing 3*, No. 2: 89–95.
- Kendall, E., Buys, N., Charker, J., & MacMillan, S. (2006). Self-employment: An under-utilised vocational rehabilitation strategy. *Journal of Vocational Rehabilitation 25(3*), 197–205.
- Knight, F. H. (1942). Profit and Entrepreneurial Functions. *The Journal of Economic History. Vol. 2 Supplement: The Tasks of Economic History 1942*: 126-132.
- SP – LFS, (2019), https://stat.gov.pl/obszary-tematyczne/rynek-pracy/pracujacy-bezrobotni-bierni-zawodowo-wg-bael/aktywnosc-ekonomiczna-ludnosci-polski-ii-kwartal-2019-roku,4,34.html (retrieved: 08.01.2020).
- Lumpkin, G. T. & G. G. Dess (1996). Clarifying The Entrepreneurial Orientation Construct and Linking It to Performance. *The Academy of Management Review, 21(1)* 1996: 135-172.
- Ministry of Family, Labour and Social Policy MF,L&SP, (2019) p. http://niepelnosprawni.gov.pl/p,80,rynek-pracy (retrieved: 8.01.2020).
- Ministry of Family, Labour and Social Policy MF,L&SP, (2020), http://niepelnosprawni.gov.pl/p,164,orzekanie-o-niepelnosprawnosci-i-stopniu-niepelnosprawnosci-statystyki, (retrieved: 05.01.2020).
- Niehaus, M., & Bauer, J. (2013). Chancen und Barrieren für hochqualifizierte Menschen mit Behinderung: Übergang in ein sozialversicherungspflichtiges Beschäftigungsverhältnis; Pilotstudie zur beruflichen Teilhabe; Abschlussbericht. Bonn: Aktion Mensch e.V.
- Pagan R. (2009). Self-employment among people with disabilities: evidence for Europe *Disability & Society,* Vol. 24, No. 2, March 2009, 217–229.
- Palmer G., Mohibur R., Kanway P. (2002). Monitoring poverty and social exclusion., New Policy Institute, Joseph Rowntree Foundation, York, 2002. p. https://npi.org.uk/files/6813/7544/7027/MPSE_full_2002.pdf (retrieved: 23.01.2020).
- PFRON-SODiR (2020). *[Support System for Co-funding and Refunding]* http://www.pfron.org.pl/
- Piggott, L., B. Sapey, and F. Wilenius. (2005). Out of touch: Local government and disabled people's employment needs. *Disability & Society 20, No. 6*: 599–611.
- Schumpeter, J. A. (1934). The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle. Cambridge, MA.: Harvard University Press 1934.
- Shepherd D. A., Patzelt H. (2018), Entrepreneurial Cognition. Exploring the Mindset of Entrepreneurs. Palgrave Macmilan, 2018.

- Shima, I., Zólyomi, E., & Zaidi, A. (2008). The labour market situation of people with disabilities in EU25. Vienna: European Centre for Social Welfare Policy and Research 2008.

- Vornholt K., Vilotti P., Muschalla B., Bauer J., Colella A., Zijlstra F. (2018), *Disability and employment – overview and highlights, Volume 27*, Issue 1.

- Wiklund, J., Patzelt, H., & Dimov, D. (2016). Entrepreneurship and psychological disorders: How ADHD can be productively harnessed. *Journal of Business Venturing Insights, 6*, 14–20.

- World Bank (2011) The World Report on Disability, The World Bank, ttp://documents.worldbank.org/curated/en/665131468331271288/pdf/627830WP0World00PUBLIC0 0BOX361491B0.pdf.

The Method for Determining the Angle of Rotation of The Image Using the Hough Transform

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Abstract

The success of text recognition, when using machine vision, directly depends on the quality of the preliminary processing of the image, as a result of which the image is obtained from the original image . At the stage of detecting text areas by methods of mathematical morphology in an image with laser engraving, the authors encountered a problem that arises when the label with text id (next label) is rotated in front of the image pickup device by an angle greater than 20º: the area containing the text is not detected. The article is devoted to the presentation of the methodology proposed by the authors to solve this problem. The Hough transformation, developed in 1962, is an excellent tool for finding straight lines in an image. The authors used this algorithm, finalizing a preliminary analysis of areas to find the angle of deviation of the label. The article provides a description of the technique for rotating the image of a label made by laser engraving on metal, as well as the results of testing the technique, proving its performance and effectiveness.

Keywords: Hough Transformation, Dynamic Determination of The Angle of Rotation of The Image, Image Processing Before Recognition.

Introduction

In recent decades, there has been a rapid increase in interest in visual systems technologies, including computer vision, image analysis and processing. Initially, the main reason for this was the powerful progress of computer technology, then-the introduction of robotic systems in the industry, and recently-the ubiquity of mobile devices equipped with video cameras. At all stages of development of technologies of visual systems the list of basic tools necessary for this purpose, such as morphological filtration, fast calculation of convolutions, selection of borders, color adaptation and so on was replenished. Among foreign scientists who have made a significant contribution to the

development of image analysis, it is worth noting R. Deresh, B. Horn, K. Shapiro, G. Finlayson, and among domestic - V. L. Arlazarov, M. M. Bongard, Yu. V. Vizilter, S. Yu. Zheltov, Yu. I. Zhuravlev, D. S. Lebedev, B. M. Miller, V. A. Soifer and P. A. Chochia.

Recognition operations on images of certain objects are usually preceded by image processing to create conditions that improve the efficiency and quality of selection and recognition of the desired or studied objects. The methods of mathematical morphology are an excellent tool for highlighting the text area on the image with laser engraving [1]. But when turning the label at an angle of more than 20º, there is a problem of selecting the text area, due to the fact that the algorithm proposed by the authors [1] is not isotropic, due to differentiation only in the horizontal direction (Fig. 1). The purpose of this work is to solve the problem arising when turning the label in front of the image capture device with the lowest resource consumption. The proposed method of eliminating this drawback is based on a preliminary analysis of the image regions, the construction of the Hough space, on the basis of which the angle of deviation of the tag with laser engraving from the horizontal position on the image is determined.

The Hough transform is recognized as one of the most popular methods for detecting straight lines and other parametrically described shapes in discrete images. This transformation was discovered by Hough [2] in 1962, the advantage of Hough's algorithm over similar algorithms lies in its durability and stability when working with noisy images.

Fig.1: The illustration of the drawback of text area selection by mathematical morphology methods, when the label is rotated by an angle of more than 20º

R.Duda and P.Hart [3] applied this algorithm with some improvements to computer vision. D.H.Ballard provided a generalized Hough transform that could find arbitrary shapes of any orientation and any scale [4]. A number of other Hough transform modifications have been proposed for:

a) improving accuracy [5-8];

b) reduction of time costs [9-12];

c) reducing the cost of computer resources (memory) [13, 14].

Additional analysis was done to quantize the space used in the Hough transform [15, 16]. An excellent overview of the problems and methods of Hough transform is given in [8].

Hough transform is mainly used to detect straight lines, which is also applicable to contour analysis [17, 18]. The use of the Hough transform is limited by the fact that this approach allows us to determine only the polar parameters of straight lines, but not the exact position of their pixels [17].

Based on the above, the study of the selected area is extremely relevant in our time.

This article provides a theoretical justification for the technique proposed by the authors and practical implementation in high-level programming language C #.

The method of determining an angle of turning the label

A general idea of the Hough transform for detecting straight lines in a image label made by laser engraving on metal

The main idea of the Hough transform for finding straight lines is that any point of a binary image can belong to some set of straight lines [19]. Consider a point (x_i, y_i) in the *xy*-plane and the general equation of a straight line in slope-intercept form $y = ax + b$. However it is more convenient to represent a straight line using two other parameters ρ and Θ. The parameter ρ is the length of the perpendicular dropped on a straight line from the origin, and Θ – is the angle between this perpendicular and the *x*-axis (fig. 2).

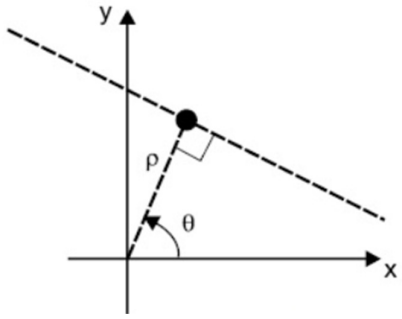

Fig. 2: (ρ, Θ) parameterization of line in the *xy*-plane

The plane (ρ, Θ) is sometimes called the Hough space for a set of lines in the two-dimensional case (also called parameter space) [21].

Infinitely many lines pass through $A(x_i, y_i)$, but they all satisfy the equation $y_i = ax_i + b$ for varying values of *a* and *b*. The all lines pass through *A* corresponds to the next equation [20]:

$$\rho(\theta) = x_i \cdot \cos\theta + y_i \cdot \sin\theta \tag{1}$$

The illustration of formula (1) is shown in fig 3 for two points, that lie on the same straight line with coordinates (x_i, y_i) and (x_j, y_j). Each sinusoidal curve in fig. 3 represents the family of lines that pass through a particular point (x_k, y_k) in the *xy*-plane. The intersection point (ρ', Θ') in fig. 3 corresponds to the line that passes through both (x_i, y_i) and (x_j, y_j).

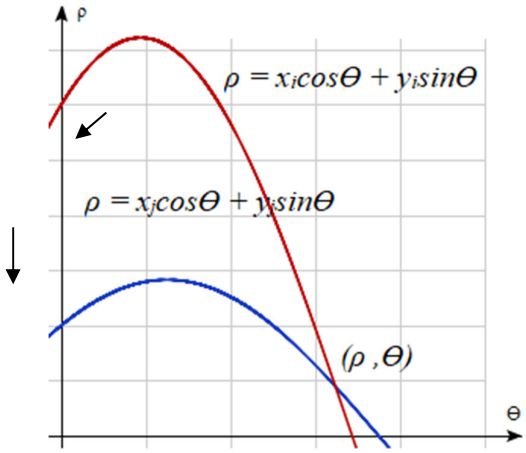

Fig. 3: Sinusoids on the plane ρΘ

The computational attractiveness of the Hough transform arises from subdividing the $\rho\Theta$ parameter space into so-called "accumulator cells" (fig. 4). The cell at coordinates (*p,q)* with accumulator value *A(p,q)* corresponds to the square associated with parameter-space coordinates (ρ_p, θ_q). Initially, these cells are set to zero. Then, for every non-background point (x_i, y_i) in the xy-plane, we let parameter Θ equal each of the allowed subdivision values on the Θ and solve for the corresponding using the equation (1). The resulting values are then rounded off to the nearest allowed cell value along the ρ axis. If a choice of θ_q results in solution ρ_p, we add 1 to value in the cell (there is a voting procedure): *A(p,q) = A(p,q) + 1.* After performing the described procedure for all the studied points (x_i, y_i) which is wrote in *(p,q)* value *A(p,q) = P* means, that there are *P* points t hat lie on the same straight line $\rho_p = x \cdot \cos\theta_q + y \cdot \sin\theta_q$ into *xy-plane.* The number of subdivisions in the $\rho\Theta$-plane determines the accuracy of the co linearity of these points. It can be shown that the number of computations in the method just discussed is linear with respect to *n* the number of non-background points in the *xy-plane*.

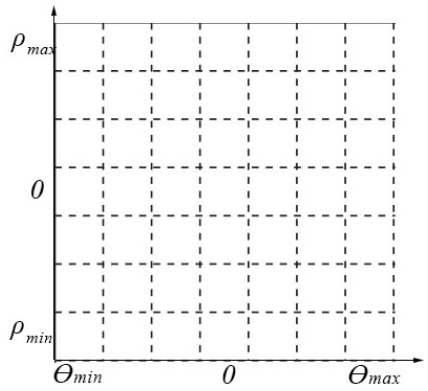

Fig. 4: Division of the into ρΘ accumulator cells

Description of the methodology for optimizing the application of the Hough transform to label images made by laser engraving on metal

To reduce the execution time of the algorithm, the authors propose to pre-analyze the area by the number of pixels contained in it. Assuming that the color of the background pixel is zero, and the color of the object pixel is one, we derive the following technique for analyzing the region.

Let's introduce a filter mask *w(x,y)* with size *m*x*n,* all values this mask is equation to 1. Next, we need to "scan" the input mask of the original image. Scanning consists in the element-by-element multiplication of the image area and the mask, if the sum of the products of elements is less than 60% of the mask area, then this area is not of interest and the Hough transform is not applied to it. The authors consider optimal parameters of the mask size to take no more than 7x7, due to the narrow areas around the text area (fig. 1). Let's derive the formula for the described scanning of areas:

$$w(x, y) \bullet f(x, y) = \sum_{s=-a}^{b} \sum_{t=-b}^{b} w(s,t) \cdot f(x+s, y+t) \geq 0.6 \cdot \sum_{x=0}^{m} \sum_{y=0}^{n} w(x, y) \quad (2)$$

where $a = (m - 1)/2$, $b = (m - 1)/2$.

We use the above technique of scanning areas to build the Hough space of the image shown in Fig. 1 on the left. Initially, the cells of the accumulation are blank (fig. 4). After performing the "voting" procedure, the cells contain different values, display these values in gradations of brightness (the higher the value, the brighter the color). The result is shown in fig. 5, where is the horizontal parameter Θ, the vertical parameter is *p*. The areas of the image with pronounced bursts indicate that the corresponding polar points (cells) are the longest straight lines of the original image.

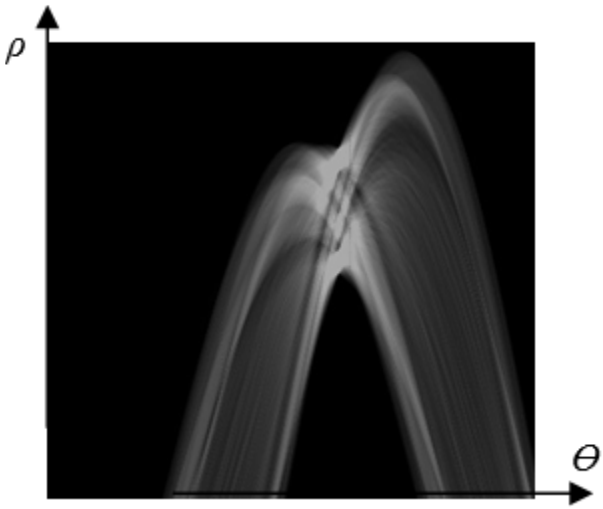

Fig. 5: Hough space for source image

Description of the method of obtaining the angle of rotation using the Hough transform to label images made by laser engraving on metal

In relation to the images of tags with laser engraving, the authors propose the following method of pre - processing images to reduce the angle of deviation of the image of the tag made by laser engraving on metal from the horizontal line.

All images of labels of this type have a wide border around the text area (fig. 4 on the left). Using this property, it is possible to determine that the longest line (in the Hough space has the largest number of votes) containing the pixels of the object will pass along or inside the edging line. As an example, figure 6 on the right shows the longest straight line detected by the Hough algorithm (a white line passing through the border). Knowing the parameter Θ of this line in the future, you can apply the affine transformation "rotation".

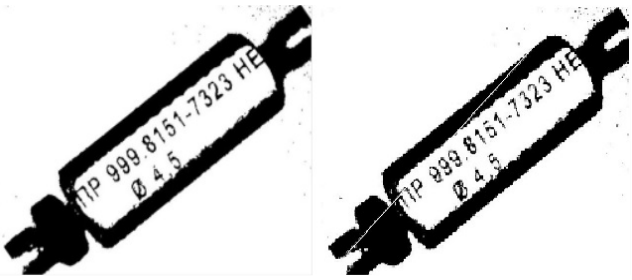

Fig.6: On the left – source image, on the right – found straight line by Hough transform

The full algorithm of the software module, which implements the proposed method of finding the angle of deviation of the image tag made by laser engraving on metal with a preliminary analysis of the areas, consists of the following steps:

1. Capture the image;
2. To perform the process of binarization with adaptive threshold;
3. To do areas analysis using formula (2);

4. To do loop through all the pixels in the area where:

   a. If pixel is black, then to perform the voting procedure for $0^o \leq \Theta \leq 180^o$ according to equation (1);

5. To define the point with more number of votes in Hough space;

6. To do affine transform "rotation" with angle Θ.

As it was shown earlier, the detection of the text area by the method of mathematical morphology described in [1] does not work when the detail is repeated by more than 20º. This disadvantage is eliminated by the introduction of the proposed method of rotation of the image with laser engraving using the Hough method. The result of solving the problem shown in fig.1 is shown in fig. 7

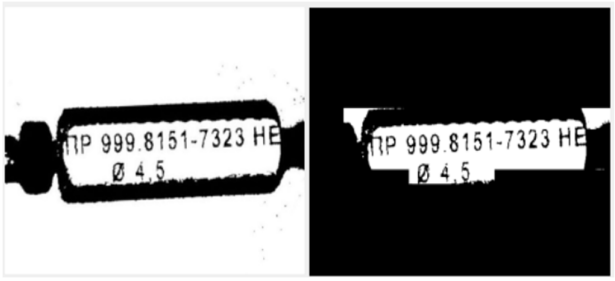

Fig. 7: The result of affine transformation "rotation" on the angle Θ, with further successful localization of the text

As seen in Fig. 7 the text area was detected without loss, later on this image was recognized text without errors.

The practical implementation of the method proposed by the authors was carried out in C# without third-party libraries.

Practical Implementation

For label made by laser engraving on metal, the main part of the software module that implements the proposed technique in C # in Visual Studio Community 2017 is divided into two functions, shown in Listing 1 and Listing 2.

Listing 1

```
/************************************************

The function of preliminary analysis of regions, to which part of
the binarized image is transferred as the first parameter
(BinaryImage img. The BinaryImage class has a pixels property in
which the pixel values of the image are stored. The second and third
parameters transfer the sizes by which the filter mask will be built
(int m , int n), the default filter size is 7x7

************************************************/
public int scanning(BinaryImage img,int m = 7, int n = 7)
{
// initialization and filling of the filter mask
int[,] filter = new int[m, n];
```

```
for (int i = 0; i < m; i++)
    for (int j = 0; j < n; j++)
        filter[i, j] = 1;
//the variable that will store the sum of the product of elements
double sum = 0;
// The cycle in which the rectangular area of the image is scanned
for (int y = 0; y < m; y++)
{
    for (int x = 0; x < n; x++)
    {
/* We do the conversion of the index of a two-dimensional array into
a one-dimensional one, so that we can refer to the corresponding
pixel of the image region of interest*/
        int index = img.height * y + x;
//The implementation of the calculation according to //the formula 2
        sum += filter[y, x] * img.pixels[index];
    }
 }
//We check whether the selected area is suitable for
//further analysis
if(sum >= 0.6*m*n)
    return HoughTransform(img);
}
```

Listing 2

```
/*************************************************

The function that implements the Hough transform, a binarized image
region suitable for analysis is passed as a parameter

*************************************************/
public int HoughTransform (BinaryImage img)
{
//The variables for tracking cells with the maximum
//number of votes (maxVote), and the maximum angle Θ (thetaMax)
int maxVote = 0;
double thetaMAX = 0;
//The variable declarations used in the Hough transform
double theta = 0; /* The variable Θ in formula (1), which will take
the values of the specified range in degrees */
double thetaRadians = 0; //The variable Θ in radians
double ro = 0; //The variable ρ in formula (1)
//D - diagonal distance between the corners of the image.
int D = Convert.ToInt32(Math.Round(Math.Sqrt(Math.Pow(ImageWidth, 2)
+ Math.Pow(ImageHeight, 2))));
// votes - two-dimensional array in which the values
//of votes for the i, jth cell will be stored
int[,] votes = new int[2 * D, 181];
}

for (int y = 0; y < img.height; y++)
{
  for (int x = 0; x < img.width; x++)
  {
```

```
    /*transforming the index of a two-dimensional array into one-
dimensional, so that we can refer to the corresponding pixel of the
image area of interest.*/
    int index = img.width * y + x;
    //pixel is black?
    if (img.pixels[index] == 0)
      {
       // θ  takes values from 0° to 180°
       for (theta = 0; theta <= 180; theta++)
       { //θ conversion from degrees to radians
         thetaRadians = theta * Math.PI / 180;
//we calculate the value of ρ in accordance with the formula (1)
         ro = Math.Round(y * Math.Cos(thetaRadians) + x *
Math.Sin(thetaRadians));
// We make a vote in the cell votes[ρ, θ].
//Adding D to ρ means centering along the y axis.
         votes[(int)ro + D, (int)theta]++;
        /* If there are more votes in the votes [ρ, θ] cell than in
the variable containing the maximum number of votes, then we assign
the value of votes [ρ, θ] to maxVote, and enter θmax = θ, thereby
determining the maximum angle of rotation of the image*/
         if (votes[(int)ro + D, (int)theta] > maxVote)
         {
           maxVote = votes[(int)ro + D, (int)theta];
           thetaMAX = (int)theta;
         }
       }
     }
   }
   // return the maximum angle of rotation of the image
   return thetaMAX;
```

Conclusion

Summarizing, we can say that in the framework of this article, the Hough transform for tag images made by laser engraving was investigated, a theoretical substantiation of the technique for determining the image rotation angle proposed by the authors was also given, and the practical implementation of this technique was given. The main idea of the work was achieved. In the practice, the authors proposed methodology for determining the angle of rotation of the label, made by laser engraving on metal taken using USB devices, photo-video fixing using the Hough transform with a preliminary analysis of image areas. The technique showed high quality of determining the image rotation angle, which subsequently allowed the image to be rotated by the found angle and the deviation from the horizontal line was minimized, the algorithm described in [1] correctly detected the test group, which made it possible, in the future, to transfer these images to standard OCR systems 100% recognition of shot text labels.

References

1. Tikhomirov, VA. and Stolyarov V.Ya. (2018), 'Otsenka effektivnosti primeneniya konturnoy obrabotki k izobrazheniyam s lazernoy gravirovkoy [Evaluation of the effectiveness of applying contouring to images with laser engraving],' *Sbornik konferentsii "Aktual'nye nauchnye issledovaniya v sovremennom mire" [Proceeding of International scientific and practical conferences "Actual scientific research in the modern world"]*, 84-88.
2. Hough PVC. (1962), Methods and Means for Recognized Complex Patterns, U.S. Patent 3069654.

3. Duda, RO. and Hart, PE. (1972), 'Use of the Hough transformation to detect lines and curves in pictures,' *Communications of the ACM*, 15(1), 11-15.
4. Ballard, DH. (1987), 'Generalizing the Hough transform to detect arbitrary shapes,' *Readings in computer vision*, 714-725.
5. Van Veen, TM. and Groen, FC. (1981), 'Discretization errors in the Hough transform,' *Pattern recognition*, 14(1-6), 137-145.
6. Niblack, W. and Petkovic, D. (1988), 'On improving the accuracy of the Hough transform: theory, simulations, and experiments,' *Proceedings CVPR'88: The Computer Society Conference on Computer Vision and Pattern Recognition*, 574-579.
7. Illingworth, J. and Kittler, J. (1987), 'The adaptive Hough transform,' *IEEE Transactions on Pattern Analysis and Machine Intelligence*, (5), 690-698.
8. Palmer, PL., Kittler, J. and Petrou, M. (1994), 'Using focus of attention with the Hough transform for accurate line parameter estimation,' *Pattern Recognition*, 27(9), 1127-1134.
9. Kiryati, N., Eldar, Y. and Bruckstein, AM. (1991), 'A probabilistic Hough transform,' *Pattern recognitio*n, 24(4), 303-316.
10. Xu, L., Oja, E. and Kultanen, P. (1990), 'A new curve detection method: randomized Hough transform (RHT),' *Pattern recognition letters*, 11(5), 331-338.
11. Gatos, B., Perantonis, S. J. and Papamarkos, N. (1996), 'Accelerated Hough transform using rectangular image decomposition,' *Electronics Letters*, 32(8), 730-732.
12. Perantonis, S. J., Gatos, B. and Papamarkos, N. (1999), 'Block decomposition and segmentation for fast Hough transform evaluation,' *Pattern Recognition*, 32(5), 811-824.
13. Ben-Tzvi, D., Leavers, VF. and Sandler, MB. (1989), 'A dynamic combinatorial Hough transform,' *Proc. 5th Int. Conf. Image Anal*, 152-159.
14. Zhang, Y. and Webber, R. (1996), 'A windowing approach to detecting line segments using Hough transform,' *Pattern Recognition*, 29(2), 255-265.
15. Leung, DN., Lam, LT. and Lam, WC. (1993), 'Diagonal quantization for the Hough transform,' *Pattern recognition letters*, 14(3), 181-189.
16. Lam, WC., Lam, LT., Yuen, KS. And Leung, DN. (1994), 'An analysis on quantizing the Hough space,' *Pattern Recognition Letters*, 15(11), 1127-1135.
17. Davies, E. R. (2012), Computer and machine vision: theory, algorithms, practicalities. Academic Press.
18. Neri, A. (1996), 'Optimal detection and estimation of straight patterns,' *IEEE transactions on image processing*, 5(5), 787-792.
19. Kaehler, A. and Bradski, G. (2016), Learning OpenCV 3: computer vision in C++ with the OpenCV library. O'Reilly Media, Inc..
20. Gonzalez, RC., Woods, RE. (2002), Digital image processing. Pearson Education India.
21. Roux, FS. (2018), 'Coordinate Transformations and the Hough Transform,' Encyclopedia of Modern Optics (Second Edition), 4, 182-192

Debt Management of Local Government Units in Poland In 2014-2018

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Abstract

The paper presents important aspects of local government debt management based on the experience of local government units in Poland. The considerations were based on the concept and standards of debt management in terms of economic and legal determinants for incurring and servicing debt by local government units in Poland, and data from the Ministry of Finance and reports on budget implementation in the entities studied. The aim of the paper is to evaluate the debt of local government units in Poland after the introduction of new legal regulations concerning its monitoring. In particular, an ex-post analysis was carried out based on the historical data of the level and structure of debt in local government units in Poland, the individual debt index (IDI), general debt index and debt service. The research period covered the years 2014-2018.

Keywords: Debt Management, Individual Debt Index (IDI), Local Government Units (LGUs).

Introduction

Debt management in LGUs is one of the most dynamic categories of public finance in Poland (Poniatowicz et al 2017). It's includes activities aimed at the planned, incurring and repayment of liabilities in accordance with the financial needs and capabilities of these entities and the situation on financial markets (Wiśniewski 2016). The LGUs debt mainly serves investment purposes. Because LGUs in Poland needs projects fostering its development, the steadily rising volume of investment spending must be recognised as a positive phenomenon (Uryszek 2013). It should be emphasized that, among others, Jastrzebska (2017) points out that the implementation of local government investments, including those co-financed with EU funds, induces LGUs to increase the debt, which requires effective management of the resulting debt. The ability of these entities to incur debt, measured by their creditworthiness as an element of local government financial potential, allows them to repay all liabilities with interest due on time and enables them to obtain additional external funds, mainly for investment tasks. For many LGUs, specifically those having low revenues at their disposal, the only alternative is to search for external sources as their own essential contribution for obtaining the EU aid (Nogalski et al 2015).

There are several researches examining both local government debt level, its growth and the determinants. Veiga and Veiga (2014) analysed lots of variables on fiscal (e.g. own revenues in total revenues without loans, interest payments of debt in total expenditures, investment expenditures in total expenditures,), socio-economic (e.g. earnings, unemployment, building permits or touristic facilities per inhabitant, type of the area,) as well as political situation (e.g. election cycle or issues of a ruling party). Balaguer-Coll, Prior and Tortosa-Ausina (2014) specify other variables, such as: density of residence or issues of decentralization, economic activity, which might be tied with the debt of local government.

Peter-Bombik and Kożuch (2013) argue that debt management in LGUs in Poland cannot be found effective if the possibilities of its generation are more and more limited. The Public Finance Act of 27 August 2009 introduced, first of all, a new way of limiting debt, which makes the unit's capability to incur debt dependent on its ability to create financial surpluses. The main objective of these activities was primarily to limit further dynamic growth of liabilities of local government units in Poland (Wiśniewska and Wiśniewski 2014). As indicated by Marchewka-Bartkowiak and Wiśniewski

(2012), the research shows that the new legal restrictions limiting the debt (IDI) are on average more stringent for the majority of local government units in Poland than the limit valid until the end of 2013: general debt limit (60% of total income) and debt service (with the limit of 15% of total income planned). Referring to this thesis, the main objective of this study was adopted: the analysis and evaluation of the level and structure of debt of particular types of local government units in Poland after the change of its statutory limits in 2014-2018.

Selected problems of debt management of LGUs in Poland in 2014-2018

The source of indebtedness LGUs is the accounting difference between income and expenditure, referred to as the budget deficit (Osiatyński 2006, Ostachowski 2019). The financing of the resulting budget deficit often requires the incurring of financial liabilities, whose repayment obliges LGUs to manage the debt efficiently. The literature postulates that an important element of local finance management is the adoption of an appropriate debt management strategy for local government units in Poland (Poniatowicz et al 2010). The debt management process of these entities includes (Jastrzębska 2009): planning the debt level, organization of technical operations related to incurring liabilities, motivating, monitoring and evaluation of the level and structure of debt, analysis of the budgetary burden of the liabilities, and controlling the level of debt and adjusting it *ex ante* and *ex post* to the legal debt limits.

It should be emphasized that legal regulations in Poland allowed, until new Law on Public Finance as of 27 August 2009 was introduced, for using two limits for debt in local self-government units (Table 1), i.e. limit of total debt level at the end of financial year (it could not exceed 60% of the budget revenues) and total amount of instalments from credits and loans, potential repayment of amounts due to sureties and the level of debt servicing (could not be higher than 15% of the planned budgetary revenues or 12% if state public debt in relation to GDP exceeded 55%).

Table 1: Comparison of the structure of debt ratios in *Law on Public Finance, dated* 30 June 2005 with *Law on Public Finance, as of* 27 August 2009

Comparison of the structure of debt ratios in *Law on Public Finance, as of* 30 June 2005 until the end of 2013	Comparison of the structure of debt ratios in *Law on Public Finance, as of* 27 August 2009 in 2014-2018
1) Total debt in local self-governments at the end of financial year could not exceed 60% of the revenues in total in the financial year: $\left(\frac{Z_o}{D_o}\right) \leq 60\ \%$ where: Z_o – total debt in local self-government due to repayment of instalments of credits and loans and buying bonds, D_o – revenues in total in the budget for the given financial year. 2) During a financial year, total amount of debt in a unit of local self-government could not exceed 60% of the revenues planned for the given financial year: $\left(\frac{Z_o}{D_{pl}}\right) \leq 60\ \%$ where: Z_o – total debt in local self-government unit due to repayment of instalments of credits and loans and buying bonds, D_{pl} – revenues in total in the budget for the given financial year. 3) Level of debt servicing – total amounts for the given	Executive body in a unit in local self-government cannot pass the budget if it causes that relation of total amount for the given financial year (in a financial year and in each year following the financial year): 1) of repayment of credits and loans with interests due in the given year, 2) of redemption of securities with interest due and discount from securities, 3) of potential amounts due resulting from granted sureties and guarantees, to planned revenues in total exceeds arithmetic mean for relation (calculated for the last three years) of its current revenues, extended with revenues on selling the property and reduced with current expenditures to the revenues in total within the budget, given by the following formula: $\left(\frac{R+O}{D}\right)_n \leq \frac{1}{3} \times \left(\frac{Db_{n-1} + Sm_{n-1} - Wb_{n-1}}{D_{n-1}} + \frac{Db_{n-2} + Sm_{n-2} - Wb_{n-2}}{D_{n-2}} + \frac{Db_{n-3} + Sm_{n-3} - Wb_{n-3}}{D_{n-3}} \right) * 100\%$ where:

financial year: - repayment of credits and loans with interest on these credits and loand due in the given year, - redemption of securities with due interests and discount from securities, - potential repayment of amonts resulting from sureties and guarantees, could not exceed: • 15% of the revenues of the local self-government unit planned for the given financial year: $\left(\frac{R+O}{D_{pl}}\right) \leq 15\%$ where: R – total amount planned for the given financial year due to repayment of credits and loand and redemption of securities, O – interest on credits and loans and interests and discount from issued bonds and repayment of amounts due to sureties and guaranties planned for the given financial year, D_{pl} – planned budget revenues in total fo the given financial year, • or 12%, when state public debt, in relation to GDP, exceeded 55%: $PDP > 55\%PKB \Rightarrow \left(\frac{R+O}{D_{pl}}\right) \leq 12\%$ where: SPD – State Public Debt, GDP – Gross Domestic Product.	R – total amount due to repayment of credits and loand and redemption of securities planned for the given financial year, O - interest on credits and loans and interests and discount from issued bonds and repayment of amounts due to sureties and guaranties planned for the given financial year, D – revenues in total in budget for the given financial year, Db – current revenues, Sm – revenues on property sale, Wb – current expenditures, n – financial year for which the relation is determined, n-1 – the year preceding the financial year for which the relation is determined, n-2 – the year preceding the financial year by two years, n-3 – the year preceding the financial year by three years. New law introduced an institution of individual debt ratio for local government units, which depends of financial situation in this entity within three years preceding liability.

Source: author's own study based on: (Law on Public Finance, dated 30 June 2005 (Journal of Laws 2005, No. 249, item 2104, with subsequent amendments), Law on Public Finance, dated 27 August 2009 (Journal of Laws 2009, No. 157, item 1240); (Łukomska-Szarek, 2010, p. 70).

In the beginning of 2014, local government units had to face new conditions regarding the possibilities of financing tasks with debt instruments (Łukomska-Szarek 2011). Abolition of the debt level limit for local government units in Poland and the introduction of the debt service payment limit (IDI index - calculated formula presented in Table 1), should induce local government units to effectively manage the debt, especially its level and costs of debt service. However, it is postulated in the literature that debt management policies in LGUs in Poland cannot be considered efficient, especially because the conditions were not conducive to taking effective actions in this area (Peter-Bombik and Kożuch 2013).

In a research study Liu and Waibel (2010) argue that in some economies (mainly in industrial countries) are enacted fiscal rules, in which the debt must have investment-oriented purpose. This concept indicates that only such borrowing is beneficial. Therefore, it is prohibited to introduce the deficit in the current part of the budget (golden rule - current expenditures cannot exceed current revenues). He confirms this thesis Galiński (2015) argue that 'since 2011 in Poland, it is forbidden to enact the local government budget, in which planned current expenditures exceed expected current revenues with the budget surplus from previous years and free resources. Therefore, the growth of the debt does not result from the deficit in the current part of the budget and actually finances investment activity of the unit'.

Methodology and Data

Taking into account the above considerations, the following main research hypothesis was adopted in the study: *The legal regulations limiting the level of debt in local government units in Poland led to a reduction, in the first years of their operation, of the likelihood to incur and repay their financial liabilities*. In order to verify the main research thesis, the ratio analysis was performed to examine the structure and level of debt in local government units in Poland: IDI, the general debt and debt service ratios were evaluated. The research period was 5 years. The survey was conducted from 2014, considering the fact that this is the first year of the debt limit change for local government units in Poland, until 2018. The study covered 2,478 LGUs in Poland, including 16 voivodeships, 314 powiats and 66 cities on powiat status. The article is based on the Polish and international literature on the subject and the presented data were made available by the Polish Ministry of Finance and reports on the implementation of the LGUs budget.

Results and Discussion

Based on the data presented in Table 2, it can be concluded that liabilities of local government units in Poland were characterised in 2014-2017 by a negative rate of changes: from PLN 72.1 billion in 2015, they decreased to PLN 68.9 billion (change by 4.4%). Their renewed growth was not recorded until 2018, when they amounted to 76.1 billion PLN. As part of debt financing, local government units in Poland primarily incur loans and credits, and they do not use bank deposits at all while securities are of marginal importance. In the structure of *debt* types, loans and credits in the period of 2014-2018 accounted for between 93-95%, while securities accounted for 4.8-6.2%, as shown in details in Fig. 1 and 2.

Table 2: Local governments' liability by types of debt in Poland in 2014-2018

SPECIFICATION	2014	2015	2016	2017	2018
	in millions of PLN				
liability by types of debt	**72 109,9**	**71 634,7**	**69 019,9**	**68 926,1**	**76 115,8**
Securities	4 267,8	4 157,9	4 272,7	3 942,0	3 645,7
credits and loans	67 628,9	67 328,8	64 653,2	64 907,4	72 338,9
deposits in banks	0,0	0,0	0,0	0,0	0,0
matured payables	213,1	148,0	94,0	76,7	131,2

Source: own study based on data from the Ministry of Finance.

The share of credits and loans in the structure of debt titles of individual types of LGUs in Poland is illustrated in Figure 1. In 2014-2018, gmina and powiat governments incurred liabilities from credits and loans at the level of 98-99%, voivodeships from 94 to 96%, while the towns with powiat status, from 88 to 90%.

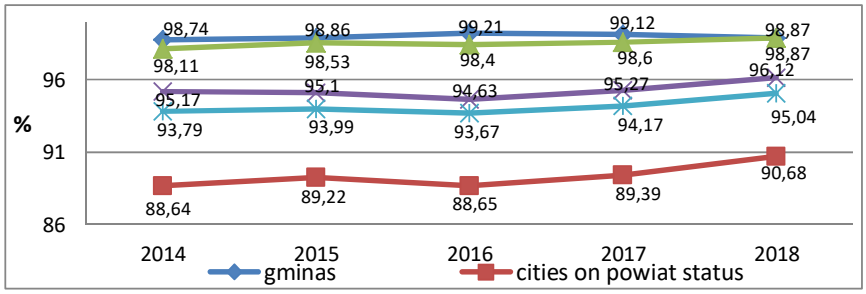

Fig. 1: The share of credits and loans in the structure of debt titles of individual types of LGUs in Poland in 2014-2018

Source: own study based on data from the Ministry of Finance.

In the case of gminas, the issuing of securities did not exceed 1% in the structure of debt. Furthermore, for voivodeships, this was between 3-5%, while for towns with powiat status, the value of the examined measure ranged between 9 and 11% (which is confirmed by the data shown in Figure 2).

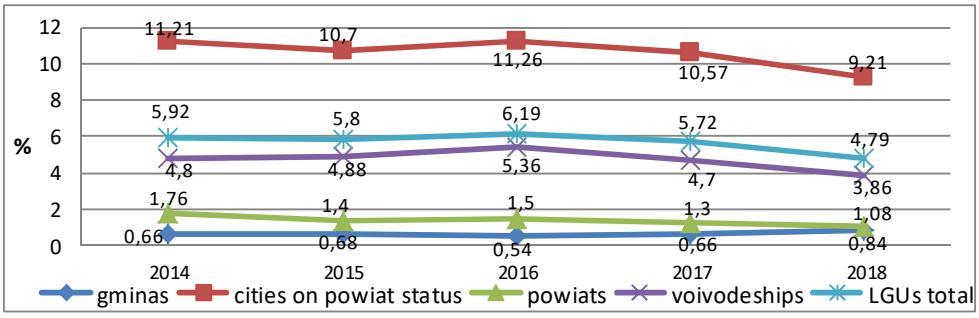

Fig. 2: Share of securities in the structure of debt titles of individual types of LGUs in Poland in 2014-2018

Source: own study based on data from the Ministry of Finance.

The results of the survey lead to the conclusion that liabilities incurred by local government units in Poland are characterized by a dominant share of loans and credits, whereas issuing of securities is of marginal importance, especially in the case of gminas and powiats. In the period covered by the survey, the towns with powiat status had the largest fraction of securities in the structure of types of debt in local government units with over 10%.

Table 2: Debt ratios of different types of LGUs in Poland in 2014-2018 [in %]

Specification		2014	2015	2016	2017	2018
LGUs total	WZ_1	32.1	31.6	29.7	30.6	30.3
	WZ_3	5.7	5.6	5.2	5.3	4.3
	IDI	8.4	8.8	9.2	9.9	10.4
Gminas	WZ_1	24.0	22.6	18.1	17.1	24.4
	WZ_3	9.1	9.7	7.5	6.6	3.8
	IDI	9.1	9.8	10.3	10.4	10.4
Cities on powiat status	WZ_1	40.4	40.7	37.5	36.7	37.5
	WZ_3	5,0	4.9	4.3	4.2	4.1
	IDI	7.8	8.1	8.6	9.1	9.1

Powiats	WZ_1	25.3	25.1	23.8	22.6	23.4
	WZ_3	3.3	3.5	3.5	3.4	3.3
	IDI	6.0	6.2	6.8	7.7	8.3
Voivodeships	WZ_1	38.2	39.6	46.0	39.3	36.0
	WZ_3	4.5	5.3	6.8	7.1	6.0
	IDI	10.9	11.0	11.1	12.5	13.8

**WZ_1 – Total debt in local governments (Share of total liabilities in total revenues); WZ_3 – total amount of debt in a unit of local government; IDI – Individual Debt Index*
Source: own study based on data from the Ministry of Finance.

The introduction of new legal regulations in the area of debt monitoring resulted in a regression of the liabilities incurred, which resulted in a slowdown in investment activity and cautious policy of using returnable sources of finance at all levels of local government in Poland. This thesis is confirmed by the calculated ratios for liabilities by types of debt and the individual debt index as shown in Table 2. When analysing detailed data, it can be observed that the level of the total debt ratio for local government units in Poland ranged from 29.7 to 32.1%. The highest level of debt (over 40% of total income) and its constant appreciation, except for the years 2016-2017, were recorded in towns with powiat rights, although in 2016, the indicator reached its peak in local government voivodeships at 46%.

The analysed LGUs did not show any major problems with the repayment of liabilities, as the ratio of burdening the total income with expenditures on debt servicing in the case of local government units in total in Poland decreased from 5.7% in 2014 to ca. 4.3% in 2018. Debt service in gminas decreased from 9.1% to 3.8%, in towns with powiat status - from 5% to 4.1%, in powiats - from 3.3 to 3.5%, and in voivodeships - from 4.5 to 7.1%. In voivodeships, as opposed to other types of local government units, the surveyed measure was characterized by progress until 2017.

The presented values of IDIs illustrate the progression of debt repayment capacity in local government units in the analysed years. For the entities in Poland in total, this was the change from 8.4% to 10.4%: from 9.1% to 10.4% in gminas, from 7.8% to 9.1% in towns with powiat status, from 6% to 8.3% in powiats, and from 10.9% to 13.8% in local government voivodeship. Therefore, it should be noted that individual types of local government units did not show any significant differences in the measure studied. Its lowest level was found in powiats whereas the highest was observed in voivodeships. Gminas showed values close to the arithmetic mean for LGUs in total (Łukomska-Szarek et al 2018).

Conclusion

The main reason for introducing individualized debt limits for particular local government units in Poland was first of all to strive to make the foundations of the local financial policy more credible in terms of adjustment of the capability to incur liabilities with the capability to actually repay them. From this point of view, the introduction of a new solution can be considered to be fully justified. The research leads to the conclusion that the new regulations have led to the limitation of the debt in the entities studied, especially in the first 3 years. A cautious policy of financing tasks from foreign capital has led to an increase in the IDI. The consequence of these activities was a slowdown in the investment activity of local government units in Poland in the years 2014-2016, whereas its revival was recorded after 2017.

References

- Balaguer-Coll, M. T., Prior, D. and Tortosa-Ausina E. (2014), 'On the determinants of local government debt: Does one size fit all?,' *Universitat Jaume, Economics Department Working Paper* 16, 4-10.

- Galiński P. (2015), 'Determinants of debt limits in local governments: case of Poland.' *Procedia - Social and Behavioral Sciences* 213, 376 – 382.

- Jastrzębska, M. (2009), Zarządzanie długiem jednostek samorządu terytorialnego, Wolters Kluwer, Warsaw.

- Jastrzębska, M. (2017), 'Działania służące i niesłużące efektywnemu zarządzaniu długiem jednostek samorządu terytorialnego,' *Problemy zarządzania* 15 (2/67), 147-160.

- *Law on Public Finance, as of* 27 August 2009 (*Journal of Laws* 2009, No. 157, item 1240, with subsequent amendments)

- *Law on Public Finance, as of* 30 June 2005 (*Journal of Laws* 2005, No. 249, item 2104, with further amendments).

- Liu, L. and Waibel, M. (2010), 'Managing Subnational Credit and Default Risks,' *The World Bank Policy Research Working Paper* 5362, 8.

- Łukomska-Szarek, J., Zawora, J. and Kawecki, M. (2018), Metody analityczne w zarządzaniu finansami jednostek samorządu terytorialnego, Polskie Towarzystwo Ekonomiczne Oddział w Częstochowie, Częstochowa.

- Łukomska-Szarek, J., (2010), Banking services for local self-governments units in terms of returnable sources of financing, Risk management in public and financial institutions, Łukomska-Szarek, J., Wójcik-Mazur, A. (eds.), Nauka i oświata, Dnepropetrovsk.

- Łukomska-Szarek, J., (2011), Financial analysis as a method of assessment of financial standing in local self-governments, Publish house Education and Science s.r.o., OOO Rusnauckniga, Praha-Belgorod.

- Marchewka—Bartkowiak, K. and Wiśniewski, M. (2012), 'Indywidualny wskaźnik zadłużenia JST – ocena krytyczna i propozycje zmian,' *Analizy BAS* 21, 1-6.

- Nogalski, B., Kozłowski, A.J., Czaplicka-Kozłowska, A. Z. and Trusewicz M., (2015), 'Management of commune's financial resources under conditions of debt bondage,' *International Journal of Contemporary Management* 14(1), 79–90

- Osiatyński, J. (2006) Finanse publiczne. Teoria i praktyka, WN PWN. Warsaw.

- Peter-Bombik, K. and Kożuch, A.J. (2013), 'Efektywne zarządzanie długiem jednostek samorządu terytorialnego w świetle obowiązujących regulacji prawnych,' *Studia Ekonomiczne* 168, 245-255.

- Poniatowicz, M.. Salachna, J. M. and Perło, D., (2010), Efektywne zarządzanie długiem w jednostce samorządu terytorialnego, Wolters Kluwer, Warsaw 2010.

- Poniatowicz, M., Wyszykowska, D. and Piekarska, E., (2017), 'Controversies over non-conventional instruments of financing budget needs of local governments units,' *Opitmium. Studia Ekonomiczne* 5 (89), 99-116.

- Uryszek, T., (2013), 'Financial management of local governments in Poland – selected problems,' *Journal of Economics, Business and Management* 1(3), August, 252-256.

- Wiśniewska, D. and Wiśniewski M. (2014), 'Tendencje w zarządzaniu długiem jednostek samorządu terytorialnego w Polsce na podstawie wieloletnich prognoz finansowych jednostek samorządu terytorialnego,' *Ruch prawniczy, ekonomiczny i socjologiczny*, LXXIV(1), 175-193.

- Wiśniewski, M. (2016), 'Klasyfikacja i kwantyfikacja ryzyka portfelowego w zarządzaniu długiem samorządowym w Polsce,' *Finanse* 1 (9), 155-179.

- Veiga, L.G. and Veiga, F.J. (2014), 'Determinants of Portuguese local governments' indebtedness,' *NIPE WP* 16, 10-20.

Debt Limitation in the Management of Local Government Units in Poland With the Example of the Financial Forecast of Voivodeships

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Abstract

Managing local government units requires using efficient tools to ensure their effective and efficient operation. In the case of local government units in Poland, many instruments improving the process of local finance management have been implemented in the last decade, such as internal control, long-term financial forecasting and participatory budgeting. Significant changes were also introduced in the area of debt management, especially in terms of the limitation and monitoring of financial liabilities made by LGUs. These changes concerned the debt limit in 2014 based on the Individual Debt Index (IDI), which was obligatory until the end of 2018. The introduction of this index was widely criticised not only by local government officials themselves, but also in the literature on the subject, which resulted in the government undertaking legislative work in Poland to modify the index. As a result of discussions and the work of parliamentary committees, the Act of 14 December 2018 amending the Public Finance Act and other laws was passed and, on its basis, a new formula for calculating IDI was introduced from 1 January 2019. The aim of the paper is to assess, based on the many-year financial forecast, the impact of a change in the way of IDI calculation on the possibilities of incurring and repaying liabilities by voivodeship governments in Poland. The research was conducted for the years 2016-2026.

Keywords: Public Management, Debt Management, Individual Debt Index (IDI), Long-Term Financial Forecasts

Introduction

Having limited financial resources requires the local government to make rational decisions on the methods and directions of spending its funds (Król 2016). Dafflon (2002) mentioned that Incurring debt for financing current needs LGUs in extreme cases, can lead to accumulation of the so-called debt loop and solvency problems In Poland, from 2011 was the need to balance current budgets of LGUs - current expenditures cannot exceed obtained current revenue. Bitner (2013) mentioned that this assumption, which is rational and inhibits incurring debt for financing of current expenses, is applied also in many EU countries. Fixing the limit of expenditure (the amount of the so-called free funds from the previous year), this enables more flexible approach to management of LGU budgets, which is positively stressed also in international experiences (Ashworth et al. 2005). Limiting debt of LGUs is used in many European countries, but there are no uniform solutions in this regard (Satoła 2015):

a) Goal of debt:
   - both investment and current goals (the necessity of balance in three-year planning period): Finland, Hungary, Czech Republic;
   - only investment goals: UK, Sweden, Spain, Slovakia, Luxembourg, Italy, Netherlands, Ireland, Germany, France, Estonia, Denmark, Belgium, Austria,
b) Consent to incurring credit or loan:
   - required: Slovenia, Spain, Malta, Latvia, Ireland, Germany, Denmark, Cyprus, Austria,
   - not required: Hungary, Estonia, Czech Republic;
c) Upper annual debt limit:
   - Slovakia 60% – of the annual current income in the previous budget year;
   - Estonia – 60% of the annual income;

- Cyprus – 40% of the annual income for long-term liabilities and 20% of the annual income short-term liabilities;
- Lithuania – 35% of the annual income;
- UK – self-governments must comply with the individual upper debt limit determined on the annual basis by the supervisory authorities;
- Denmark – the central authorities determine maximum debt limits corresponding to maximum percentage of annual income, budget expenses or general investments;
- Austria – diverse, depending on land;

d) Upper limit of annual debt service costs:
- Hungary – 70% of current income.
- Spain – 25% of operating income;
- Slovakia – 25% of income in the previous budget year;
- Estonia – 20% of the annual income;
- Portugal – 12.5% of annual financial transfers in the current year or 10% of capital outlays in the previous year;
- Slovenia – 5% of income in the previous budget year.

LGUs often have to make financial commitments in order to carry out planned tasks. Since 2014, IDI (Individual Debt Index) has been used in the Polish public finance system. It is one of the important factors affecting budgetary planning process in LGUs, determined by the accuracy of forecasts (Grad 2018). In the beginning of 2014, local government units in Poland had to face new conditions regarding the possibilities of financing tasks with debt instruments. A total departure was observed from the debt reduction system based on the general debt ratios (60%) and debt service (15%) and the transition to debt limitation based on the individual debt index (IDI) calculated for each local government unit individually, depending on the financial resources held by the unit (in the past). As before, this also represents a universal solution, independent of the type and size of the local government unit (Dylewski 2014).

According to new principles (effective from 2014-2018), the executive body in LGUs could not sign the budget if it causes that in the financial year and in each year following financial year, relation of total amount of debt to planned revenues in total exceeds arithmetic mean for relation (calculated for the last three years) of its current revenues, extended with revenues on selling the property and reduced with current expenditures to the revenues in total within the budget (Łukomska-Szarek, 2011).

The inspiration for this study was a review of the literature on the subject and a search for answers to the question: Will the introduction of new regulations on debt limitation have a positive impact on the budget management in local government units in Poland, especially their investment activity? Therefore, an attempt was made to analyse and evaluate individual debt limits in a selected group of local government units in Poland i.e. voivodeships (the highest level of territorial division, regional units). The analysis of debt limits was supplemented by an assessment of 5 budget indicators.

One of the most popular approaches to assess financial standing of local government units in the USA is the Financial Trend Monitoring System (FTMS) developed by the International City/County Management Association (ICMA) in 1980. This system operates based on around 35 indicators for the analysis of variables that have the greatest impact on the financial standing of LGUs (Rivenbark, Roenigk 2011). A 10-point test was used for small LGUs, with the results compared with the benchmark. The calculated ratios were compared with the ratios for other LGUs and they were assigned the appropriate numbers of points. However, one of the most recent approaches uses a method based on 11 ratios categorized into four groups of solvency ratios (Rivenbark, Roenigk, Allison 2010). It is worth emphasizing that in the USA, different methods are used in different states to measure financial standing and use ratios which represent a combination of financial and demographic indices (Wang Dennis, Tu 2007). In Poland, the indicator analysis of the budget of local government units is based on 5 groups of indicators: financial liquidity, debt, financial independence, investment activity, and development capacity. The choice of this group of indicators was considered appropriate to verify the research hypothesis: ‘The introduction of new legal regulations in the field

of limiting the debt level led to a slowdown in the investment activity of local governments (voivodeships) in Poland'.

The study adopted the groups of ratios covering the following research areas (Łukomska-Szarek 2011):

- degree of financial liquidity in the cash-based arrangement, measured as a ratio of total budget revenues and incomes to the total of budget expenditures and disbursements.
- degree of financial independence: expressed as a ratio of own revenues to total budget revenues;
- degree of debt – Individual Debt Ratio (2014) constituting the arithmetic mean of its current revenues increased by revenues on sales of property and decreased by current expenses to total budget revenues calculated for the last three years; Individual Debt Ratio (2019) constituting the arithmetic mean of its current revenue less grants and ongoing funds to implement the programme, project or task financed with the EU funds and decreased by current expenditure less current expenditure on the repayment of instalments of liabilities, current expenditure on debt service and current expenditure on the implementation of the programme, project or task financed with the EU funds to total budget revenues calculated for the last seven years;
- assessment of investment activity: ratio of investment expenditures to total expenditures,
- degree of self-financing of investment activity measured as a ratio of operating surplus and property revenues to property expenditures;
- assessment of developmental potential: operational capability of development measured as a ratio of the difference between current revenues and current expenditures to current expenditures, total capability of local government units to develop: ratio of the difference between total revenues and current expenditures to total revenues.

The formulas for calculating the indicators are given in the section 'Methodology and data'. The research period was the years 2016-2026 in order to identify the trends and pace of changes of individual ratios. The problems covered by the research included the assessment of budget ratios based on the reports on the implementation of the budget of voivodeships using the ex-post analysis (historical data on the implementation of the budget for the years 2016-2018) and ex-ante analysis (estimates for the period 2020-2026).

Methodology and Data

The main aim of the paper is to assess the effect of a change in the way of IDI calculation on the capability of incurring and repaying liabilities by voivodeship governments in Poland. The following research questions were asked in order to achieve the main aim:

- will the modification of IDI limit the investment activity of voivodeships in Poland?
- what is the degree of operational and total capacity for the development in the entities studied compared to the individual debt capabilities?
- to what extent can voivodeships benefit from self-financing of property expenses from free resources including operating surplus and property income?
- does the debt limit allow the level of financial liquidity to be stabilised on a cash basis?

In order to answer the above questions, the paper attempts to carry out financial analysis of budget based on the data from the Ministry of Finance in Poland for 2016-2018 (ex post analysis based on the reports on the implementation of the budget) and for 2019-2026 (ex-ante analysis based on long-term financial forecast 2019).

The term analysis is an ambiguous term, which results from its broad use, since there is neither science nor practical human activity which would not use a variety of analytical tools. Analysis is a science of the methods of analysing, i.e. the science of analysis of not only characteristics, structures and internal and external relationships in a complex phenomenon or an object, but also investigating,

simulation and forecasting the effects of the activities or abandoning activities based on the characteristics, structures and relationships (Dudycz 2000, Łukomska-Szarek 2011).

Important elements of the LGU debt management process include continuous monitoring of debt level, budget burden analysis, and adjustment of the debt level to currently used ratios. Debt ratio analysis in local governments takes into account changes in time, environmental factors, multidimensional relations, and both explicit and implicit liabilities (Rivenbark, Roenigk, Allison, 2010).

Dafflon and Beer-Tóth (2009) stressed that debt has a positive impact on the modernization of local economies. However, in the face of the increasing level of debt, implementation of effective debt management policies is needed, resulting in financing the tasks which are not covered by the entity's revenues, minimizing the financial risk, losing financial liquidity, or reducing debt costs.

Based on the aggregated data, the calculations were made for 16 voivodeship governments in Poland. In particular, the following indices were analysed and evaluated (Łukomska-Szarek 2011):

1) IDI (according to the formula from 2014 and modified formula from 2019),

– IDI 2019 (The Act of 14 December 2018 amending the Public Finance Act and other laws (*Journal of Laws* 2018, item 2500)):

$$\frac{(R+O)}{Db} \leq \frac{1}{7}\sum_{i=1}^{7}\frac{Dbei-Wbei}{Dbi} * 100\% \quad (1)$$

Where:
R - the total amount planned for the financial year for the repayment of the instalments of the liabilities included in the debt and redemption of securities, excluding repayments of loans and credits and redemptions of securities taken out or issued respectively for the purpose referred to in Article 89(1)(1) and the obligations set out in Article 91(3)(1),
O - current expenditure planned for the financial year for debt service, including interest on liabilities included in the debt referred to in Article 72(1)(2), interest and discount on securities and repayment of amounts resulting from hedging and guarantees provided,
Db - planned for the year for which the relationship is established, the budget's current revenue less grants and current goals,
Dbei - current revenue in the year preceding (by *i* years) the year for which the relationship is established, less grants and ongoing funds to implement the programme, project or task financed with the funds referred to in Article 5(1)(2),
Dbi - current revenue in the year preceding (by *i* years) the year for which the relationship is established, less grants and funds for current purposes,
Wbei - current expenditure in the year preceding (by *i* years) the year for which the relation is established, less current expenditure on the repayment of instalments of liabilities included in the debt title referred to in Article 72(1)(2), current expenditure on debt service and current expenditure on the implementation of the programme, project or task financed with the funds referred to in Article 5(1)(2).

– IDI 2014 (*Law on Public Finance, as of* 27 August 2009 (*Journal of Laws* 2009, No. 157, item 1240, with subsequent amendments)):

$$\left(\frac{R+O}{D}\right)_i \leq \frac{1}{3}\sum_{i=1}^{3}\frac{Db_i+Sm_i-Wb_i}{D_i} * 100\% \quad (2)$$

Where:

R – total amount due to repayment of credits and loans and redemption of securities planned for the given financial year,
O – interest on credits and loans and interests and discount from issued bonds and repayment of amounts due to sureties and guaranties planned for the given financial year,
D – revenues in total in budget for the given financial year,

Db_i – current revenues in the year preceding (by *i* years),
Sm_i – revenues on property sale in the year preceding (by *i* years),
Wb_i – current expenditure in the year preceding in the year preceding (by *i* years),
D_i – revenues in total in budget for the given financial year in the year preceding (by *i* years)

2) WPK – liquidity ratio on cash basis is calculated as a quotient of the totalled performed budget revenues, performed budget incomes and receivables and the totalled performed budget expenditures, performed budget disbursements and payments:

$$WPK = \frac{D_t + PB_t}{W_t + RB_t} \quad 3)$$

Where:
D_t –budget incomes performed at the moment *t*,
PB_t –budget revenues performed at the moment *t*,
W_t – budget expenditures performed at the moment *t*,
RB_t – budget disbursements performed at the moment *t*.

3) WOR – operational capacity of development in a unit of territorial self-government:

$$WOR = \frac{Db_i - Wb_t}{Db_t} * 100\ \% \quad 4)$$

where:
Db_t – current revenues in a year t,
Wb_t – current expenditures in a year t,

4) WORC – total capacity of development in a unit of territorial self-government:

$$WORC = \frac{Db_t - Wb_t + Dm_t}{D_t} * 100\% \quad 5)$$

Where:
Db_t – current revenues in a year t,
Wb_t – current expenditures in a year t,
Dm_t – property revenues in a year t,
D_t – revenues in total in a year t.

5) WB_7 - self-financing level (share of operating surplus increased by property income in property expenditure):

$$WB_7 = \frac{Db_t - Wb_t + Dm_t}{Wm_t} * 100\% \quad 6)$$

Where:
Db_t – current revenues in a year t,
Dm_t – property revenues in a year t,
Wb_t – property expenditures in a year t,
Wm_t – expenditures in total in a year t.

6) WB_4 – degree of investment activity (measured as the share of property expenditure in total expenditure):

$$WB_4 = \frac{Wm_t}{W_t} * 100\% \quad 7)$$

Where:
Wm_t – property expenditures in a year t,
W_t – expenditures in total in a year t.

Ratio analysis delivers information on financial situation in business entities and the results of their operation on the basis of a set of logically interrelated ratios. The value of these ratios, their changes

and relations between them enable assessment of business entities' operation and they are the basis for formulation of conclusion for the future (Gabrusewicz, 2005, p.29).

The research allowed for the indication of how the modification of the index limiting the debt level in LGUs in Poland affect selected areas of the budget economy of local government voivodeships.

Analysis of the debt of voivodships in Poland based on the long-term financial forecast in 2016-2026 - Results and Discussion

Based on the data of 16 voivodeships in Poland and their many-year financial forecast, arithmetic means were calculated for the selected group of financial indicators as presented in Table 1. The results of the study lead to the conclusion that the voivodeship governments, in the financial forecast for the years 2019-2026 according to the arithmetic mean of the WOR index (formula for calculating number 4), are characterized by a steady progression of the operational development capacity. The indicator increased in the period studied from the level of 15% to 26.8%, which means that on average, the voivodeships planned to generate an operating surplus at the level of over a quarter of the current income. Very high (50-70%) total potential for the development (WORC – formula for calculating number 5) of the analysed local government units was reduced in the last four years the forecasts to ca. 30%. This affects the investment activity of the voivodeships implemented in 2016-2018 and planned for the following years.

Table 1: Long-term financial forecast of selected indicators of voivodeships budget in Poland in 2016-2026

	Year	WOR (%)	WORC (%)	WB_4 (%)	WB_7 (%)	WPK	Individual Debt Indicators (%)		
							IDI_{2014}	IDI_{2019}*	IDI_{2019}**
ex-post analysis	2016	20.80	51.28	27.82	131.31	1,35	11.1	6.23	6.13
	2017	21.20	54.08	32.45	107.56	1,34	12.5	6.15	5.77
	2018	13.75	64.34	42.37	79.74	1,33	13.8	5.18	4.75
ex-ante analysis (data contained in the Long-Term Financial Forecast are approximate)	2019	14.99	60.67	40.69	81.72	1,32	12.7	5.28	4.86
	2020	19.55	69.73	44.27	85.93	1,37	11.,3	5.73	5.21
	2021	21.47	57.93	35.43	102.31	1,35	10.5	6.81	6.36
	2022	22.32	41.17	25.33	119.62	1,28	12.0	7.83	7.32
	2023	24.11	31.53	18.84	139.56	1,24	14.0	8.41	8.03
	2024	24.82	29.57	16.96	150.38	1,23	16.0	8.96	8.43
	2025	26.46	30.33	17.11	155.12	1,24	17.7	9.08	8.43
	2026	26.77	30.50	18.06	144.12	1,24	19.1	7.97	7.56

** The ratio of the planned total amount of repayment of liabilities to income, excluding the liabilities of the association co-created by local government units and excluding statutory exclusions for a given year (IDI 2019)*

*** The ratio of the planned total amount of repayment of liabilities to income, excluding the liabilities of the association co-created by local government units and not excluding statutory exclusions for a given year (IDI 2019)*

Source: own study based on data from the Ministry of Finance.

The share of their property expenditure in total expenditure (WB_4 – formula for calculating number 7) in the ex-post period was characterized by an increasing trend: the indicator ranged between 28 and 42%. On the other hand, the ex-ante forecast period shows a decrease in the measure studied after 2020 from over 44% to ca. 16-18% in subsequent years. It can be concluded that with a noticeable slowdown in investment activity, the capability of self-financing of voivodeships (WB_7 – formula for calculating number 6) has been growing dynamically since 2018 (has been growing from ca. 80% over the analysed period of time to 155%). On the other hand, financial liquidity on a cash basis

(formula for calculating number 3) shows no large amplitude of fluctuations, between 1.24 and 1.35 but with a slight downward trend. The budget management presented in the selected areas was affected by the possibility of incurring and repayment financial liabilities. IDI_{2014} (formula for calculating number 2) calculated according to the 2014 formula would allow for servicing the debt at the level of 10-19%, depending on the individual years indicated in Table 1. On the other hand, the ratio of the planned total amount of repayment of liabilities to income, excluding the liabilities of the association co-created by local government units and excluding statutory exclusions for a given year (IDI_{2019} - formula for calculating number 1), is expected to range from 5.3% to 9.1%, with a noticeable progression to 2025. With the correction of the index by taking into account the statutory exclusions for a given year, the calculated values were slightly lower and ranged from 4.9% to 8.43%, which significantly limits the possibilities of voivodeships in Poland to use debt capital.

Conclusion

The introduction of new regulations concerning monitoring of local government units and its service resulted in a wide discussion on the formula of index calculation. Already before the introduction of IDI in 2014, K. Marchewka-Bartkowiak and M. Wiśniewski (2012, p. 1-6) subjected its structure to a thorough critical analysis, pointing to proposals for changes. After the introduction of new legal solutions for modification of the IDI index, scientific studies concerning the analysis of the impact of index changes on the financial standing of local government units appeared (this was analysed by e.g. M. Wojciel, W. Kańczuga (2019, p. 58-66) and M. Grad (2018, p.107-120). The new formula (effective from 2019) of control over LGUs liabilities seems more accurate, although it is worrying that local authorities' practices aimed at circumventing this regulation by hiding debt in municipal companies whose liabilities are not included in the methodology for calculating their debt (Langer, 2014, p.77-80, Ostachowski, 2019, p. 87).

In Poland, a new way of limiting LGU debt level, the so-called Individual Debts Indicators (IDIs), has been in force since 2014 (Poniatowicz, Wyszykowska, Piekarska, 2017, p.106). The presented considerations concerning the limitation of debt service level in local government units in Poland reveal that various solutions concerning monitoring of their debt have been implemented for several years. The greatest changes concerning the abolition of the general debt ratio from 2014 and the necessity of individual monitoring of the debt based on the 3-year financial standing of local government units were subject to wide criticism, which resulted in the modification of the ratio and extension of this period to 7 years. It is difficult to answer the question of how the new form of the indicator will affect budget management in local government units. The results of the analysis concern only a selected group (voivodeships). However, they allow for a conclusion that the possibilities of incurring liabilities by voivodeships in Poland are decreasing, which translates into a slowdown in their investment activity, despite the growing operational capacity for their development. The increase in their self-financing capacity may result in an accumulation of financial resources and a lack of implementation of many important tasks, especially in the field of municipal infrastructure.

References

- Ashworth, J., Geys, B. and Heyndels, B. (2005), 'Government weakness and local public debt development in Flemish municipalities,' International *Tax and Public Finance* 12 (4), 395–422.

- Bitner, M. (2013), Reguły fiskalne ograniczające zaciąganie długu przez jednostki samorządu terytorialnego w wybranych krajach OECD – analiza prawno-porównawcza,' *Samorząd Terytorialny* 1–2, 9–40.

- Dafflon, B. (2002), The Theory of subnational balanced budget and debt control, Local Public Finance in Europe: Balancing the Budget and Controlling Debt. B. Dafflon (ed), Studies in Fiscal Federalism and State – Local Finances Series, Cheltenham-Northampton, Edward Elgar, 15–44.

- Dafflon, B. and Beer-Tóth, K. (2009), 'Managing local public debt in transition countries: an issue of self-control,' *Financial Accountability & Management* 25(3), 305-333.

- Dudycz, T. and Wrzosek S. (2000), Analiza finansowa. Problemy metodyczne w ujęciu praktycznym. Akademia Ekonomiczna we Wrocławiu, Wrocław.

- Dylewski, M. (2014), 'Zadłużenie JST – problemy nowej perspektywy finansowej UE,' *Studia Ekonomiczne, Uniwersytet Ekonomiczny w Katowicach* 198 (1), 125-134.

- Gabrusewicz, W. (2005), Podstawy analizy finansowej, PWE, Warsaw.

- Grad M. (2018), 'Indywidualny wskaźnik obsługi zadłużenia w procesie planowania budżetowego jednostek samorządu terytorialnego,' *Nierówności społeczne i gospodarcze* 4(56), 107-120.

- Król, D. (2016), 'Ocena instrumentów zarządzania finansami samorządu terytorialnego w świetle ewolucji paradygmatu finansów publicznych,' *Nauki o Finansach* 1(26), 42-53.

- Langer, M. (2014), 'Ukryte formy zadłużenia jednostek samorządu terytorialnego – próba oceny zjawiska,' *Prawo budżetowe państwa i samorządu* 4, 75-86.

- *Law on Public Finance, as of* 27 August 2009 (*Journal of Laws* 2009, No. 157, item 1240, with subsequent amendments)

- *Law on Public Finance, as of* 30 June 2005 (*Journal of Laws* 2005, No. 249, item 2104, with further amendments).

- Łukomska-Szarek, J. (2011), Financial analysis as a method of assessment of financial standing in local self-governments, Publish house Education and Science s.r.o., OOO Rusnauckniga, Praha-Belgorod.

- Marchewka-Bartkowiak, M. and Wiśniewski M. (2012), 'Indywidualny wskaźnik zadłużenia JST - ocena krytyczna i propozycje zmian,' *Analizy BAS* 21 (88), 21 December, 1-6.

- Ostachowski, P. (2019), 'Debt of polish local governments and assuming its supplies in the years 2011-2017,' *Central and Eastern European Journal of Management and Economics* 7(1), March, 81-96,

- Poniatowicz, M., Wyszykowska, D. and Piekarska, E. (2017), 'Controversies over non-conventional instruments of financing budget needs of local governments units,' *Opitmium. Studia Ekonomiczne* 5 (89), 99-116.

- Rivenbark, W.C. and Roenigk D.J. (2011). 'Implementation of Financial Condition Analysis in Local Government,' *Public Administration Quarterly* 35 (2), 238-264.

- Rivenbark, W.C., Roenigk D.J. and Allison G.S. (2010), 'Conceptualizing Financial Condition in Local Government,' *Journal of Public Budgeting, Accounting & Financial Management* 22 (2), 149–177.

- Satoła, Ł. (2015), 'Debt of communes in the light of new individual debt ratio,' *Scientiarum Polonorum Acta Oeconomia* 14 (4), 103-113.

- The Act of 14 December 2018 amending the Public Finance Act and other laws (*Journal of Laws* 2018, item 2500).

- Wang, X, Dennis, L. and Tu Y.S. (2007) Measuring Financial Condition: A Study of U.S. States. Public Budgeting & Finance 27 (2) Summer, 1–21.

- Wieloletnia prognoza finansowa 2019 (Long-term financial forecast 2019). [Online] [Retrieved December 18, 2019], https://www.gov.pl/web/finanse/wieloletnia-prognoza-finansowa-2019-r

- Wojciel, M. and Kańczuga, W. (2019), 'Wstępna analiza zmian w indywidualnym wskaźniku spłaty zadłużenia na przykładzie jednostek samorządu terytorialnego z terenu województwa dolnośląskiego w latach 2020-2025,' *Samorząd terytorialny* 9, 58-66.

"New" Primary Covered Bonds Market in Poland

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Abstract

The main aim of the article is presentation of the changes that have occurred on the primary covered bonds markets in Poland in the period 2000-2019 with emphasis on the impact of changes in legal regulations. The desk research was used to achieve the main goal. Based on the conducted analysis, it can be concluded that domestic mortgage banks benefited from new legal solutions, which resulted in a significant increase in the quantity and value of issued covered bonds and their introduction onto European markets. The abolition of withholding tax and increased investor protection resulted in increased interest in Polish mortgage bonds from foreign investors who became the main purchasers of mortgage bonds issued since 2016. A bold statement can be made that the covered bonds market in Poland has transformed from the local market into foreign market.

Keywords: Mortgage Banks in Poland, Polish Covered Bonds, Mortgage Legal Regulations.

Introduction

Covered bonds are financial instruments issued by financial institutions to raise capital to finance lending. Most often, covered bonds are issued by universal banks or authorized credit institutions (in Poland mortgage banks). In recent years, financial institutions operating in various European countries have increased the value of issued covered bonds. According to the European Covered Bond Council, the value of issued covered bonds at the end of 2018 was EUR 2,576 trillion. There are many reasons for increasing the value of issued covered bonds. One of the most important is the change in legal regulations, in particular in the scope of increasing the security of buyers of covered bonds. The second reason is the search for other sources of capital financing than bank deposits and a better match of maturities of covered bonds and loans granted.

In the literature, the most developed and long-existing mortgage letter markets are most often analysed, for example France, Spain, Germany and the United Kingdom. Researchers investigate factors influencing mortgage covered bonds' risk premiums (Prokopczuk and Vonhoff 2012; Gürtler and Neelmeier 2018, 2019). Other studies investigate covered bonds' illiquidity (Prokopczuk et al. 2013; Wegener et al. 2019). However, all these studies investigate countries excluding Poland.

The stringent provisions became the starting point in the analyses regarding the opportunities for and barriers to mortgage banking development (Cyburt 2002, Getka 2002, Reksa 2002, Szulfer 2005, Gorlecka 2006, Szelągowska and Marlęga 2007, Sitek 2010, Szelągowska 2010, Dżuryk 2017, Frańczuk 2017, Dziuba 2018). Other researchers concentrated on comparing polish mortgage banking market to foreign markets (Bucholski 2012, Sołtysiak 2014, Lechowicz 2015). The common characteristic of the enumerated studies is the focus on the impact of the law on the development level of the mortgage banking market in Poland.

This paper points to other aspects of mortgage bank and covered bond functioning. The objective of the paper is to check to what extent changes in legal regulations affected the subjective and objective structure of the covered bond market, with a particular consideration of purchasers of such financial instruments in the period 2000–2019.

The organization of the rest of the paper is as follows. In the next section, we present fundamentals about the mortgage banking market in Poland. In the third section, we show changes in legal regulations and differences between Polish and German covered bonds. Next we present structure of mortgages banks and issue of covered bonds. We present the primary and secondary covered bonds market in the fifth and sixth section. At the end we provide a short conclusion with a summary of the results.

The Mortgage Banking Market in Poland

The beginnings of mortgage banking in Poland date back to the 18th century. Śląskie Towarzystwo Kredytowe Ziemskie [Silesian Landowners' Loan Society], which extended mortgage cash loans, is considered one of the first institutions associated with covered bonds. It obtained funds for lending by issuing mortgage covered bonds. Other institutions were established and legal regulations were introduced as time went by (Gąsowska 2000). Mortgage banking developed in Poland until 1948, when it was banned under two decrees. Covered bonds were reintroduced to the Polish banking system after almost 50 years. Adopted in 1997, the Act on Covered Bonds and Mortgage Banks used pre-war provisions and solutions applied in Germany. The basis for the new law was maximising the security of banks and covered bonds issued by them and providing a stable source of funding for the real property market and long-term funding for banks.

In order to ensure as high security of covered bondholders as possible, the Act of 1997 imposed numerous restrictions and limits on mortgage banks both as regards their activities and prospective purchasers.

The first mortgage bank established under the Act of 1997 was Rheinhyp-BRE Bank Hipoteczny (March 1999, at present: mBank Hipoteczny). A few months later, another mortgage bank commenced its activity, namely HypoVereinsbank Bank Hipoteczny (1999, at present: Pekao Bank Hipoteczny). At the same time (1998 and 1999), applications for licences, which were finally suspended, were filed also by PBK, WBK, and PKO in collaboration with BGK (Cyburt 2002: 59). In 2001 and 2002, two more banks were established: Śląski Bank Hipoteczny (later: ING Bank Hipoteczny) and Nykredit Bank Hipoteczny. PKO Bank Hipoteczny, which commenced its operating activities in 2015, is the mortgage bank which has operated for the shortest period. That year, a few other universal banks announced their plans to found mortgage banks, yet only Raiffeisen Bank submitted an application for permit to establish Raiffeisen Bank Hipoteczny to the PFSA (March 2015) but the PFSA suspended the procedure in October 2016. Out of the mentioned banks, only three operated at the end of 2016: mBank Hipoteczny, Pekao Bank Hipoteczny, and PKO Bank Hipoteczny.

In the period 2000–2012, mBank Hipoteczny dealt mainly with financing small commercial real properties and real property development activities. Its ancillary activity was extending loans to the natural persons who purchased real properties from developer companies, financed by mBank Hipoteczny. In 2013, the bank's management board decided to change the operating model and concentrate mainly on issuing mortgage covered bonds and refinancing the mortgage loans granted by mBank (Newseria.pl 2013). Since the beginning of its operation, Pekao Bank Hipoteczny has been pursuing a policy of financing mainly projects related to commercial real properties and, to a limited extent, natural persons. Nykredit Bank Hipoteczny, which operated in

the period 2002–2005, did not pursue operating activities actively and was finally liquidated in 2005. ING Bank Hipoteczny, in turn, limited lending and changed its operating strategies several times over the entire period of its activity (2001–2011). Ultimately, ING Bank Hipoteczny was merged with ING Bank Śląski in 2011 and reopened in 2019.

The last of the founded banks, PKO Bank Hipoteczny, intends to pursue an activity consisting mainly in issuing covered bonds based on mortgage loans extended by PKO BP to natural persons in PLN for housing. The second pillar of its activity is to grant mortgage loans in collaboration with PKO BP.

Changes in Legal Regulations

On 1 January 2016, the amendment to The Act on Covered Bonds and Mortgage Banks was adopted, which introduced several changes in response to the expectations of the banking sector. The main changes concerned facilitating the issue of covered bonds and increasing the protection of their buyers by, among others, reducing the mortgage bank insolvency risk and improving the liquidity of mortgage bonds (more in section 5). One of the most significant changes, which has a direct impact on the size of new issues of mortgage bonds, is the increase in the refinancing limit for housing loans from the funds obtained from the issue of mortgage bonds from 60% to 80%. For commercial properties, the limit was left at the same level (60%). The second notable change in the payment of mortgage loans. Individual and institutional investors were also exempted from tax on interest and profit from the discount on mortgage bonds.

On the other hand, in the scope of increasing legal protection of buyers of mortgage bonds, two key changes were introduced. One of them is an overcollateralisation institution of 10%. The total amount of claims secured by a mortgage of a given issuer increased by cash, securities issued or guaranteed by a public institution or placed at the NBP should not be less than 110% of the total amount of covered bonds on the market mortgage bonds of this issuer. The purpose of the minimum mandatory overcollateralization institution is to create a capital buffer that will reduce the liquidity risk of the mortgage bank. The second change is the strengthening of investor protection (purchasers of mortgage bonds), including as part of bankruptcy proceedings. In the case of bankruptcy of a mortgage bank by law, a separate asset arises, from which purchasers of mortgage bonds will be able to satisfy themselves without taking into account other creditors. In addition, a pass-through was introduced, i.e. an extension of the maturity dates of mortgage bank liabilities from covered bonds. In the event of bankruptcy of a mortgage bank that is an issuer of mortgage bonds, the maturity of its obligations to creditors under covered bonds will be postponed for a maximum of three years from the latest maturity date of the claim entered in the covered bond collateral register. This solution allows you to conduct a test to check whether the rights and funds entered into the covered bond collateral register are sufficient to fully satisfy holders of mortgage bonds.

Table 1: Polish Covered Bonds Law vs German Pfandbriefe Law

	Poland	Germany
Special Covered Bonds Law	Yes	Yes
Special bank principle	Yes	No
Mortgage Valuation concept	Mortgage lending value	Mortgage lending value
Loan to Value (LtV)	100%	No
Mortgage value refinancing limit	Residential: 80%, Commercial: 60%	60% of mortgage lending value
Geographical scope for mortgage assets	Only Poland	EEA, CH, USA, CA, JP, AU, NZ
Minimum Mandatory Overcollateralization	10%	2%
Legal framework for bankruptcy	Specific legal framework superseding the general insolvency law	
Bankruptcy remoteness	Preferential claim by law and specific cover pool administration	

Source: author's compilation based on European Covered Bond Counsil.

Due to the modelling of legislators on the regulations in force in Germany, it is worth looking at the differences and similarities between the regulations in force in Poland and Germany. As can be seen from the basic data contained in Table 1, it appears that the new legal provisions introduced in Poland are more restrictive than in Germany. Nevertheless, mortgage banks have a lot of freedom in their operations, adequate to the level of development of the domestic mortgage banking market and market opportunities.

Structure of Mortgage Banks

From the very beginning of the mortgage banking market functioning, mBank Hipoteczny has been the unquestionable leader. The bank's market share gradually decreased from 90% to 76% in the period 2000–2015. Late 2016 saw a considerable change of market shares of individual banks (calculated as the value of the issued and not purchased covered bonds). The share of mBank Hipoteczny decreased to 50% and that of PKO Bank Hipoteczny increased to 36% (growth from 0.4% at the end of 2015), which results from the bank's three issues of mortgage covered bonds at more than PLN 3 billion. Pekao Bank Hipoteczny's share, in turn, dropped to 14%. It was also the first year when mBank Hipoteczny lost its dominant position after 17 years. Thanks to the international covered bonds programme, PKO BankIn Hipoteczny in 2017 managed to increase its market share up to 54% and become a leader. In the end of 2019 PKO Bank Hipoteczny became the market leader. The share of this bank increased to 69% and that of mBank Hipoteczny decreased to 23%.

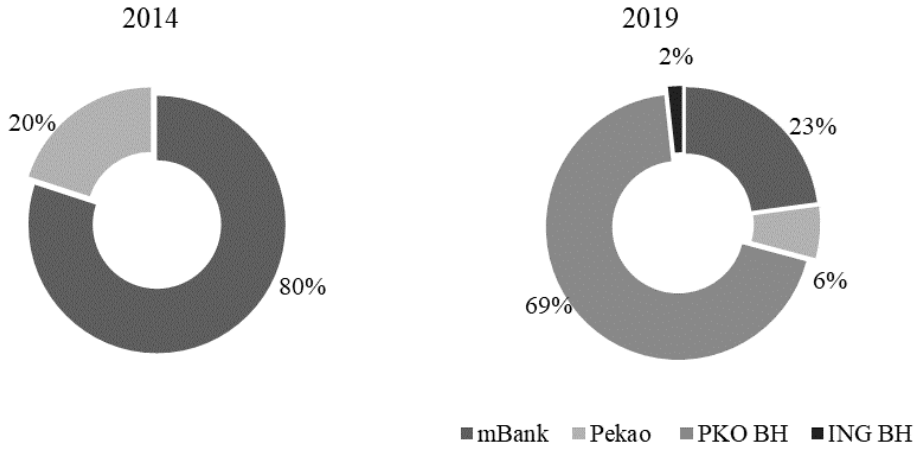

Fig. 1: Structure of mortgage banks in the market in the end of 2014 and 2019

In accordance with the applicable laws, mortgage banks may issue public sector and mortgage covered bonds. The most significant difference between such bonds is the type of receivables which serve as their security. Public sector covered bonds are backed on receivables in respect of loans granted to public sector entities. Mortgage covered bonds, in turn, are secured with receivables in respect of mortgage loans for natural persons and enterprises. As follows from the data presented in Table 2, mortgage banks concentrate on issuing mortgage covered bonds (107 out of 123 issues) in public offerings, that is ones addressed to a large group of purchasers (more than 85% of all issues).

Table 2: Characteristic of mortgage banks' activity in 2000-2019

Banks	**Number of programmes**	**Type of covered bond / number of programmes**	**Number and type of programmes**	**Total aseets (PLN bln)**	**Total assets (PLN bln)**
2000 – 2015					in 31.12.2015
mBank Hipoteczny	60	Public sector / 12 Mortgage / 48	Public / 49 Private / 11	8 051	4 066
Pekao Bank Hipoteczny	21	Public sector / 3 Mortgage / 18	Public / 19 Private / 2	2 489	1 285
PKO Bank Hipoteczny	1	Mortgage / 1	Public / 1	30	30
ING Bank Hipoteczny	3	Mortgage / 3	Private / 3	62	Not applicable

Nykredit Bank Hipoteczny	0	No issues	No issues	Not applicable	Not applicable
2016 – 2019					in 31.12.2019
mBank Hipoteczny	12	Mortgage / 12	Public / 11 Private / 1	3 414	10 365
Pekao Bank Hipoteczny	6	Public sector /1 Mortgage / 5	Public / 6	673	2 858
PKO Bank Hipoteczny	20	Mortgage / 20	Public / 20	16 215	16 245
ING Bank Hipoteczny	1	Mortgage / 1	Public / 1	0,4	0,4

It is worth examining short- and long-term plans of mortgage banks. All three operating banks are to be used as a source of long-term funding for their parent banks. For this purpose, loans are transferred from parent banks to mortgage banks. mBank Hipoteczny introduced in 2014 transfer of existing residential mortgage loans from mBank (immediate parent of mBank Hipoteczny) and in the second quarter of 2017, mBank decided to move sales of retail loans from mBank Hipoteczny to mBank. Moreover, on July 2017, mBank Hipoteczny started international issue covered bonds at the total value of 3 billion EUR completion of 4% at the end of 2019). In turn, PKO BP intends to transfer mortgage loans worth ca. PLN 23 billion to PKO Bank Hipoteczny and actively participate in granting loans at the level of 25-30% of the entire PKO capital group. On June 2016, PKO Bank Hipoteczny assumed the issue worth EUR 4 billion (completion of 69% at the end of 2019) and annual mortgage loan sales at the value of PLN 10 billion. The last bank, Pekao Bank Hipoteczny, continues the issue of covered bonds for PLN 2 billion that was commenced in 2010 (completion of 71% at the end of 2019).

Issue of Covered Bonds

In the period 2000–2019, all mortgage banks issued covered bonds at the total amount of nearly PLN 30 billion, 95% of which were mortgage covered bonds and 5% – public sector covered bonds. To 2016 the prevailing currency of covered bonds was PLN – 68% of the total value of the issued bonds. As regards foreign currencies, bonds were issued in EUR (30.5%) and USD (1.5%). At the end of 2019 the share of covered bonds issued in PLN and EUR was at similar level. Generally, covered bonds denominated in PLN issued for the period of 5 years with a variable interest rate as per the WIBOR3M reference rate were the most common. In turn, covered bonds denominated in EUR – 6 years and fixed rate.

In the initial period (2000–2010), mortgage banks issued 23 series of covered bonds, 17 of which as part of private offerings and only 6 – in the public offering. On average, 3 series of covered bonds were issued per annum, with only one issue in 2006 and 2009. The frequency of issuing covered bonds and their value significantly increased in subsequent years (2011–2015) and has

maintained at the level of 7-10 series a year and exceeded PLN 1 billion since 2011 (Fig 2). The exceptionally high value of bonds issued in 2017 arises from the fact that PKO Bank Hipoteczny had two bond issues worth EUR 1 billion and two at the value of PLN 500 million each. Additionally, mBank Hipoteczny also had two at the value of PLN 1.5 billion. In the following years all mortgages banks issued bonds at the similar level – about PLN 4.4 billion.

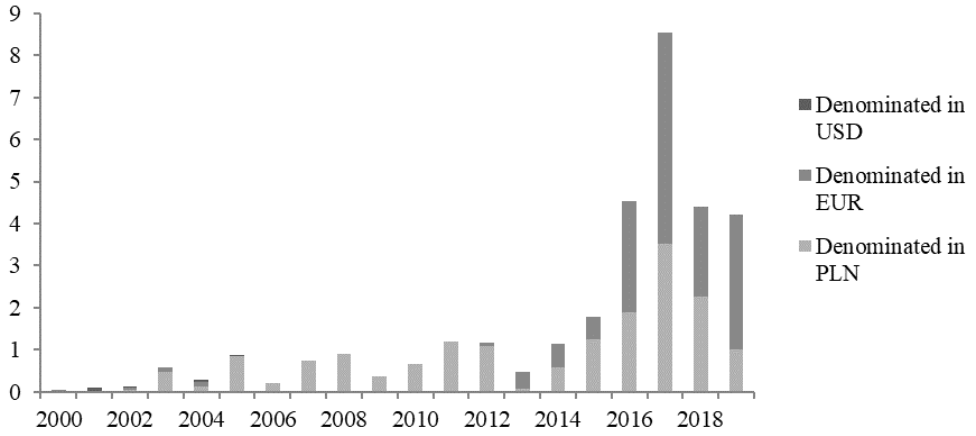

Fig. 2: New issues of covered bonds in 2000-2019 (PLN bln)

It is worth indicating that all issues of covered bonds to date have found purchasers. Additionally, the investors' interest in purchasing covered bonds exceeded the supply each time. For instance, in the case of PKO Bank Hipoteczny's issues of covered bonds denominated in PLN, worth PLN 500 million each, which took place in 2016, 37 and 23 investors declared their willingness to purchase them for PLN 1.24 and 682 million, respectively (PKO Bank Hipoteczny 2016). Or one of the last issues of PKO Bank Hipoteczny (EUR 500 million, 2017), 112 investors wanted to purchase ca. PLN 1.4 billion.

The increase in the frequency of issuing covered bonds translated into a change in mortgage banks' sources of funding. In the period 2000–2009, covered bonds accounted for 40% of the funds for the crediting activity on average. A significant source of funding was liabilities towards the financial sector. Mortgage banks had not begun to replace the cash loans taken out in equity affiliates with covered bonds until 2010, which resulted in the growth in their share in the financing structure to over 50%. The increase in the number and value of the issued covered bonds contributed to the gradual increase in mortgage banks' indebtedness arising from the issued covered bonds, which amounted to over PLN 23 billion at the end of 2019 (Fig 3). Given the plans of mortgage banks for the coming years, it can be assumed that the indebtedness arising from covered bond issues will continue growing. In the period 2021–24, covered bonds worth circa PLN 5 billion will be redeemed every year. Covered bonds at the value about PLN 1 billion will be redeemed only in 2020 and 2025.

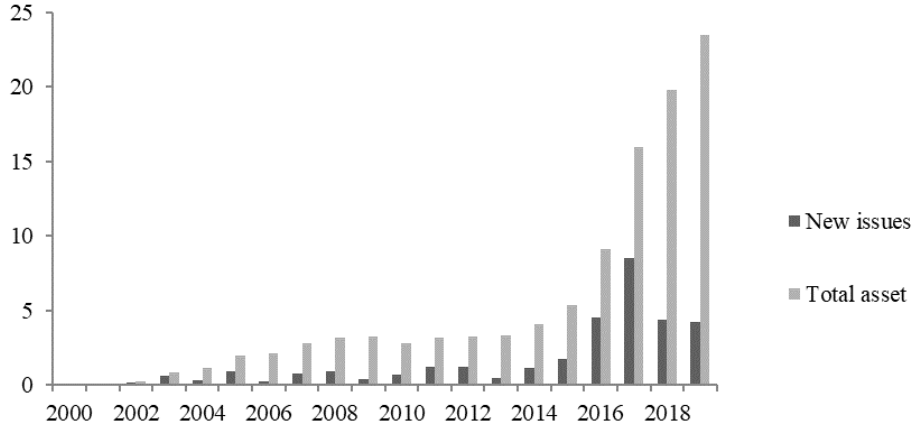

Fig. 3: New issues of covered bonds and total assets of covered bonds in

2000–2019 (PLN bln)

Apart from changes in the structure of mortgage bank financing and covered bond issues, the rules of charging interest on mortgage covered bonds with a variable interest rate (the reference rate + margin) were also amended. From the beginning of 2000 to mid-2015, the basis for charging interest on bonds denominated in PLN was WIBOR6M, and later – WIBOR3M. In the case of bonds denominated in EUR, the basis for charging interest changed earlier – in mid-2014 EURIBOR6M was replaced with EURIBOR3M. The mentioned changes were introduced by mBank Hipoteczny only. Pekao Bank Hipoteczny did not abandon the 6M reference rate. PKO Bank Hipoteczny, in turn, also based the issued covered bonds on WIBOR3M.

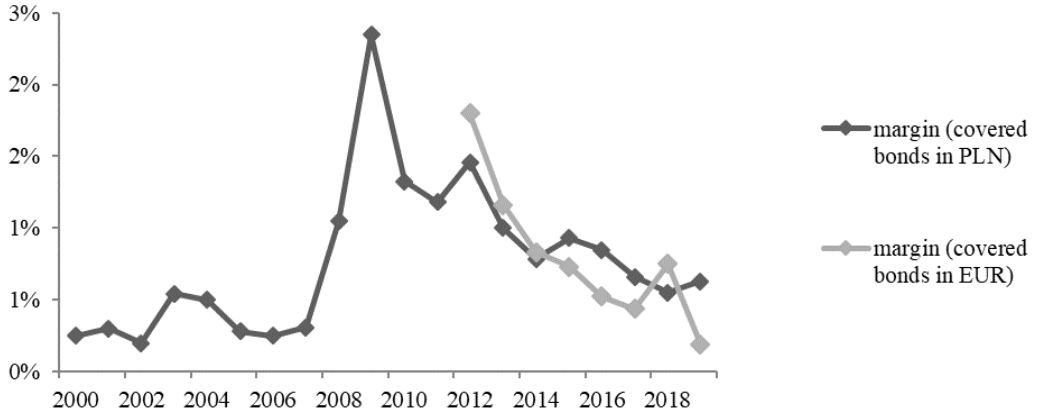

Fig. 4: Average margin covered bonds in PLN and EUR in 2000-2019

The margin level was adapted to the situation on the financial market. In the period 2000–2007, the margin of the covered bonds denominated in PLN was 0.3% on average. The margin growth lasted from early 2008 (the average of 0.74%) to 2009, when two series of covered bonds with a record-breaking margin level (2.1% and 2.59%) were issued. In the next period (2010–2012), the

margin, following a temporary decrease from 1.3% to below 1% in 2011, grew to the level of 1.7%. A gradual drop in the margin level, from 1% in 2013 to 0.6% at the end of 2017 (in PLN) and from 1.8% in 2012 to 0.4% at the end of 2017 (in EUR), can be noticed.

Primary Covered Bonds Market

By the end of 2015, that is the end of the period when the Act of 1997 was in force, only some institutional investors were allowed to become domestic purchasers of covered bonds:

- banks,
- investment funds (up to 25% of NAV and up to 5% of NAV in one issuer or two or more issuers being affiliated entities),
- and open-end pension funds (from 2004, as part of the subjective limit).

The legal regulations restricting the number of investors translated into the structure of purchasers. According to NBP data (reporting on non-treasury debt securities), in the period 2003–2008, covered bonds were purchased mainly by domestic banks and foreign entities. The share of the latter group of entities started to drop in 2006 in favour of domestic banks (Fig 5). In the subsequent period (2009–2012), over 80% of bonds were purchased by banks, almost 10% by open-end pension funds, and circa 10% by investment funds. Foreign entities had not resumed their activities on the Polish covered bond market until 2013, at the expense of domestic banks.

In the following year, a half of the issued covered bonds were sold to foreign entities, which resulted in a decreased share of banks, pension funds, and investment funds. At the same time, it was the first year when covered bonds were purchased by closed-end investment funds. Before that, only open-end investment funds and specialised open-end investment funds invested in such instruments.

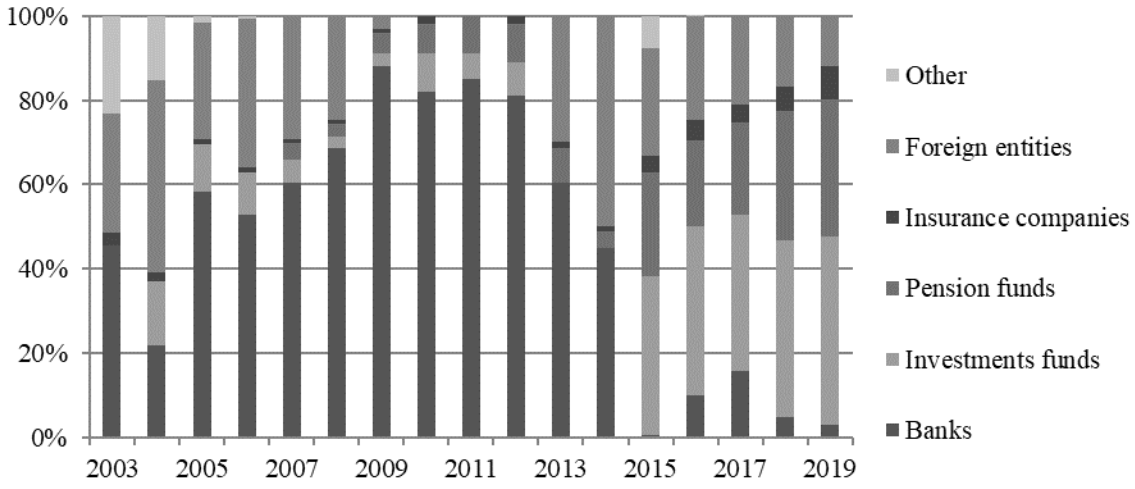

Fig. 5: Purchasers of covered bonds in 2003-2019

In 2015, in turn, the share of banks in the structure of bond purchasers was merely 1%, which was the poorest result in the almost 20 years' history of the covered bond market. The lack of interest in covered bonds on the part of banks arises from the fact that these entities redirected their attention towards corporate bonds. Increased interest was observed among other investors: investment funds (38%) and pension funds (25%).

The amendment to the Act on Covered Bonds and Mortgage Banks of 2015 introduced three crucial changes for prospective investors:

- cooperative savings and credit unions were permitted to invest assets in covered bonds,
- covered bonds were separated from the subjective group of open-end pension funds' investments, and at the same time an investment limit of 5% of the value of assets in all securities of a single issuer or of two or more issuers being affiliated entities was introduced,
- withholding tax was abolished.

At the end of December 2016, insignificant changes occurred in the structure of covered bond purchasers. The share of banks increased to 10%, while that of other entities remained at a level similar to the one from the previous year. The group of covered bond purchasers lacked cooperative savings and credit unions.

To sum up, the domestic covered bonds issued by mortgage banks are purchased mainly by domestic financial institutions. The share of these long-term debt instruments in investment portfolios of purchasers does not exceed 1%, which is influenced by high values of the assets accumulated by individual entities and low amounts invested in covered bonds. For instance, according to GUS (Central Statistical Office of Poland) data, covered bonds accounted for only 1.7% (PLN 4.7 billion) in the investment portfolios of investment funds at the end of HY1 2019, with the major share included in the portfolios of open-end investment funds (2.8%, nearly PLN 3 billion). Closed-end investment funds, in turn, invested less than PLN 263 million (the share of 0.02% in the investment portfolio) in covered bonds.

An exception here is PKO Bank Hipoteczny's covered bonds (EUR) issued in 2016 and 2017, which were addressed mainly to foreign investors. The abolition of the withholding tax and the highest possible Moody's rating for these bonds (Aa3) undoubtedly contributed to the fact that the demand was almost three times higher than the value of the bond issue (EUR 500 million) (PKO BP 2016). It needs to be indicated that the covered bonds of that series made their debut on the Luxembourg Stock Exchange. An analogous situation occurred for two consecutive emissions from 2017. According to PKO BH, buyers of covered bonds were banks (share of around 45%), investment funds (40%) and insurances (12%). Over half of the buyers were from Germany and Austria (55%), France and Benelux (14%). Other investors came from such countries as Switzerland, Italy and the United Kingdom as well as the Scandinavian countries (PKO BH 2018). In mid-2018, mBank as the second mortgage bank issued covered bonds, which are listed on the Luxembourg Stock Exchange.

Secondary Covered Bonds Market

The first covered bond sales and purchase transactions on the secondary market had not been finalised until 2003, that is the fourth year of covered bonds' functioning in Poland. Earlier, covered bonds had been issued only in private offerings addressed to parent banks. In 2003 and 2004, transactions worth PLN 59 and 122 million, respectively, were made, while none were

recorded in 2005. A significant change occurred in 2006, when the first transactions on the regulated securities market (RPW CeTO) market were effected (64 transactions at the value of PLN 6 million). In the subsequent period (2007–2009), trade in covered bonds on the regulated market was low (Fig 6). Significant transactions were finalised on the unregulated market:

64 transactions worth PLN 655 million in 2007,

68 transactions worth PLN 870 million in 2008,

140 transactions worth PLN 584 million in 2009.

The high values of the transactions concluded on the unregulated market could be attributed to the need of releasing the funds invested in covered bonds by foreign entities. Such transactions coincided with the financial crisis of 2007 and the subsequent problems of foreign financial institutions with maintaining financial liquidity. It needs to be added that foreign investors completely withdrew from purchasing Polish covered bonds in the period 2009–2012.

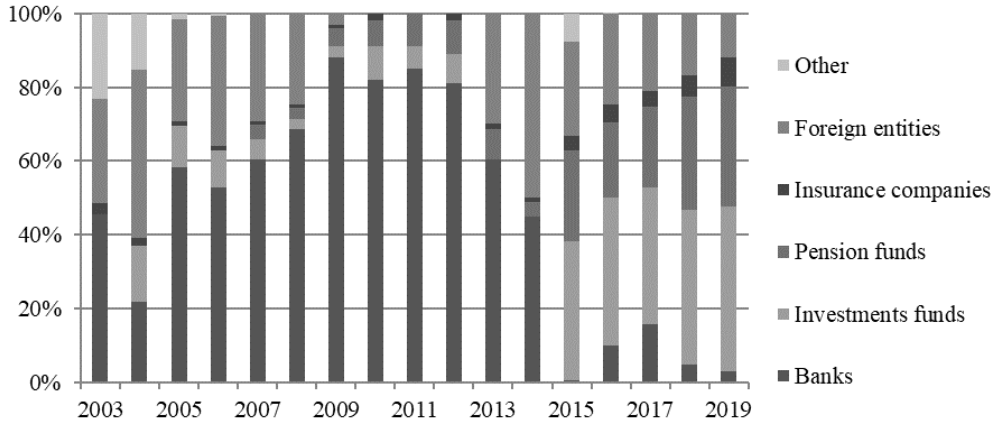

Fig. 6: Number of trades and turnover value (in PLN mln) in Catalyst platform in 2006-2019

On 30 September 2009, trade in covered bonds was transferred from RPW CeTO market to the regulated wholesale market managed by BondSpot as part of the Catalyst platform. The changes in the method of transaction conclusion and the increased security of investors (through approving prospectuses by the PFSA and issuing ratings for each series of covered bonds separately) failed to translate into a higher number and value of covered bond sales and purchase transactions. The record-breaking trade in covered bonds in 2013 arose from effecting 40 block transactions at over PLN 660 million, which can be associated with the return of foreign entities to the domestic covered bond market.

In 2009–2019, that is in the period when covered bonds became available also to individual investors, the total number of 38 transactions were made on Catalyst. More than half of them were transactions of sales and purchase of over 1,000 covered bonds. Despite the introduction of legal changes aimed at increasing the liquidity of covered bonds, their liquidity has not increased. As indicated by the small number of transactions made on the secondary market since 2016. Given the fact that the profitability of covered bonds is higher than that of Treasury bonds with a similar risk level or luck of the obligation to pay the withholding tax, a question arises whether it pays off

to investors to resell covered bonds before the maturity date. In the author's opinion, the answer is negative. The function of the secondary covered bond market is not such important in Poland. Its existence is helpful but not obligatory. In particular when covered bonds remain beyond the reach of a majority of individual investors.

Final Notes

Is the era of mortgage banking coming? The answer depends on the level of plan accomplishment by mortgage banks. If mortgage loans are transfer from parent banks and other commercial banks that are not related to mortgage banks by equity, dynamic changes on the primary covered bond market can be expected. An increased share of mortgage banks in lending and growth in the domestic financial institutions' interest in investing funds in covered bonds is anticipated (as long as they have such possibilities). On the other hand, changes in legal regulations, in particular the abolition of withholding tax, resulted in increased interest in Polish mortgage bonds from foreign investors. All issues of covered bonds in public offerings enjoyed quite a high interest on the part of purchasers, that is entities other than banks which were related to the issuers by equity. The purchasers included mainly foreign commercial banks, investment and pension funds. Since 2014, changes in the structure of buyers of mortgage bonds can be noted. What coincides with the presentation of the draft amendment to the Act on Covered Bonds and Mortgage Banks. Favourable changes in the legal provisions regarding mortgage bonds and bankruptcy law encouraged mortgage banks to issue covered bonds more often. As well as issuing mortgage bonds with a higher value than they have so far. They also have a chance to enter foreign markets. Like PKO Bank Hipoteczny or mBank Hipoteczny have done.

In combination with the implementation of international covered bonds programmes denominated in EUR and directing them to foreign investors, it affected the transformation of the primary mortgage bond market in Poland. There were no major changes in the entity structure except for the creation of one bank. Changes have taken place in the subject structure. Mortgage banks increase the issue of covered bonds in euros and introduce them to trading on the Luxembourg Stock Exchanges, which is associated with a reduction in emissions in PLN.

Acknowledgment

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References

- Bucholski, R. (2012), 'Specjalizacja czy uniwersalizm? Rozważania o bankowości hipotecznej w Polsce na tle regulacji czeskich – aspekty prawne,' *Studia z Zakresu Prawa, Administracji i Zarządzania UKW*, 2, 137–163.

- Cyburt, P. (2002), 'Prawne i ekonomiczne aspekty działalności banków hipotecznych w Polsce,' *Bezpieczny Bank*, 2/3(17/18), 56-72.

- Dziuba, E. (2018), 'Listy zastawne jako instrument wspierający rozwój rynku kredytów hipotecznych w Polsce,' *Systemy Logistyczne Wojsk*, 2(49), 65-82.

- Dżyrut, A. (2017), List zastawny a stabilność polskiego systemu finansowego, Centrum Myśli Strategicznych, Sopot.

- Frańczuk, M. (2017), 'Rozwój rynku listów zastawnych w Polsce w kontekście nowych zmian regulacyjnych,' *Zarządzanie finansami i rachunkowość*, 5 (1), 29–43.

- Gąsowska, A. (2000), Bankowość hipoteczna, Poltext, Warszawa.

- Getka, E. (2002), 'Banki hipoteczne w polskim systemie bankowym – szanse i zagrożenia,' *Bezpieczny Bank*, 2/3(17/18), 39-55.

- Gorlecka, EB. (2006), 'Ogólna charakterystyka banków hipotecznych i listów zastawnych w prawie polskim,' *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie*, 725, 105–117.

- Gürtler, M. and Neelmeier, P. (2018), 'Empirical analysis of the international public covered bond market,' *Journal of Empirical Finance*, 46, 163–181.

- Gürtler M. and Neelmeier, Ph. (2019), 'Risk assessment of mortgage covered bonds: International evidence,' *Finance Research Letters*, 28, 292-298.

- Lechowicz, T. (2015), 'Emisja listów zastawnych na przykładzie rynku polskiego i brytyjskiego,' *Finanse i Prawo Finansowe*, II(3), 71–87.

- mBank Hipoteczny, (2018), 'mBank Hipoteczny Mortgage Covered Bond. Investor presenation. Proven track record and prospectus for fytyre growth,' [Retrieved February 10, 2020], https://mhipoteczny.pl/relacje-inwestorskie/files/Prezentacja_inwestorska/mBH-Covered-Bond-Investor-Presentation.pdf.

- Newseria.pl, (2013), 'BRE Bank Hipoteczny zmienia profil działalności,' [Retrieved February 10, 2020], http://www.biznes.newseria.pl/news/bre_bank_hipoteczny,p41882888.

- PKO Bank Hipoteczny, (2016), 'PKO Bank Polski Group A taste of covered bonds out of Poland,' [Retrieved February 10, 2020],http://www.pkobh.pl/media_files/b521d479-0950-4824-b8a9-217a63ca6780.pdf.

- PKO BP, (2016), 'Listy zastawne PKO Banku Hipotecznego zadebiutowały na giełdzie papierów wartościowych w Luksemburgu, ' [Retrieved February 10, 2020], http://www.pkobh.pl/o-banku/aktualnosci/listy-zastawne-pko-banku-hipotecznego-zadebiutowaly-na-gieldzie-papierow-wartosciowych-w-luksemburgu/.

- PKO BH, (2018), 'Grupa PKO Banku Polskiego jako regularny emitent listów zastawnych w Polsce, ' [Retrieved February 10, 2020], https://www.pkobh.pl/media_files/9baf0797-4942-491d-8ca3-dc4572c86599.pdf.

- Prokopczuk, M. and Vonhoff, V. (2012), 'Risk premia in covered bond markets,' *Journal of Fixed Income*, 22 (2), 19–29.

- Prokopczuk M., Siewert JB. and Vonhoff V. (2013), 'Credit risk in covered bonds,' *Journal of Empirical Finance*, 21, 102-120.

- Reksa Ł. (2002),' Bariery rozwoju banków hipotecznych i listów zastawnych w Polsce,' *Bank i Kredyt*, 10, 36–42.

- Sitek M. (2010), Bankowość hipoteczna i rynek nieruchomości, Wydawnictwo Key Text, Warszawa.

- Sołtysiak M. (2014), 'Rynek listów zastawnych w Polsce i w Państwach Unii Europejskiej,' *Humanities and Social Sciencse*, XIX(21), 205–216.

- Szelągowska A. (ed.) (2010), Współczesna bankowość hipoteczna, CeDeWu, Warszawa.

- Szelągowska A. and Marlęga M. (2007), 'Współczesne problemy rozwoju bankowości hipotecznej w Polsce,' *Contemporary Economics*, 1, 29–38.

- Szulfer J. (2005), 'Rola bankowości hipotecznej w finansowaniu inwestycji mieszkaniowych,' *Gospodarka Narodowa*, 1-2, 63–77.

- The Act on Covered Bonds and Mortgage Banks, 1997 with changes in 2016.

- The Bankruptcy and Reorganization Law, 2003 with changes in 2016.

- Wegener, C., Basse, T., Sibbertsen, P. and Nguyen DK. (2019), 'Liquidity risk and the covered bond market in times of crisis: empirical evidence from Germany,' *Annals of Operations Research*, 282, 407–426.

Water Resources Management in Poland: The Case of Lakes Governance

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Abstract

Poland has about 9 000 natural lakes with an area of over 1 ha. They perform unique ecological, landscape and tourist and recreational functions. The lakes are able to provide the above benefits as long as they maintain their good ecological status. Tens of years of centrally planned water management and dominant state ownership did not prevent poor state of surface water quality in Poland. The new centralist system of management of water resources even more limited stakeholder participation to the level of information exchange and consultation. Grassroots lake associations can help overcome ineffective administrative patterns in lakes management. These organization are able to address issues that state institutions are not well suited to tackle at local scale. The role of government institutions is very important but on the level of preparation relevant policies, strategies, legal and administrative regulations.

Keywords: Lakes, Water Law, Water Management, Lake Governance, Lake Stakeholders

Introduction

Compared to other European countries the Polish fresh water resources are very small. On average, Europe has around 5000 m3 of water per inhabitant per year, while in Poland there is only about 1800 m3 (average value from 1946-2016) (Suchożebrski, 2018). On the contrary among other European countries, Poland is distinguished by a relatively high number of lakes. It is estimated to have 9,000 lakes above 1 ha, covering 1% of the total country's area (Soszka et al., 2003). Most larger lakes are located in the northern part of the country, and they are most numerous in the Land of Great Masurian Lakes, where they make up about 24% of the region's surface area (Lossow, 2011).

Lakes over 10 ha in size accumulate about 18.2 billion m^3 of water, which is five-fold more than the total capacity of all water retention reservoirs in our country. In turn, the water-holding capacity of the lakes seems not so big when compared to the groundwater resources, estimated to reach 6,000 billion m^3 (Diagnoza, 2010). But unlike groundwater, the option of water extraction, so important for conventional water management, is just one of the many services lakes can provide (Turkowski, 2016). The lakes take part in the water cycle - evaporation, retention, purification - and mediate in surface and underground water runoffs. Regardless of their size, lakes are primary repositories of rich aquatic biodiversity, with many having a range of native and endemic species. Water in the lake can become particularly useful during periods of drought and in the event of fires. The lakes can absorb large amounts of heat, soothing the local climate. The risk of flooding in the lake district is relatively low due to the significant retention capacity of the lakes. The usefulness of lakes does not end with hydrological and environmental functions. Not to be forgotten is the intrinsic beauty of lakes, many of which exhibit breath-taking aesthetic features. Lakes evoke a pleasing range of emotional, spiritual and intellectual responses in humans (World Lake Vision, 2003). No wonder that with the surrounding land, the lakes form the basis of the tourist image and the driving force of the dynamically developing lake recreation (Czarkowski et al., 2014) and tourism as well (Hall and Härkönen, 2006).

The lakes will provide the above benefits as long as they maintain their good ecological status. The difficulty of managing lakes is that the source of most of the problems associated with them lies in

the surroundings of the lakes, and not in the lakes themselves. Lake management must be integrative to be successful, given the nature of lakes and their basins. Integrated lake basin management (ILBM) is widely accepted as the best concept to achieve the goals (ILEC, 2005; MoFE, 2018; Zati et al., 2018). In the European Union, a key element of the Water Framework Directive (WFD) is integrated water resource management (IWRM), which has been implemented in accordance with international, national and regional guidelines for water management (Ingold et al., 2016). IWRM serves as the foundations for ILBM and it is defined as 'a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems' (GWP, 2000). However, ILBM is more than a simple application of IWRM (ILEC, 2005). ILBM is an approach for achieving sustainable management of lakes and reservoirs through gradual, continuous and holistic improvement of basin governance, including sustained efforts for integration of institutional responsibilities, policy directions, stakeholder participation, scientific and traditional knowledge, technological possibilities, and funding prospects and constraints (RCSE - and ILEC, 2014).

The article aims to present the current state of water and lake management in Poland and the possibility of stakeholders contribution in the lake management. The stakeholders are defined as group or institutions, either governmental or non-governmental organizations, and also individuals, with the interest or stake in decision-making process or project (according to SADC, 2000, cited by Slawski, 2013).

Legal status of lakes in Poland

Unlike the EU Water Framework Directive (WFD), which clearly defines lake as inland surface standing water (WFD, 2000, Article 2.5), Polish Water Act (PWA, 2017) distinguishes lakes as flowing (Article 22.2) and standing (Article 23.1) water bodies (Fig. 1).

Flowing waters include lakes with a permanent or periodic inflow or outflow of surface waters, while standing waters include lakes not directly and naturally connected with surface flowing waters. All flowing waters belong to the State Treasury and are publicly owned property. In turn, lakes classified as stagnant waters belong to owners of the real estate property. As a result, a great majority of lakes in Poland constitute public (or the State Treasury) property.

The current Polish Water Act has introduced new restrictions on trading in standing waters in the form of a statutory right of pre-emption for the State Treasury with respect to any land under inland standing waters, regardless of the surface area of the water or the land (PWA, 2017, article 217.13). These activities are in line with the development of modern water rights. A characteristic feature of the rights is the participation of all stakeholders in decision making regarding water resources. However, the first step to establishing a water rights system is to put water resources under state ownership or control (Hodgson, 2006). As a result, private water ownership has started to be restricted in many countries.

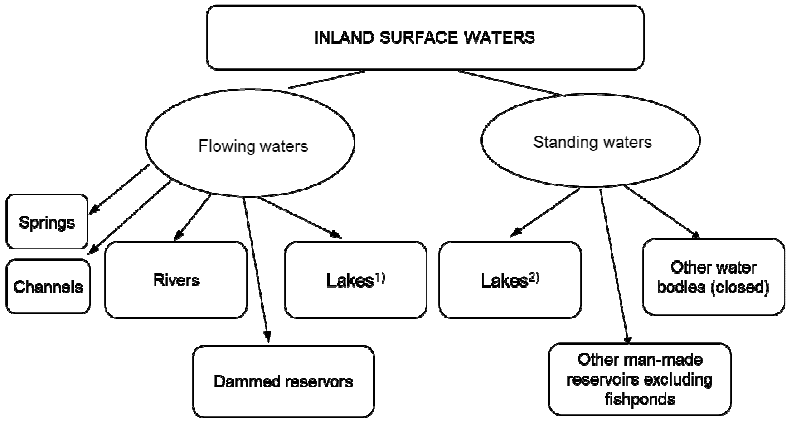

Fig. 1: Classification of inland surface waters according to Polish Water Act (PWA, 2017)
1) lakes that have a continuous or periodical inflow and/or outflow of surface water,
2) lakes that are not directly and naturally related to surface inland flowing waters.
Source: Turkowski, 2017a, modified

Institutions in Water Resources Management in Poland

Having placed water resources under state control or ownership and dealt with the status of existing water rights, logically the next legislative step is to create the institutional arrangements for the management of those resources, including the issue of water rights (Hodgson, 2006).

Current leading political power in Poland returned to the model of centralized management of water resources, neglecting the issue of broader public participation. Officially, the main reason for new water law introduction was to remove the disadvantages of the previous Water Act of 2001, which consisted of the dispersion of water management competences in various institutions and the lack of an appropriate financing water system. The second important objective of the new Water Act was to create a legal basis for the reform of water management that would meet the requirements and the objectives of the WFD and the other related EU directives.

The general control of water management is exercised by state administration, supervised by the minister competent for water management. According to Water Act (PWA, 2017) the administration has overall responsibility for water resources management, including the administration of water rights. The central management body is a state legal entity called Polish Water State Enterprise 'Polish Water'. The structure of the Polish Waters includes 11 regional water management boards, 50 catchment managements and about 330 water supervisions. The relevant bodies of Polish Waters are responsible for such matters as issuing water law permits and water law assessments, perform inspections, and also operate the water registry.

The water management competencies of regional and local self-government authorities were greatly reduced in new Water Act. The local government units dealing with, among others, waters important for agriculture (Voivodship Offices for Land Reclamation and Water Facilities) were liquidated, and part of their staff was employed in the Polish Waters. The basic instrument of water management - permits for the use of water - are issued only by organizational units of Polish Waters, and not as it was earlier by local government units, i.e. by marshals of voivodships or county executives (poviat starosts).

In terms of the quality of water taken to supply the population with water intended for human consumption as well as bathing water and the place occasionally used for bathing, the control is carried out by the State Sanitary Inspection. The protection and use of water are also controlled by the Environmental Protection Inspection. It includes compliance with the conditions set out in decisions issued on the basis of the Water Act and contained in integrated permits, as well as

compliance with the obligations and restrictions imposed on landowners. The controls include also nitrate pollution from agricultural sources.

Lakes Management in Poland

From the hydrological point of view, lakes are primarily water storage bodies. The occurrence and management of lake basin problems is a function of its three distinguishing characteristics: (1) an integrating nature; (2) long water residence time; and (3) complex response dynamics (RCSE - and ILEC, 2014; Chidammodzi and Muhandiki, 2015). Together it makes that lakes are among the most vulnerable and fragile aquatic ecosystems.

Most lake water is renewed on average over a period of 17 years (Shiklomanov and Rodda, 2003). For comparison, for rivers it is on average only 12-13 days (Bajkiewicz-Grabowska and Mikulski, 2005). The capacity of water bodies self-purification strictly depends on the time water exchange (Zubaidah et al., 2019). A long water retention time ensures that, even when remedial programs are implemented to restore a degraded lake, it can take a very long time - if ever - for a lake to recover (RCSE – ILEC, 2014).

In contrast to lotic (river) water systems, lakes do not necessarily respond to perturbations or pollution in a linear fashion. This is due in large part to their stagnancy of impounded water mass held over long time, which allows time delays in response to external disturbances. Hence, they are unpredictable and uncontrollable (RCSE - and ILEC, 2014; Chidammodzi and Muhandiki, 2015).

In European legal regulations lakes constitute one of bodies of surface water – as in Polish regulations. Lakes as other water in Poland are protected, regardless of whose property they are (PWA, 2017, Article 16.20). The main environmental objectives of river basin and particular water bodies management, as well as the measures to be taken to achieve them, have been set out in the river basin management plan (RBMP). The draft RBMP is developed by Polish Waters after consultation with relevant voivode (head of a regional state administration). The overall environmental objective is to protect, improve and maintain at least good biological and chemical status of surface waters, as well as to prevent its deterioration.

The plans are reviewed and updated periodically every six years and constitute the basis for making decisions affecting the state of water resources and the principles of their management in the future. The arrangements for water management plans are included in the country's spatial development concept, as well as voivodship strategy and spatial development plans (https://www.wody.gov.pl/nasze-dzialania/ramowa-dyrektywa-wodna-plany-gospodarowania-wodami).

Only larger lakes are detailed in the plans and usually only the type of the lake and an overall environmental goal are specified. For example, Lake Kośno (569 ha) in the point 'subject of protection' was briefly defined as "mesotrophic lake, plant communities of the class Charetea fragilis, alder, boreal spruce on peat, wetland birds", and the environmental goal has been specified as ‘Preservation of natural vegetation, including the class Charetea plant and lake fauna’ (RBMP Pregoła, 2016). The ILBM approach has not been used mainly due to the lack of relevant provisions in the WFD and the wide scope of the above-mentioned plans covering entire river basins.

An overall assessment of the state of 885 Polish lakes monitored in 2013–2018 showed that 87% of them were in poor condition (GUS, 2019). Inspections carried out in 2017 have shown that naturally occurring clean surface waters can be found in Poland practically only in mountain streams and some lakes, located away from human settlements and industrial plants. Despite spending over PLN 18 billion on the construction and modernization of sewage treatment plants in the last dozen years, almost 90% of the monitored reservoirs remained in poor condition (NIK, 2018). These results are very pessimistic, but while full assessment of environmental changes requires further years of monitoring, the evaluation of the administrative efficiency can be more explicit. Audits (NIK, 2018) showed the situation of discontinuation of supervisory activities, both in the area of water monitoring

and control, assessment of the impact of sewage treatment plants on the environment, and compliance with the requirements set out in permits.

The experience gained in other countries suggests that institutions responsible for the administration of lake catchments need time before they operate effectively (ILEC, 2005). This experience also implies that the above process can be greatly accelerated by the decentralization of some of the competences by delegating them to more local level institutions, and by the inclusion of other interested parties, including non-government organizations and community associations into the decision-making process (Davidson and Loë, 2016; Huitema and Meijerink, 2017).

Lakes Governance

Institutions lie at the core of the management of lake catchments. They perform and supervise the performance of tasks defined by legal regulations; they shape the policy and initiate new legal solutions; but they can also serve as a center for engaging other interested persons and organizations into decision-making processes (ILEC, 2005). The numerous functions and values of lakes make them subject to the use and interest of many people and institutions (Fig. 2).

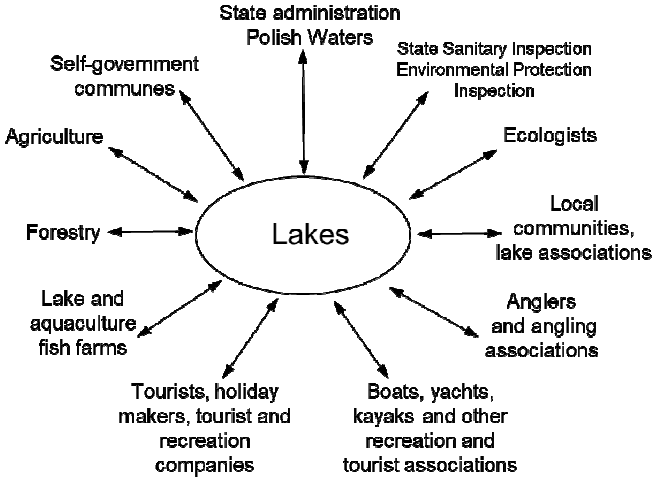

Fig. 2: Main Polish lake stakeholders

Source: own work

The European FWD also emphasizes the need to involve all stakeholders in water resource management –'(14) the success of this Directive relies on close cooperation and coherent action at Community, Member State and local level as well as on information, consultation and involvement of the public, including users' (WFD, 2000). Advancing guidelines for the development of the ILBM platform process, describes four levels of stakeholder participation: information - sharing, consultation, collaboration and empowerment, and constructs an ordering of influence contingent on the nature of communication (one versus two-way communication) and allocation of resources (independent versus shared versus transferable) among researchers, government and non-government organizational staff, and other stakeholders (ILEC, 2005, citied by Bell et al., 2013). Public participation in current Polish water law has been determined at the level of information exchange and consultation. In particular, the water administration is obliged to carry out public consultations on the review of significant problems related to water management and water management plans being developed for river basins.

The opinion, that politicians and government administrations subordinate to them, do not see the need for social organizations to participate in decision making and are afraid of independent assessments (Graniszewski, 2017), confirms the provision regarding the new rules for issuing water law permits

(PWA 2017, article 402). Non-governmental organizations have been excluded from participating in the new proceedings regarding water law permits. As a result, these ecologically relevant administrative decisions will remain outside broader public control.

Regardless of the changing governments and their ideologies, Polish society is becoming more and more civil society (Korolczuk, 2017). Nowadays we can observe a tremendous increase of the number of non-government organizations (NGO). In 2018 there were about 143 thousand NGOs including 117 thousand associations and 26 thousand foundations (Charycka and Gumkowska, 2019). For comparison in 2012 there were about 78,5 thousand NGOs including about 70 thousand associations and 8,5 thousand foundations (Adamski et al., 2014, cited by Brodziński et al., 2017). One of the manifestations of this phenomenon are grassroots lake associations emerging in recent years in Poland. There are still few such associations compared to other countries with long tradition of lake associations as the USA (Thornton, 2013; Rees, 2014). But the reason for creation of lake association is the same. When a community, agency or individual makes any decision regarding land management, it can impact lake water quality by affecting drinking water supplies, ecosystem health, and recreation opportunities. Processes of eutrophication and pollution can rapidly accelerate when the areas are built-up and intensively used in the absence of adequate sanitary installations. When negative impacts become great enough that the public begins to observe them, it can inspire individuals and communities to act to protect the lakes they love and rely upon (Henson et al., 2019).

Local institutions, such as lake associations, are well suited to complement traditional regulatory approaches because the strong connections and relationships developed through these organizations allow for more detailed knowledge of the sources of potential problems as well as greater support for local monitoring and enforcement (Snell et al., 2013). Core requirements for successful collective action of association include the presence of defined group with common interests; repeated, face-to-face interactions among group members, allowing members to share information and devise appropriate rules and norm (Ostrom, 1990; Gardner and Walker, 1994; Poteete and Ostrom, 2004 cited by Baldwin et al., 2018). A good example here can be 'The Ecological Association Łajs 2000' (Poland). The association was founded by the inhabitants of the village of Łajs located on the lakes, befriended anglers and naturalists in 2007. The main motive behind the establishment of the association was to act for the protection of the waters of the Łajskie Lake and the Reserve of Kośno Lake. Both lakes, despite established formal protection areas (protected landscape area, Natura 2000, nature reserve), have been subject to uncontrolled pollution. The residents' initiative resulted in taking specific actions to protect the lakes and their catchments. The association did not limit its activities to education, monitoring and protests, but prepared a lake protection program and has coordinated the most important local and regional institutions around it (Fig. 3).

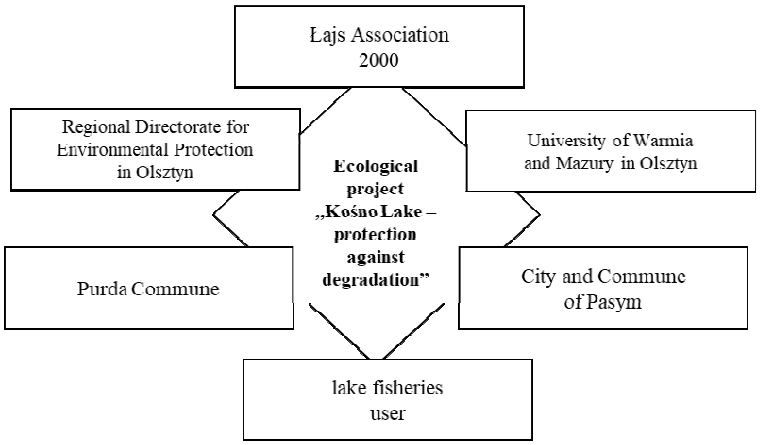

Fig. 3: Main participates of the local project of lake Kośno (Poland)
Source: Turkowski, 2017b, p. 359.

The initiative of residents and supporters of the exemplary village of Łajs and the favorable attitude of the regional and local government administrations as well as the university resulted in actions that in the near future should bring a significant improvement in water status as well as permanent and effective protection of the lakes.

Summary

The lakes constitute a significant part of inland water resources, but their significance goes far beyond the value of the water they accumulate. The lakes are ecosystems, dynamic living ecological systems, as well as elements of the landscape in which the natural and architectural components harmonize with the free space of the lake and change with the current weather conditions and seasons. But the quality of lake waters and their values are closely linked to the land use and other activities carried out by people in the catchment areas of the lakes. For this reason, the sustainable use of lakes is associated with the integrated management of their drainage basins. Actions and strategies in the management of lakes do not differ from similar activities envisaged in the framework of integrated water resource management. The difference lies in the need to focus on individual lakes and their specific conditions. Experience from other countries shows that integrated management of individual lakes and their basins is the best way.

Analysis of legal acts and river basin management plans indicates that lakes and the specificity of their problems are not sufficiently recognized in Poland at the central level of water resources management. Due to the mainly local dimension, the participation of citizens and other stakeholders, including non-governmental organizations, local self-government authorities, entrepreneurs and industrial organizations, as well as educational and research institutions, is fundamental in managing individual lakes. The progressive development of civil society and the increasing readiness of Poles to participate in the life of the state are conducive to these activities and should be properly used. The role of government institutions should focus on the preparation of relevant policies, strategies as well as legal and administrative provisions. These activities should define the foundations of management, including full partnership participation of the local government, private sector and local communities. The changes should begin with the restoration in the water law the possibility of participation of non-governmental organizations in proceedings regarding the water permit. In addition, the exclusion of these organizations is contrary to the provisions of the Aarhus Convention (Convention on access to information, public participation in decision-making and access to justice in environmental matters signed June 25, 1998 in Aarhus). Defining the role and principles of interaction between stakeholders in lake management requires further analysis of solutions used in other countries and the separate own studies.

References

- Bajkiewicz-Grabowska, E and Mikulski, Z. (2005), Hydrologia ogólna, Wydawnictwo Naukowe PWN, Warszawa.
- Baldwin, E., McCord, P., Dell'Angelo, J. and Evans, T. (2018), 'Collective action in a polycentric water governance system', *Environmental Policy and Governance*, 28, 212–222.
- Bell, KP., Lindenfeld, L., Speers, AE., Teisl, MF. and Leahy, JE. (2013), 'Creating opportunities for improving lake-focused stakeholder engagement: knowledge–action systems, pro-environment behaviour and sustainable lake management', *Lakes & Reservoirs: Research and Management,* 18, 5–14.
- Brodziński, Z., Bórawski, P. and Dunn, J.W. (2017), 'Development of Non-Governmental Organizations in Poland', *Contemporary Economics*, 11 (4), 401-414.
- Charycka, B. and Gumkowska, M. (2019), Kondycja sektora organizacji pozarządowych, Wyd. Stowarzyszenie Klon/Jawor, Warszawa.
- Chidammodzi, CL. and Muhandiki VS. (2015), 'Development of indicators for assessment of Lake Malawi Basin in an Integrated Lake Basin Management (ILBM) framework', *International Journal of the Commons*, 9 (1), 209–236.
- Czarkowski, T., Kupren, K., Turkowski, K., Kucharczyk, D., Kozłowski, K. and Mamcarz, A. (2014), Rybactwo a atrakcyjność turystyczna obszarów pojeziernych, Problemy rekreacji

i turystyki wodnej, Hakuć-Błażowska, A., Furgała-Selezniow, G. and Skrzypczak, A. (eds),Wyd. UWM Olsztyn.

- Davidson, SL. and de Loë, RC. (2016), 'The Changing role of ENGOs in water governance: institutional entrepreneurs?', *Environmental Management*, 57, 62–78.
- Diagnoza aktualnego stanu gospodarki wodnej, (2010), Załącznik 1 do Projektu Polityki Wodnej Państwa 2030 (z uwzględnieniem etapu 2016), Krajowy Zarząd Gospodarki Wodnej. Warszawa.
- Graniszewski, L. (2017), 'Governance w Polsce – udział organizacji pozarządowych we współrządzeniu publicznym', *Rocznik Administracji Publicznej*, 3, 166 – 181.
- GUS, (2019), Ochrona środowiska, Warszawa, stat.gov.pl.
- GWP, (2000), Global Water Partnership - Technical Advisory Committee (TAC). Integrated Water Resources Management. TAC Background Pap., 4, Stockholm.
- Hall, CM. and Härkönen, T. (2006), Lake Tourism: an introduction to lacustrine tourism systems, Lake Tourism. An Integrated Approach to Lacustrine Tourism Systems, Hall, CM. and Härkönen, T. (eds), Channel View Publications, Clevedon, Buffalo, Toronto.
- Henson, VR., Cobourn, KM., Carey, CC., Boyle, KJ., Sorice, MG, Ward, NK. and Weathers, KC. (2019), 'Closing the Human-Nature Feedback Loop'*, LakeLine Magazine*, 39 (3), 35-38.
- Hodgson, S. (2006), Modern water rights. Theory and practice. FAO Legislative Study 92. Rome.
- Huitema, D. and Meijerink, S. (2017), 'The politics of river basin organizations: institutional design choices, coalitions, and consequences', *Ecology and Society*, 22 (2), 42.
- ILEC, (2005), Managing Lakes and their Basins for Sustainable Use: A Report for Lake Basin Managers and Stakeholders. International Lake Environment Committee Foundation: Kusatsu, Japan.
- Ingold, K., Fischer, M., de Boer, Ch. and Mollinga, PP. (2016), 'Water management across borders, scales and sectors: recent developments and future challenges in water policy analysis', *Environmental Policy and Governance*. 26, 223–228.
- Korolczuk, E. (2017), Społeczeństwo obywatelskie w Polsce – kryzys czy nowe otwarcie? Seria Analizy Instytutu Studiów Zaawansowanych, Warszawa.
- Lossow, K. (2011), Jeziorność, Encyklopedia rybacka, Szczerbowski, J. (ed), Wyd. IRŚ, Olsztyn.
- MoFE, (2018), Integrated Lake Basin Management Plan of Lake Cluster of Pokhara Valley, Nepal (2018-2023). Ministry of Forests and Environment, Kathmandu, Nepal.
- NIK, (2018), Sprawozdanie z działalności Najwyższej Izby Kontroli w 2017 roku. Nr ewid. 143/2018/KST.
- PWA, (2017), Polish Water Act of 20 July 2017, Dz.U. 2018 item 2268 with subsequent amendments.
- RBMP Pregoła, (2016), Plan gospodarowania wodami na obszarze dorzecza Pregoły. Załącznik do rozporządzenia Rady Ministrów z dnia 18 października 2016 r. (poz. 1959).
- RCSE - and ILEC, (2014), Development of ILBM Platform Process: Evolving Guidelines through Participatory Improvement. 2nd Edition.
- Rees, T., (2014), 'The Role of Lake Associations: Connecting People for the Good of the Lake', *LakeLine Magazine*, 34 (2), 24 – 26.
- Shiklomanov, IA. and Rodda, JC. 2003, World Water Resources at the Beginning of the Twenty-First Century. Cambridge University Press, Cambridge.
- Slawski, TM. (2013), 'River Basin Organization development in southeastern Wisconsin', *Lakes & Reservoirs: Research and Management,* 18(1), 53–65.
- Snell, M., Bell, K. P. and Leahy, J. (2013), 'Local institutions and lake management', *Lakes & Reservoirs: Research and Management*, 18: 35–44.
- Soszka, H., Cydzik, D. and Czajka, J. (2003), Lakes, The state of environment in Poland 1996–2001 report, Inspection for Environmental Protection. Environmental Monitoring Library, Warsaw.
- Suchożebrski, J. (2018), Zasoby wodne Polski, Zarządzanie zasobami wodnymi w Polsce 2018, Global Compact Network Poland. Warsaw.

- Thornton, J. (2013), 'Stakeholder participation in lake management in Wisconsin (USA)', *Lakes & Reservoirs: Research and Management* 18 (1), 26-33.
- Turkowski, K. (2016), 'Własność i zarządzanie jeziorami a problem ich zrównoważonego użytkowania', *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 453, 153-166.
- Turkowski, K. (2017a), 'Governance of publicly owned lakes in Poland - the current state and underlying conditions', *Economics and Environment*, 1 (60), 92-102.
- Turkowski, K. (2017b). 'Udział społeczności lokalnej w zrównoważonym zarządzaniu środowiskiem na przykładzie jezior Łajskiego i Kośno', *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 491, 352 – 363.
- WFD, (2000), Directive the European Parliament and the Council of the European Community 2000/60/EC, of 23.10.2000, establishing a framework for Community action in the field of water policy.
- World Lake Vision, 2003, World Lake Vision – a call to action. World Lake Vision Committee, Kusatsu, Shiga, JAPAN.
- Zati, S., Akashah, M. and Saim, S. (2018), 'Economic and institutional assessment of Malaysia's first biosphere reserve: Chini Lake', *Lakes & Reservoirs*, 23, 104–116.
- Zubaidah, T., Karnaningroem, N. and Slamet, A. (2019), 'The Self-Purification Ability in the Rivers of Banjarmasin, Indonesia', *Journal of Ecological Engineering*, 20 (2), 177–182.

Discrepancy Water Rights for 'Marginals' in Water Management : Case Study in Penjaringan, North Jakarta

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Abstract

One crucial element that must consider the welfare of the community is access to water. In this case, access to water that is easily obtained by the community is one of the ideologies in Indonesia. Namely, social justice for all Indonesian people, it mainly applies to water rights in marginalized communities. In North Jakarta, especially in Penjaringan sub-district, people still have difficulty in accessing clean water. Due to the complexity of the problem from the start of land concessions to the elevation of an area. Consequently, it makes it difficult for the government to provide access to water in the form of piped water connections for the community. This research employs a qualitative approach through interviews and literature research. Interviews were conducted in early January 2020 to residents of Penjaringan, North Jakarta, while secondary data obtained from open access PALYJA (water company). The program found at the research location, for instance, is Master Meter. A program intended for people who have a Building Land Tax, so that *de jure* can get access to water at a low price per month. However, the facts found in the field between one village and another village have significant differences; between the cost of payment to the payment method and the installation of waterways. Hence, due to discrepancy, people still pay their obligations in order to get rights to water.

Keywords: Water Rights; Water Management; Marginals; Corporate Social Responsibility .

Background

Water, as a political attribute, has a role in determining people's welfare (Batley & Mcloughlin, 2015; Levy & Sidel, 2011; Rey, Pérez-Blanco, Escriva-Bou, Girard, & Veldkamp, 2019; Wright-Contreras, 2019). Water classified as common goods; thus, there is no room for private ownership desire or personal interests (Sultana, 2018). If elaborated on the economic dimension, water classified as inelastic goods will affect water prices, high water price fluctuations will affect the cost needs in the household (Distaso & Ciervo, 2011). Thus, water management policies based on management based on "common goods" and the economic capacity of the community in consuming water (Agthe & Billings, 2003). Water management primarily managed cooperatively in the local community (Demie, Bekele, & Seyoum, 2016; Hove et al., 2019). Notably, through infrastructure that can distribute water by following the economy of reciprocity rules (Distasto & Ciervo, 2011). However, human integrity in applying the principles of environmental management and creating a sense of security for the capacity of water resources for the long term (Kranz et al, 2004).

Marginals in this research claimed as people who live on a pre-prosperous level. Data shows from Central Bureau (2019), 95.860 people in North Jakarta, as in 2018, live as a sparse population. Indeed, the constraint, in this case, is how to meet the balance between people's purchasing power and water supply (Cosgrove & Loucks, 2015) and then produce the purchase price of water. However, the calculation of water prices should base on customers' economic behaviour to achieve fairness over

marginal society. This research will describe a significant difference in the two neighbouring villages in accessing the water rights of marginals people. Therefore, it gets a real framework of things experienced by the community in accessing clean water as one of the rights of human life and the right as citizens.

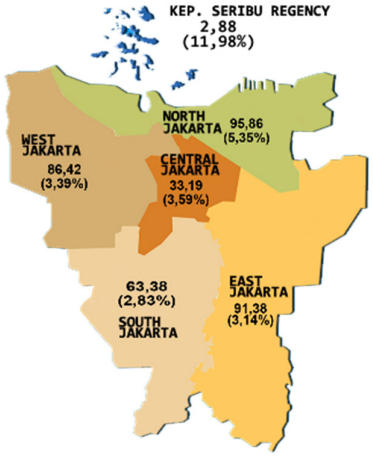

Fig. 1: Poor population percentage (thousand/person) by September 2018.
(Source: Central Bureau North Jakarta)

Method

This research employs a qualitative approach, and researchers state-specific hypotheses completed with quantitative data collection to derive explanations from those data. Primary data collected through interviews and observation in earlier January 2020 with people at two villages; Kembang Lestari and Marlina, at Penjaringan sub-district, North Jakarta, Indonesia. Secondary data collected from Pam Lyonnaise Jaya or known as PALYJA, particularly in water management in North Jakarta, Indonesia. Data analyzed using descriptive analysis, equipped with pictures that have been obtaining at the research location.

Result and Discussion

Water for all is a commitment of the water company by Pam Lyonnaise Jaya in Jakarta to strive for all people to access clean water. The focus of its implementation is on locations that have not yet channeled clean water through pipelines. Hence, with a program supported by corporate social responsibility, it is expected that all levels of society can access clean water, and the company also participates in campaigns to support the conservation of natural resources following the principles of sustainable development. Whereas, some of these programs are still running and some have been terminated, clearly that each program must be reviewed for their effectiveness in on-site implementation.

Corporate Social Responsibility: Water for All

First, GPOBA (the Global Partnership on Output-Based Aid) is an innovative program for better infrastructure development for the underprivileged in developing countries, one of which is providing access to clean water with funding from the World Bank through the reimbursement system. This financial assistance provided with certain conditions based on the results felt by the community. At the beginning of this project, PALYJA, as one of the clean water service providers in DKI Jakarta, is responsible for funding the implementation of the program until the results can be felt directly by the community and an independent auditor has audited the results of this program. Based on the results of the audited program, the cost reimbursement mechanism implemented. The implementation of this program has been taking place since April 2008 and has ended in June 2013.

Now, PALYJA has connected as many as 5,042 households through the GPOBA program. The regions that have obtained clean water pipelines in the GPOBA program are Bengkel Swamp, Menceng, Warung Hang, Swamp Lele, Utan Jati, Muara Baru. These locations were chosen because they are the location of underprivileged communities in the DKI Jakarta area and have groundwater conditions that are no longer suitable for consumption. For PALYJA, this program expected to help the underprivileged communities in DKI Jakarta to get clean water pipelines to homes at affordable prices. Price comparisons show in table 1, before and after the GPOBA program.

Table 1: Comparison Before and After GPOBA

Before GPOBA			After GPOBA		
Water usage	**Price USD/L (Rp/L)**	**consumption / home / month**	**Water usage**	**Price USD/L (Rp/L)**	**consumption / home / month**
Cook and drink	US$ 2,71-5,50 (depends on the area)	600 L	Cook, drink, and wash	US$ 0,077-0,26 (depends on the area)	14000 L

(Source: PALYJA)

Secondly, the 'water kiosk' is a program initiated by a state-owned enterprise (PALYJA) in water management. Water kiosk is a water supply program for underprivileged communities or marginal in Jakarta that is outside the reach of the PALYJA network. Water kiosks implemented by building water kiosks, which are then collected and distributed through PALYJA tanker cars. Until now, PALYJA has more than 50 water kiosks spread throughout the areas managed by PALYJA. The existence of these water kiosks expected to make it easier for the community to get access to healthy, clean water at affordable prices. In table 2 shows the water price comparison of water kiosk before and after the program.

Table 2: Water price comparison

	Before Water Kiosk	After Water Kiosk	
Water source	*Kiosk Owner*	*Kiosk Owner*	*On the Location*
Price Rupiah/L (USD/L)	US$ 3,66 - US$ 5,50 (depends on the area)	US$ 1,83 - US$ 2,75 (depends on the area)	US$ 1,47

(Source: PALYJA)

Thirdly, the Master Meter is a program carried out by Pam Lyonnaise Jaya (PALYJA) to provide solutions to overcome the problem of access to clean water. In the Master Meter program, one of the requirements that must be met by the community is by providing proof of legal ownership of the house in the form of proof of payment of Building Land Tax. In the Master Meter program, PALYJA provides water facilities in the form of a clean water connection by using a master meter located in a proper location and with an adjustable size. Through the Master Meter connection, the community can channel clean water connections to their respective homes. The arrangement of the Master Meter clean water distribution mechanism is carried out by the Community Based Organization or CBO. Signet Master Meter in Figure 2 located beside the designated community home to regulate expenditure or consumption of water per month. This management is managed by the community, starting from payment and maintenance, as well as registration for installing the meter in each resident's home.

Fig. 2: Signet Master Meter in Kembang Lestari Village, Penjaringan, North Jakarta.
(Source: Authors)

Data obtained from observation and direct interviews with one of the Kembang Lestari Village housewives, Penjaringan Subdistrict, the head of the family work as an Officer in Handling Infrastructure and Public Facilities, with a monthly fee of water consumption approximately US$ 34 or above. The meter as a gauge of water consumption in every corner of the house that already has water channels. Information obtained from the results of the interview that the installation costs around US$ 73 to get to each resident's house. Payment is paid to one of the residents who are the management of the Master Meter, and payment is using cash. If the payment is experiencing problems or is too late from the due date, a payment penalty will be given with a penalty that counts per day. The most crucial thing from the Master Meter program in Kembang Lestari village is that the water flow will be opened in the morning within 3-5 hours in the morning around 7 am until 11 am and then it will be locked again which will be open again at the next day. The informant informed that she had a container to collect water during the access period that was being opened, moreover the whole family can use the water that have been collected.

In contrast to the next village, namely Marlina village, costs to be paid for water consumption per month is US$ 4 or above. Payment can be accumulated to the following month, with payment methods made at convenience stores in collaboration with PAM or Water Companies. Reviewed from two villages, the amount of fees charged by the two villages is not evenly distributing. The financial ability of marginal people was charged mainly for paying their water consumption. Thus, due to discrepancy be a challenge for future improvement strategies to equalize the price of water consumption for marginal communities in Penjaringan, North Jakarta. Therefore, marginal people must get their rights to water at an affordable price. Contrasting with Kembang Lestari village, at Marlina village, people can access water all day long for 24 hours without a certain period to turn on and turn off the water access.

Fig. 3: Meter in every home resident

(Souce: Authors)

Exposure to the findings at the study site above can be one of the strategies for improvement in water management. That, the initiation of the water for all programs is not just a corporate social responsibility but also as one of the prior programs for marginalized communities in obtaining the water rights. Therefore, it is expecting that there will be no discrepancy between the poor and rich, especially the poor with the poor between villages. The problem that must discuss with all related parties is the Building Land Tax because this tax is one of the obstacles for people to be able to access the Master Meter to meet their daily water needs. Emphasizing, in its consideration the 'water for all' programs must adjust to the regional or regional spatial plan; moreover, the community does not suffer losses soon. Furthermore, holistic research on spatial planning and land ownership that has been occupied by marginal communities urgently needed to fight for their rights, particularly water rights. Thus, the challenge for PALYJA in initiating the 'water for all' program is as a form of transparency and an invitation to all parties to work together to save and preserve water resources in order to preserve the environment and the survival of humans and living things.

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References

- Agthe, D. E., & Billings, R. B. (2003) Elasticity of Demand for Water Resource Managers, 71–86. https://doi.org/10.1007/978-94-017-0237-9_5

- Batley, R., & Mcloughlin, C. (2015) 'The Politics of Public Services: A Service Characteristics Approach', *World Development*, *74*, 275–285. https://doi.org/10.1016/j.worlddev.2015.05.018

- Central Bureau North Jakarta. (2019). 'Jakarta Poverty and Inequality Level September 2018'. [Online]. *Central Bureau North Jakarta*. [Retrieved January 03, 2020]. Available: https://jakutkota.bps.go.id/pressrelease/2019/01/22/136/tingkat-kemiskinan-dan-ketimpangan-dki-jakarta-september-2018.html

- Cosgrove, W. J., & Loucks, D. P. (2015) Water management: Current and future challenges and research directions, *Water Resources Research*, *51*(6), 4823–4839. https://doi.org/10.1002/2014WR016869

- Demie, G., Bekele, M., & Seyoum, B. (2016) 'Water accessibility impact on girl and women's participation in education and other development activities: the case of Wuchale and Jidda Woreda, Ethiopia', *Environmental Systems Research*, *5*(1). https://doi.org/10.1186/s40068-016-0061-6

- Distaso, A., & Ciervo, M. (2011) 'Water and common goods: Community management as a possible alternative to the public-private model', *Rivista Internazionale Di Scienze Sociali*, *2*(2), 143–166. https://doi.org/10.1400/209762

- Hove, J., D'Ambruoso, L., Mabetha, D., Van Der Merwe, M., Byass, P., Kahn, K., … Twine, R. (2019) "Water is life": Developing community participation for clean water in rural South Africa', *BMJ Global Health*, *4*(3), 1–13. https://doi.org/10.1136/bmjgh-2018-001377

- Levy, B. S., & Sidel, V. W. (2011) 'Editorial: Water rights and water fights: Preventing and resolving conflicts before they boil over', *American Journal of Public Health*, *101*(5), 778–780. https://doi.org/10.2105/AJPH.2010.194670

- PAM Lyonnaise Jaya. (2013). 'Air untuk semua'. [Online]. *PAM Lyonnaise Jaya.* [Retrieved January 03, 2020]. Available: https://palyja.co.id/id/air-untuk-semua/

- PAM Lyonnaise Jaya. (2017). 'Master Meter'. [Online]. *PAM Lyonnaise Jaya.* [Retrieved January 03, 2020]. Available: https://palyja.co.id/en/master-meter-2/

- Rey, D., Pérez-Blanco, C. D., Escriva-Bou, A., Girard, C., & Veldkamp, T. I. E. (2019) 'Role of economic instruments in water allocation reform: lessons from Europe', *International Journal of Water Resources Development*, *35*(2), 206–239. https://doi.org/10.1080/07900627.2017.1422702

- Sultana, F. (2018) 'Water justice: why it matters and how to achieve it', *Water International*, *43*(4), 483–493. https://doi.org/10.1080/02508060.2018.1458272

- Wright-Contreras, L. (2019) 'A Transnational Urban Political Ecology of Water Infrastructures: Global Water Policies and Water Management in Hanoi', *Public Works Management and Policy*, *24*(2), 195–212. https://doi.org/10.1177/1087724X18780045.

Electronic Word of Mouth (eWOM): An Exploratory Literature Review

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Abstract

With the advent of the Internet and especially social media, electronic word of mouth (eWOM) plays an influential role in person-to-person marketing. In this context, this article aims to provide an overview of the current state of eWOM research. Accordingly, we selected 1,033 academic articles from the database Scopus. Next, a latent semantic analysis was applied. The results allow distinguishing three areas of research, labeled as brand image, hospitality/tourism, and product evaluation.

Keywords: eWOM, Research, Latent Semantic Analysis.

Introduction

Word-of-mouth is known as traditional person-to-person marketing with using oral communication that it used to be one of the most worth marketing aspects for business owners. With the advent of the Internet and especially social media, this behavior has changed to a much more public space. Therefore, every kind of comments or posts that users share on the social media could include electronic word of mouth, that is one of the most influential resources of information transmission (Chu & Kim, 2018; Mishra & Satish, 2016). In this context, this article aims to provide an overview of the current state of eWOM research.

Methodology

Since our goal is to explore in the most consistent way possible all academic literature related to eWOM, we choose following the methodology proposed by Sidorova et al. (2008). Below we detail this methodology and elements of the analysis performed.

Data Gathering

This study searched all academic publications in which include “eWOM” or “e-WOM” in their titles, abstracts, or author keywords in the database Scopus between 2004 and 2019. In total, 1,121 peer-

reviewed articles and conferences have been found. In order to distinguish which article's context is related to eWOM, the researchers read the abstracts of publications, and 1,033 papers were identified.

Data Analysis

A text mining technique analyzes obtained data with the help of Rapidminer software. In particular, the latent semantic analysis (LSA) technique was used for this study. LSA can extract essential words and identify the different meanings of a word based on the context; this capability has been famed in different research areas. The 1,033 collected abstracts were imported to Rapidminer in order to start LSA processing in the following steps.

B.1. Term Reduction

Each record is defined by one abstract, and in the first step, all records come into the "tokenize" operator in which each word is recognized by one space called a token. In the next step, the tokens go through the "transform case" operator changes all the letters to lowercase in order to make all tokens integrated. Next, the "stopwords" operator removes all meaningless words in the English language, such as "a," "an," and "is". Due to stopwords are not meaningful enough we remove them from the records. Fourth, all the tokens which have one letter or more than 25 letters are removed because those tokens do not include meaningful information. In the fifth step, the root of words are taken into account and all suffix are removed. For example, all "consume," "consumer," "consuming," "consumable," and "consumed" tokens are considered as "consum" in the result. Sixth, all tokens that only appear in a document are removed. All these procedures eventuated 2,625 tokens. Furthermore, we removed the most common words in academic writing, such as "study," and "investigation." This procedure resulted in 2,063 tokens.

B.2. Term Frequency Matrix

We used the technique of calculating the relatively rare weighting called term frequency-inverse document frequency (TF-IDF). Such transformation promotes the occurrence of rare terms and decreases the impact of more common non-stopwords.

B.3. Singular Value Decomposition

Singular value decomposition (SVD) is a well-known linear algebra decomposition which makes a rectangular matrix A be broken down into the product of three matrices, an orthogonal matrix U, a diagonal matrix S, and the transpose of an orthogonal matrix V as follow:

$$A_{mn}=U_{mm}S_{mn}V^{T}_{nn}$$

With SVD, LSA can identify the different words, which have the same meaning or find one word that may mean different meanings in different contexts (Lin et al., 2017; Sidorova et al., 2008). We consider the first 100 main components that explain a variation of 95% of the total with 794 terms.

B.4 Factor Rotations And Factor Loading Thresholds

Factor rotations and factor loadings help with factor interpretation in order to find simple factors. Therefore, for each factor, we prepared a list with all high loading for both terms and documents and sorted them based on absolute loading value by factor. Moreover, a related threshold value is calculated based on one tail probability of 1/k in order to find the best classification (k is the number of factors). Indeed, this study threshold value is not valuable enough because, for example, it makes

the authors choose 118 tokens in three factors but based on different comparisons, 15 tokens for each k equivalent 2 to 5 were computed.

Results

According to the methodology, the authors determined three factors/categories that explain the best classification in eWOM research from a general perspective. Table 1 shows the classification obtained; this has three categories; moreover, the three articles more related to each category found are represented. The first category describes "Brand Image," in which the most related articles study how eWOM influences the brand image. The second topic as we expected, relates to "Hospitality/Tourism," which is a hot issue on social media nowadays, for example, the third token is TripAdvisor, which is a well-known website in the tourism industry that users can share their comments and experiences on it with each other. The last category is "Product evaluation," in which opinions and online reviews of products are studied.

Table 1: Three general categories of eWOM research

Category Label	High-Loading Terms	Representative articles
Brand Image	brand, imag_, media, commun_, purchas_, intent_, facebook, loyalty, wom, trust, consum_, market, engag_, attitude_, ewom,	Chetna & Amresh (2017), Nuseir (2019), Ullrich & Brunner (2015)
Hospitality/Tourism	Hotel, travel, tripadvisor, custom, satisfact_, tourist, service, onlin_, tourism, star-, guest, website, motiv_, price, industri_,	Blal & Sturman (2014), Casaló et al. (2015), Martin-Fuentes(2016)
Product Evaluation	Product, commerc_, ewom, wom, consum, purchas_, credibl_, perceive-, online-, intent, messag_, shop, behavior, motiv_, trust,	Aihwa et al. (2013), Jafari et al. (2015), Liu et al.(2017)

Conclusions

eWOM has an essential role in marketing. In fact, in our research, 1,033 peer-reviewed studies were associated with this phenomenon. Using LSA for exploring these articles, three significant categories were determined: brand image, hospitality/tourism, and product evaluation. In futures studies, these categories should be explored in detail.

References

- Aihwa, C., Hsieh, S. H., & Tseng, T. H. (2013). Online brand community response to negative brand events: the role of group eWOM. *Internet Research*, *23*(4), 486–506. https://doi.org/10.1108/IntR-06-2012-0107

- Blal, I., & Sturman, M. C. (2014). The Differential Effects of the Quality and Quantity of Online Reviews on Hotel Room Sales. *Cornell Hospitality Quarterly*, *55*(4), 365–375. https://doi.org/10.1177/1938965514533419

- Casaló, L. V., Flavián, C., Guinalíu, M., & Ekinci, Y. (2015). Do online hotel rating schemes influence booking behaviors? *International Journal of Hospitality Management*, *49*, 28–36. https://doi.org/10.1016/j.ijhm.2015.05.005

- Chetna, K., & Amresh, K. (2017). Social eWOM: does it affect the brand attitude and purchase intention of brands? *Management Research Review*, *40*(3), 310–330. https://doi.org/10.1108/MRR-07-2015-0161

- Chu, S. C., & Kim, J. (2018). The current state of knowledge on electronic word-of-mouth in advertising research. *International Journal of Advertising*, *37*(1), 1–13. https://doi.org/10.1080/02650487.2017.1407061

- Jafari, S. M. B., Karimi, A., Forouzandeh, M., & Safahani, N. (2015). The Effect of Brand Commitment on e-WOM and Brand Image in the Mobile Market. *Research Journal of Applied Sciences*, *10*, 519–524. http://medwelljournals.com/abstract/?doi=rjasci.2015.519.524

- Lin, X., Li, Y., & Wang, X. (2017). Social commerce research: Definition, research themes and the trends. *International Journal of Information Management*, *37*(3), 190–201. https://doi.org/10.1016/j.ijinfomgt.2016.06.006

- Liu, X., Hu, J., & Xu, B. (2017). Does eWOM matter to brand extension? An examination of the impact of online reviews on brand extension evaluations. *Journal of Research in Interactive Marketing*, *11*(3), 232–245. https://doi.org/10.1108/JRIM-02-2016-0012

- Martin-Fuentes, E. (2016). Are guests of the same opinion as the hotel star-rate classification system? *Journal of Hospitality and Tourism Management*, *29*, 126–134. https://doi.org/10.1016/j.jhtm.2016.06.006

- Mishra, A., & Satish, S. M. (2016). eWOM: Extant Research Review and Future Research Avenues. *Vikalpa*, *41*(3), 222–233. https://doi.org/10.1177/0256090916650952

- Nuseir, M. T. (2019). The impact of electronic word of mouth (e-WOM) on the online purchase intention of consumers in the Islamic countries – a case of (UAE). *Journal of Islamic Marketing*, *10*(3), 759–767. https://doi.org/10.1108/JIMA-03-2018-0059

- Sidorova, A., Evangelopoulos, N., Valacich, J. S., & Ramakrishnan, T. (2008). Uncovering the Intellectual Core of the Information Systems Discipline. *MIS Quarterly*, *32*(3), 467–482. https://doi.org/10.2307/25148852

- Ullrich, S., & Brunner, C. B. (2015). Negative online consumer reviews: effects of different responses. *Journal of Product & Brand Management*, *24*(1), 66–77. https://doi.org/10.1108/JPBM-05-2014-0611

Analysis of Key Audit Matters in CAC 40 Audit Reports

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Abstract

The objective of this paper is to continue the work of the authors on the key audit matters (further also referred to as "Key Audit Matters" or "KAM") as well summarize and present the results of the research performed in respect of the key audit matters determined and communicated in the independent auditors' reports issued in conjunction with the audit of the annual financial statements of CAC 40 constituent companies for 2018 and 2017. The research focused primarily on reading reporting requirements in respect of key audit matters relating to audits of historical financial information as defined in the International Standards on Auditing (ISA) and examination of the auditors' reports issued in conjunction with the audit of the 2018 and 2017 annual financial statements of the CAC 40 constituent companies listed on Euronext Paris (France). It was tentatively assumed that both (1) the number and (2) the nature of Key Audit Maters identified and reported in conjunction with the audit of the annual financial statements of CAC 40 constituent companies for 2018 and 2017 will not vary significantly. Because Dassault Systemes and Hermes were added to CAC 40 only in 2018, they were not taken for consideration and consequently a total number of companies reviewed was reduced to 38.

Keywords: Audit, Risk, Auditor's Report, Key Audit Matters.

Introduction

In accordance with the International Standards on Auditing the purpose of an audit is to enhance the degree of confidence of intended users in the financial statements. This is achieved by the expression of an opinion by the auditor on whether the financial statements are prepared, in all material respects, in accordance with an applicable financial reporting framework (ISA 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*, paragraph 3).

The financial statements subject to audit are those of the entity, prepared by management of the entity with oversight from those charged with governance (ISA 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*, paragraph 4).

In conducting an audit of financial statements, the overall objectives of the auditor are:

(a) to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, thereby enabling the auditor to express an opinion on whether the financial statements are prepared, in all material respects, in accordance with an applicable financial reporting framework; and
(b) to report on the financial statements, and communicate as required by the ISAs, in accordance with the auditor's findings (ISA 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*, paragraph 11).

Risk Assessment

In accordance with the International Standards on Auditing the auditor is also required to identify and assess the risks of material misstatement, whether due to fraud or error, at the financial statement and assertion levels (ISA 315 (Revised), *Identifying and Assessing the Risks of Material Misstatement through Understanding the Entity and Its Environment*, paragraph 3).

As part of the risk assessment, the auditor shall also determine whether any of the risks identified are, in the auditor's judgment, a significant risk (ISA 315 (Revised), *Identifying and Assessing the Risks of Material Misstatement through Understanding the Entity and Its Environment*, paragraph 27). The auditor shall treat those assessed risks of material misstatement due to fraud as significant risks (ISA 240, *The Auditor's Responsibilities Relating to Fraud in an Audit of Financial Statements*, paragraph 27).

When identifying and assessing the risks of material misstatement due to fraud, the auditor shall, based on a presumption that there are risks of fraud in revenue recognition, evaluate which types of revenue, revenue transactions or assertions give rise to such risks (ISA 240, *The Auditor's Responsibilities Relating to Fraud in an Audit of Financial Statements*, paragraph 26).

Areas of higher assessed risk of material misstatement, or significant risks identified in accordance with ISA 315 shall be taken by auditor into account in order to determine, from the matters communicated with those charged with governance, those matters that required significant auditor attention in performing the audit (ISA 701, *Communicating Key Audit Matters in the Independent Auditor's Report,* paragraph 9).

Determination and Communication of the Key Audit Matters

The auditor shall determine which of the matters determined in accordance with paragraph 9 of ISA 701 were of most significance in the audit of the financial statements of the current period and therefore are the key audit matters (ISA 701, *Communicating Key Audit Matters in the Independent Auditor's Report,* paragraph 10).

In accordance with paragraph 10 of ISA 701, *Communicating Key Audit Matters in the Independent Auditor's Report* the auditor shall describe each key audit matter, using an appropriate subheading, in a separate section of the auditor's report under the heading "Key Audit Matters," unless the circumstances described in further paragraphs apply.

The purpose and the methods of the research

The purpose of the research was to examine whether (1) the number and (2) the nature of Key Audit Maters determined and communicated in conjunction with the audit of the annual financial statements of CAC 40 constituent companies for 2018 and 2017 varied significantly.

It was tentatively assumed that the number (hypothesis 1) and the nature (hypothesis 2) of Key Audit Maters identified and reported in conjunction with the audit of the annual financial statements of CAC 40 constituent companies for 2018 and 2017 did not vary significantly.

The research focused primarily on the examination of the auditors' reports issued in 2019 in conjunction with the 2018 annual audits of the financial statements and the auditors' reports issued in 2018 in conjunction with the 2017 annual audits of the financial statements filed by the CAC 40 constituent companies listed on Euronext Paris (France). Given the empirical nature of the research, priority was given to the reading of the relevant International Standards on Auditing and analysis of the selected auditor's reports. Consequently, the study concentrates less on other theoretical aspects, references to professional literature or other publications.

Results of the research performed

Table 1 attached below summarizes the results of the research performed.

Table 1: Number and nature of Key Audit Matters (CAC 40 constituent companies 2017-2018)

KAM reported / Entity and year	M/V	ACP	IMP	T/L	ACQ	R/I	IFRS	PROV	OTH	Total
ACCOR HOTELS 2018	1	1	0	0	0	0	1	0	0	3
ACCOR HOTELS 2017	1	1	0	0	0	0	0	0	0	2
AIRBUS GROUP 2018	0	0	0	1	1	0	2	1	1	6
AIRBUS GROUP 2017	2	1	0	1	0	0	1	0	0	5
AIR LIQUIDE 2018	1	0	1	0	0	1	0	0	0	3
AIR LIQUIDE 2017	1	0	1	0	0	1	0	0	0	3
ARCELORMITTAL 2018	0	0	1	1	1	0	0	1	0	4
ARCELORMITTAL 2017	1	0	1	1	0	0	0	1	0	4
ATOS 2018	2	1	0	1	0	1	0	0	0	5
ATOS 2017	3	0	0	0	1	0	0	0	0	4
AXA 2018	3	0	0	0	1	0	0	0	0	4
AXA 2017	3	0	0	1	0	0	0	0	0	4
BNP PARIBAS 2018	2	0	1	1	0	0	0	0	1	5
BNP PARIBAS 2017	2	0	1	1	0	0	0	0	1	5
BOUYGUES 2018	1	1	0	0	1	0	0	1	0	4
BOUYGUES 2017	1	1	0	0	0	0	0	1	0	3
CAPGEMINI 2018	1	0	0	2	0	1	0	1	0	5
CAPGEMINI 2017	1	0	0	2	0	1	0	1	0	5
CARREFOUR 2018	1	0	0	0	0	0	0	1	0	2
CARREFOUR 2017	1	0	0	0	0	0	0	0	0	1
CREDIT AGRICOLE 2018	1	0	1	1	0	0	1	0	0	4
CREDIT AGRICOLE 2017	1	1	1	1	0	0	0	0	0	4
DANONE 2018	0	0	1	0	0	1	0	1	0	3
DANONE 2017	0	0	1	0	1	1	0	1	0	4
ENGIE 2018	1	0	0	0	0	0	0	2	0	3
ENGIE 2017	0	0	0	0	0	1	0	0	1	2
ESSILOR INTERNATIONAL 2018	0	1	1	0	0	1	1	0	0	4
ESSILOR INTERNATIONAL 2017	0	0	1	0	1	0	0	0	0	2
KERING 2018	1	0	1	1	0	0	1	0	0	4
KERING 2017	2	0	1	1	0	0	0	0	0	4
LEGRAND 2018	1	0	0	0	0	0	0	0	0	1
LEGRAND 2017	1	0	0	0	1	0	0	0	0	2
L'ORÉAL 2018	2	0	0	0	0	1	0	0	0	3
L'ORÉAL 2017	2	0	0	0	0	1	0	0	0	3
LVMH 2018	3	0	0	0	0	0	0	1	0	4
LVMH 2017	2	0	0	0	1	0	0	1	0	4
MICHELIN 2018	0	0	2	0	0	0	0	0	0	2
MICHELIN 2017	1	0	1	0	0	0	0	0	0	2

Source: Annual Reports of 2018 and 2017 CAC 40 constituent companies

Summary of abbreviations used in Table 1: M/V = Measurement/Valuation, ACP = Accounting Policies, IMP = Impairment, T/L = Tax/Legal, ACQ = Acquisitions, R/I = Revenue/Income, IFRS = Adoption of new IFRS, PROV = Provisions, OTH = Other

Table 1 (continued)

Table 2: Number and nature of Key Audit Matters (CAC 40 constituent companies 2017-2018)

KAM reported / Entity and year	M/V	ACP	IMP	T/L	ACQ	R/I	IFRS	PROV	OTH	Total
ORANGE 2018	1	0	0	1	0	1	0	1	0	4
ORANGE 2017	1	0	0	1	0	1	0	1	0	4
PERNOD RICARD 2018	2	0	0	2	0	0	0	0	0	4
PERNOD RICARD 2017	2	0	0	2	0	0	0	0	0	4
PSA GROUPE 2018	3	0	0	1	0	0	0	0	0	4
PSA GROUPE 2017	2	0	0	0	1	0	0	0	0	3
PUBLICIS 2018	1	0	0	0	0	1	1	1	0	4
PUBLICIS 2017	1	0	0	0	0	0	0	0	0	1
RENAULT 2018	1	0	0	1	1	0	1	0	0	4
RENAULT 2017	1	0	0	1	2	0	0	0	0	4
SAFRAN 2018	1	0	1	0	1	1	0	1	0	5
SAFRAN 2017	1	0	1	0	0	1	0	1	0	4
SAINT-GOBAIN 2018	2	0	0	0	1	0	0	0	0	3
SAINT-GOBAIN 2017	2	0	0	0	1	0	0	0	0	3
SANOFI 2018	1	0	0	0	0	0	0	0	0	1
SANOFI 2017	1	0	0	0	0	0	0	0	0	1
SCHNEIDER ELECTRIC 2018	2	0	0	1	0	0	0	1	0	4
SCHNEIDER ELECTRIC 2017	2	0	0	1	0	0	0	1	0	4
SOCIETE GENERALE 2018	2	0	1	1	0	0	0	0	1	5
SOCIETE GENERALE 2017	2	0	1	1	0	0	0	0	1	5
SODEXO 2018	2	0	0	1	0	0	0	0	1	4
SODEXO 2017	2	0	1	1	0	0	0	0	1	5
STMICROELECTRONICS 2018	1	0	0	1	0	1	0	0	0	3
STMICROELECTRONICS 2017	2	0	0	1	0	1	0	0	0	4
TECHNIPFMC 2018	0	0	2	0	0	1	0	0	0	3
TECHNIPFMC 2017	0	0	1	0	1	1	0	0	0	3
TOTAL 2018	0	0	1	0	1	0	0	1	0	3
TOTAL 2017	0	0	1	0	0	0	0	1	0	2
UNIBAIL-RODAMCO 2018	1	1	0	0	1	0	0	0	0	3
UNIBAIL-RODAMCO 2017	1	1	0	0	0	0	0	0	0	2
VALEO 2018	0	1	1	0	0	0	0	1	0	3
VALEO 2017	0	1	1	0	0	0	0	1	0	3
VEOLIA 2018	0	0	2	2	0	0	0	0	0	4
VEOLIA 2017	1	0	1	1	0	0	0	1	0	4
VINCI 2018	1	0	0	0	0	0	0	2	0	3
VINCI 2017	1	0	0	0	0	0	0	2	0	3
VIVENDI 2018	2	0	0	1	0	0	0	0	0	3
VIVENDI 2017	3	0	0	1	0	0	1	0	0	5
CAC 40 Total 2018	44	6	17	20	9	11	8	17	4	136
CAC 40 Total 2017	50	6	15	18	10	9	2	13	4	127

Source: Annual Reports of 2018 and 2017 CAC 40 constituent companies

Summary of abbreviations used in Table 1: M/V = Measurement/Valuation, ACP = Accounting Policies, IMP = Impairment, T/L = Tax/Legal, ACQ = Acquisitions, R/I = Revenue/Income, IFRS = Adoption of new IFRS, PROV = Provisions, OTH = Other

Evaluation of Results

The posed hypotheses (both hypothesis 1 and hypothesis 2) were tested in the course of the conducted research. Hypothesis 1 (the number of the KAM will not vary significantly in 2017-2018) was verified and Hypothesis 2 (the nature of the KAM will not vary significantly in 2017-2018) was verified positively, except for KAM classified as "Adoption of new IFRS" and "Provisions" that was verified negatively.

The number of the KAM determined and communicated in the independent auditors' reports issued in conjunction with the audit of the annual financial statements of CAC 40 constituent companies for 2018 was 136 and went up by 9 compared to 2017 (when as many as 127 KAM were determined and communicated). This change was evaluated as not significant and hypothesis 1 was regarded as verified positively.

The nature of the KAM determined and communicated in the independent auditors' reports issued in conjunction with the audit of the annual financial statements of CAC 40 constituent companies for 2018 and 2017 did not vary significantly except for the KAM relating to: "Adoption of new IFRS" (8 KAM determined and communicated in 2018 compared to 2 KAM determined and communicated in 2017) and "Provisions" (17 KAM determined and communicated in 2018 compared to 13 KAM determined and communicated in 2017). It is possible though that the increases in these two KAM were to some extent compensated by a decrease in KAM "Measurement/Valuation" (44 KAM determined and communicated in 2018 compared to 50 KAM determined and communicated in 2017).

In general, the changes in nature of KAM determined and communicated were evaluated as insignificant and consequently hypothesis 2 was regarded as verified positively except for the two KAM referred to above that were verified negatively.

Conclusions and definition of further Possible Research Areas

Based on the results of the research the authors of this paper decided to continue their work on KAM determined and communicated in annual audit reports of other companies listed in Europe and perform comparative study for 2017-2019.

In addition to the above the authors of this paper plan to perform more detailed analysis of KAM and response to risk.

References

Auditors' reports

2018 and 2017 auditors' reports of the CAC 40 constituent companies

International standards on auditing

ISA 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*,
ISA 240, *The Auditor's Responsibilities Relating to Fraud in an Audit of Financial Statements*
ISA 315 (Revised), *Identifying and Assessing the Risks of Material Misstatement through Understanding the Entity and Its Environment*,
ISA 701, *Communicating Key Audit Matters in the Independent Auditor's Report*

www
https://www.abcbourse.com/marches/modif_indices.aspx (date of access: 28 January 2020)

Effectiveness of Lease in The Light of a Credit – Case Study Using the Discounted Cash Flow Method

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Abstract

This article presents assumptions setting the path for cash flow related with a bank credit and operating lease; calculations were conducted, which account for financial benefits results from the analysed financing sources, and the value of discounted cash flow was compared in order to indicate the most beneficial manner of financing the investment.

Keywords: Financing, Credit, Operating Lease, Effectiveness of Investments.

Introduction

The factor, which conditions the functioning and the development of an enterprise, is the availability of capital. Although own funds are still very often used as a source of financing investments in Poland, a policy in an enterprise consisting of using exclusively this form of financing seems to be economically unjustified and demonstrates a lack of adequate understanding of existing financial instruments. The most common method to obtain external capital is a credit. Such capital time-limited, it is interest-bearing and is returnable. Apart from credits, recently lease became the most frequently used tool for investment financing. The initial lack of systemic regulations resulted in significant freedom of interpreting flawed laws, the consequences of which were difficult to predict. The ultimate regulation of lease in civil, tax and accounting law contributed to making this form of financing investments more popular.

Operating lease, being one of the most popular types of lease from the point of view of legal, tax and accounting consequences, is a form of financing, which allows using fixed assets in return for regular payment of fees. As a method of financing investments, lease was developed in early 1950's in the USA, and it transferred to Europe ten years later (Krzemińska 2002). In Poland, lease is present as from the start of the changes of the social and economic system on the turn of 1980's and 1990's, and codification of lease in civil law (Journal of Laws no. 74, 2000) resulted in a unified definition of lease, as from 9 December 2000, according to which lease has ceased to constitute an unnamed contract concluded in accordance with the principle of freedom of contracts.

The purpose of this article is presenting the specificity of lease as an alternative form of obtaining external capital in comparison with a credit, and analysing the effectiveness of investments conducted with these two sources of financing using the discounted cash flow method.

Characteristics and forms of lease

Lease, being one of the most popular sources of financing investments of business entities, allows using the asset and, ultimately, also purchasing the asset, without the need to engage own funds at once. The contract of lease was defined in the Polish law in the Act of 23 April 1964 – the Civil Code (Journal of Laws from 2018, item 1025 as amended), the Accounting Act of 29 September 1994 (Journal of Laws from 2018, item 395 as amended), as well as in tax law – the Act on Personal Income Tax and the Act on Corporate Income Tax.

Lease means a type of a civil law contract, where one party (financing party, lessor) grants to the other party (user, lessee) the right to use a given material asset for a certain period agreed in the contract of lease, in exchange for agreed instalment fees (lease instalments). The Polish business practice as well as literature indicates two basic types of lease: operating lease and financial lease. The division into financial lease and operating lease should be reviewed separately on the basis of tax laws, as well as the Accounting Act. The basic difference in the division concerns the party to the contract, which is entitled to create amortization write-downs on the subject of lease. If the lessor (financing party) is entitled to create amortization write-downs then for tax purposes the transaction constitutes operating lease. If the lessee is the party entitled, then the transaction constitutes financial lease (Panfil 2008). From the financial point of view, the tax recognition of lease is of critical importance. Operating lease allows increasing tax deductible costs [*k.u.p.*], thus decreasing the taxation basis by the value of the paid lease instalments. Pursuant to Article 23b.1 of the PIT Act and Article 17b.1 of the CIT Act, fees paid by the user during the principal term of the operating lease contract constitute his tax deductible costs, if the subject of lease is used to generate revenues, or to secure or maintain the source of revenues. It the subject of lease is a passenger vehicle with the value exceeding PLN 150,000, then the excess amount of the repayment of the subject of lease as from 1 January 2019 above the indicated value shall not constitute tax deductible costs.

An operating lease contract is concluded for a defined period, not shorter than 40% of the so-called normative amortization period (in case of movable property and intangible assets) or at least 5 years (in case of real property). From the tax perspective, the most significant effects of concluding an operating lease contract for the lessee, being a business entity, include:

- no basis to amortize the subject of lease (this right is vested in the lessor);
- right to include lease instalments in tax-deductible costs in the full amount; as from 2019, including the net value of the lease instalment in tax costs is limited in case of passenger vehicles valued over PLN 150,000 (vehicles with combustion engines and hybrid vehicles) and PLN 225,000 (electric passenger vehicles) (PGP 2(912) 2019);
- adding VAT to each lease instalment for provision of the service, which may be deducted in full if the purchased service is related with taxable activities conducted by the lessee (save for lease instalments concerning vehicles subject to a limitation in the deduction of 50% of the VAT amount).

Upon the end of the operating lease contract and meeting all obligations defined therein, the lessee may purchase the subject of lease for an amount different than its market value (not lower, however, than the so called hypothetical net value), increased by the due VAT (PGP 2(912) 2019).

A financial lease contract also is a contract concluded for a defined period, and the most important consequences of such contract for a lessee being a business entity include:

- including the following in the tax deductible costs: amortization write-downs from the initial value of the subject of lease and lease instalments solely in the part relating to interest;
- single adding of the VAT calculated on the sum of lease instalments covering the principal part and the interest part, due to recognizing the transaction as constituting a delivery of goods against charge; the lessee is entitled to deduct such VAT amounts if the purchased goods are related with taxable activities performed by the lessee (save or vehicles subject to a limitation in the deduction of 50% of the VAT amount).

At the end of the financial lease contract, the ownership of the subject of the contract is usually transferred to the lessee.

Advantages and disadvantages of lease in comparison with other sources of financing

The range of forms of financing investments is currently very wide. Apart from lease, an enterprise may use own funds or obtain funds through a credit, loan, tenancy, or issue or shares or bonds,

although the availability of certain forms of financing may be limited. Often difficulties with obtaining capital from the given source encourage selecting easily accessible sources, although they may not be the most beneficial from the economic point of view.

Lease definitely belongs to popular and easily accessible sources. Due to the fact that the subject of lease remains the property of the lessor during the term of the contract, requirements imposed by lease companies towards a potential lessee are less severe than, for example, requirements of banks which grant credits for purchasing investment goods. Lease surely has many significant advantages, which make it popular. It is undoubtedly a simple and cheap method of using a fixed asset for the purpose of conducting business activity. Financial lease allows increasing the company's assets by components not owned by the lessee. Operating lease does not increase the liabilities of the user, presented in the financial statements, which externally strengthens the financial position of the enterprise, and, additionally, lease fees as a rule constitute tax deductible costs in full amount, which allows decreasing the income tax basis. Moreover, there is no need to purchase the subject of lease at the end of the term of the contract. This is the attribute that differentiates lease from a bank credit, where the subject of the credit contract becomes the property of the borrower. Lease also has disadvantages. Throughout the term of the contract, the owner of the subject of lease is the lease company, which defines the terms of use. In addition, in case of a loss or damage to the subject of lease, the lessee will not be released from the payment of lease instalments for the period remaining until the end of the contract.

Financial effectiveness of an investment with the use of operating lease and bank credit based on the discounted cash flow method

In this article, certain general assumptions have been adopted, which condition the comparability of operating lease and a credit based on the discounted cash flow method. To compare the effectiveness of these two types of financing it is assumed that the enterprise operates in the SME sector and has borrowing capacity and lease capacity. The subject of financing is a new vehicle with the net value of PLN 100,000. Due to the need to expand the research scope, the investment profitability ratio does not include cash flow related with the VAT. The institution, which finances the purchase of the vehicle in case of both operating lease and credit, is mBank S.A. The financial institution allows the entrepreneur to purchase an individual insurance – hence we assume that the amount of insurance is the same in case of lease and credit, and it has not been taken into account in the calculation. The period of the contract in both cases is 60 months. For simplification of conducted calculations, it is assumed that revenue generated by the enterprise amounts to PLN 1,000,000 in each year, and costs will be generated solely by operating lease or credit. Both in case of the credit and the lease, the financing institution does not charge commission, and the rate of the income tax for the enterprise amounts to 19%. Calculations for these two forms of financing were conducted using the MS Excel worksheet, and are presented in tables 1 – 7.

Assumptions in case of financing a purchase of a vehicle in the form of operating lease:

- entry fee amounts to 20%;
- no commission on the conclusion of a lease contract;
- total cost of lease in the no-insurance variant amounts to 110.22% with 60 monthly lease instalments (to total cost of lease means the sum of lease instalments, entry fee, and repurchase amount);
- after the expiry of the contract term, the fixed asset may be repurchased for 1% of its initial value;
- with the parameters assumed above, monthly lease instalments amount to PLN 1487 during the term of the contract.

The process of calculating the economic effectiveness of using operating lease vs. credit should be started with defining the expenses incurred for the investment for each variant, and classifying individual expenses into tax deductible costs in order to determine the expected financial surplus.

Table 1: Calculation of costs and expenditures incurred for an investment financed with operating lease

No.	Specification	Years				
		1	**2**	**3**	**4**	**5**
1	Entry fee	20 000.00	-	-	-	-
2	Commission	-	-	-	-	-
3	Lease instalment	1 487 * 12 = 17 844.00	1 487 * 12 = 17 844.00	1 487 * 12 = 17 844.00	1 487 * 12 = 17 844.00	1 487 * 12 = 17 844.00
4	Amortization	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
5	Repurchase value	-	-	-	-	1 000.00
6	Total investment expenditure (1 + 2 + 3 + 5)	37 844.00	17 844.00	17 844.00	17 844.00	18 844.00
7	Amounts included in tax deductible costs (1 + 2 + 3 + 5)	37 844.00	17 844.00	17 844.00	17 844.00	18 844.00
8	Tax shield 19% * (7)	7 190.36	3 390.36	3 390.36	3 390.36	3 580.36
9	Actual expenditure (6 - 8)	30 653.64	14 453.64	14 453.64	14 453.64	15 263.64

Source: own elaboration

Using a passenger vehicle based on operating lease, the entrepreneur does not enter it in the fixed asset register nor amortize it in time. The amortization of the vehicle is conducted by the lease company, because it remains the owner of the vehicle throughout the lease term. The entrepreneur, who uses the vehicle financed with operating lease while conducting business activity, may include all lease fees along with full lease instalments in tax deductible costs. If the value of the passenger vehicle being the subject of operating lease does not exceed the limit of PLN 150,000, the lessee may include full lease fees in tax deductible costs.

Table 1 presents the calculation of costs and expenditures incurred for the investment financed with operating lease. Expenses of the enterprise include the entry fee, lease instalments, and repurchase. Each of these expenses simultaneously constitutes a tax deductible cost, which is significant in determining the amount of income subject to personal income tax.

Assumptions in case of financing a purchase of a vehicle in the form of a bank credit

- own share amounts to 20%, meaning PLN 20 000;
- credit amount PLN 80 000;
- no commission on concluding the credit contract;
- nominal interest rate amounts to 7.99% per annum – the interest rate comprises the bank's fixed margin and the WIBOR 3M rate for credits in Polish zloty;
- equal monthly instalments throughout the credit term;

– the amortization rate amounts to 20% per annum.

Since in practice banks are not willing to credit 100% of the investment, a condition in the bank credit assumptions is the company's own share in the investment amounting to PLN 20 000. Therefore, the bank grants a credit for PLN 80 000. The credit is repaid in 60 equal monthly principal and interest instalments (payable on the last day of every month). In the book by Brigham (2005) instalments were calculated according to the following formula:

$$PVA = PMT * [\frac{1}{i} - \frac{1}{i * (1+i)^n}]$$

where:

PVA –current value of ordinary pension
i – interest rate
PMT – credit instalment
n – number of periods

Pursuant to the Classification of Fixed Assets (CFA 2010) the annual amortization rate for the vehicle amounts to 20% (line amortization). In case of selecting the line method, the fixed asset with the initial value of PLN 1 000 000 net is subject to amortization for five years, and the annual amortization write-down in each subsequent year is the same and amounts to PLN 20 000.

Table 2: Calculation of costs and expenditures incurred for an investment financed with a bank credit

No.	Specification	Years				
		1	**2**	**3**	**4**	**5**
1	Own share	20 000.00	-	-	-	-
2	Commission	-	-	-	-	-
3	Interest instalment	5 902.63	4 778.77	3 561.75	2 243.85	816.71
4	Principal amount instalment	13 558.13	14 681.99	15 899.01	17 216.91	18 644.05
5	Credit instalment	19 460.76	19 460.76	19 460.76	19 460.76	19 460.76
6	Amortization	20 000.00	20 000.00	20 000.00	20 000.00	20 000.00
7	Repurchase value	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
8	Total investment expenditure (1 + 2 + 5)	39 460.76	19 460.76	19 460.76	19 460.76	19 460.76
9	Amounts included in tax deductible costs (2 + 3 + 6)	25 902.63	24 778.77	23 561.75	22 243.85	20 816.71
10	Tax shield 19% * (9)	4 921.50	4 707.97	4 476.73	4 226.33	3 955.17
11	Actual expenditure (8 - 10)	34 539.26	14 752.79	14 984.03	15 234.43	15 505.59

Source: own elaboration

In case of financing the investment with a bank credit (Table 2) the enterprise mainly incurs expenses related with own share in the financing of the purchase of the fixed asset and repayment of credit instalments (principal amount and interest). Amongst the aforementioned expenses, tax deductible

costs include interest and commission collected by the bank upon granting the loan. However, the largest share in the company's cost belongs to a component which is not an expense – amortization.

Table 3: Calculation of the financial result and the financial surplus in case of financing the investment with operating lease

No.	Specification	Years				
		1	**2**	**3**	**4**	**5**
1	Revenue	1 000 000.00	1 000 000.00	1 000 000.00	1 000 000.00	1 000 000.00
2	Tax deductible costs	37 844.00	17 844.00	17 844.00	17 844.00	18 844.00
3	Gross income (1 – 2)	962 156.00	982 156.00	982 156.00	982 156.00	982 156.00
4	Income tax 19% * (3)	182 809.64	186 609.64	186 609.64	186 609.64	186 609.64
5	Net profit/loss (3 – 4)	779 346.36	795 546.36	795 546.36	795 546.36	795 546.36
6	Financial surplus*	779 346.36	795 546.36	795 546.36	795 546.36	794 546.36

Source: own elaboration
** revenue – income tax – total financial expense on the investment in the given year*

On the basis of calculations presented in Table 3 it may be noticed that in case of financing the investment with lease, the amount of the financial surplus generated by the enterprise in subsequent years of the analysed period has the same value as the net profit of the enterprise. This results from the fact that every expense incurred during this period for the investment constitutes a tax deductible cost.

Table 4: Calculation of the financial result and the financial surplus in case of financing the investment with a bank credit

No.	Specification	Years				
		1	**2**	**3**	**4**	**5**
1	Revenue	1 000 000.00	1 000 000.00	1 000 000.00	1 000 000.00	1 000 000.00
2	Tax deductible costs	25 902.63	24 778.77	23 561.75	22 243.85	20 816.71
3	Gross income (1 – 2)	974 097.37	975 221.23	976 438.25	977 756.15	979 183.29
4	Income tax 19% * 3	185 078.50	185 292.03	185 523.27	185 773.67	186 044.83
5	Net profit/loss (3 – 4)	789 018.87	789 929.20	790 914.98	791 982.48	793 138.46
6	Financial surplus*	775 460.74	795 247.21	795 015.97	794 765.57	794 494.41

Source: own elaboration
** revenue – income tax – total financial expense on the investment in the given year*

In case of financing the purchase of the fixed asset with a bank credit, the net profit of the enterprise does not reflect the free funds generated by the investment (Table 4) like it was during financing the investment with operating lease. Since not every component of tax deductible costs constitutes a financial expense, amortization was omitted during determination of the financial surplus, as it is a non-financial cost which does not incur a financial expense.

Table 5: Comparison of the financial surplus in case of financing the investment with operation lease and bank credit

Years	Operating lease	Credit	Lease – credit difference
1	779 346.36	775 460.74	3 885.62
2	795 546.36	795 247.21	299.15
3	795 546.36	795 015.97	530.39
4	795 546.36	794 765.57	780.79
5	794 546.36	794 494.41	51.95
Σ	**3 960 531.80**	**3 954 983.91**	**5 547.89**

Source: own elaboration

Table 5 compares the values of expected cash flow resulting from operating lease and credit. Cash flow was defined as the value of the financial surplus of the analysed project calculated in table 3 and table 4, meaning the actual value of funds generated by the enterprise during five years. Analysing the data from table 5 may indicate that during the entire period of the analysis, operating lease is cheaper than the credit, since total cash flow generated in case of this form of financing have larger value. The difference in expenses to the benefit of operating lease during 5 years amounts to a total of PLN 5 547.89.

To assess the effectiveness of the discussed investment, the current value of expected financial streams should be determined. For this purpose, calculations should be made with regard to sums discounted separately for every year of cash flow generated by the enterprise upon financing the investment with operating lease and bank credit. The method based on discounted cash flow, which allows comparing and selecting the most beneficial variant of financing the investment, is the DCF method (*discounted cash flow*). This method consists of calculating the current value, which is the sum of discounted cash flow (Brigham 2005):

$$PV = \sum_{t=1}^{n} \frac{CF_t}{(1+i)^t}$$

where:

i – discounting rate
CF_t – cash flow during the period
n – number of periods

A parameter used in this method is the discounting rate. Adopting the manner of determining the discounting rate is one of the most problematic elements of the conducted analysis. The most frequently applied discounting rate is the cost of capital of the given enterprise. Determining the cost of capital may, however, cause many problems. Since enterprises most frequently finance investments with capital from various sources, it is required to estimate the cost of own capital and external capital as the components of the WACC (*Weighted Average Cost of Capital*) expressed by the following formula (Rutkowski 2007):

$$i = WACC = w_d * k_d * (1 - T) + w_w * k_w$$

where:

$WACC$ – weighted average cost of capital
w_d – share (weight) of the debt in company financing
k_d – cost of debt before taxation
w_w – share (weight) of own capital in company financing
k_w – cost of own capital

For simplification, it is often assumed that the cost of own capital of a SME enterprise is equal to the costs of external capital, possible to obtain by this enterprise (Okręglicka 2004). With this solution, the discounting rate in the conducted analysis will amount to 7.99%. The determined discounting rate, as the cost of capital, was used to calculate the current value of each cash flow in the subsequent years. The sum of cash flow, discounted separately for every year, generated by the company in case of financing with operating lease vs. credit will allow indicating the more profitable source of financing.

Table 6: Calculation of the current value of cash flow

Specification		1	2	3	4	5	Σ
Free cash flow	**Lease**	779 346.36	795 546.36	795 546.36	795 546.36	794 546.36	**3960 531.80**
	Credit	775 460.74	795 247.21	795 015.97	794 765.57	794 494.41	**3954 983.91**
Current value of PV	**Lease**	721 683.82	682 179.10	631 705.81	584 966.95	541 686.22	**3162 221.90**
	Credit	718 085.69	681 922.58	631 284.65	584 392.83	540 969.95	**3156 655.70**

Source: own elaboration

During an analysis of the data in table 6 it may noticed that the sum of discounted five-year cash flow is higher by PLN 5 566.20 in case of operating lease. This means that in consideration of assumed parameters lease is a more beneficial source of financing than bank credit. Assuming that financial effectiveness constitutes the basic determinant of undertaking financial investments, in the discussed example the enterprise should finance the purchase of the fixed asset with operating lease.

Summary

The profitability of a bank credit and an operating lease, as alternative manners of financing the investment, is affected by multiple factors, both micro-economic and macro-economic. These include, amongst others: the level of interest rates, inflation, amount of income tax rate, selection of the method of amortization of the fixed asset, term of contract, and many others. This elaboration takes account of the factors, which, in the author's opinion, have the most significant influence on the effectiveness of selected sources of financing. It should be underlined that the analysis of the effectiveness of financing the investment with a bank credit was conducted with the assumption of a fixed WIBOR interest rate, whereas in reality the interest rate on the credit is variable and consists of: a fixed margin, and a WIBOR 3M rate for a credit in Polish zloty updated every 3 months. The base WIBOR 3M rate is examined every quarter (in February, May, August and November) and the rate adopted on the date of the examination will be applicable for the next 3 calendar months until the next examination. thus, the amount of the interest rate on the credit may be changed maximum 4 times per year, which means potential changes in the amount of credit instalments.

The conducted analysis was concentrate around three stages. Stage one covered determining the amount of expenses incurred for the investment for the selected sources of financing and their classification as elements of potential tax deductible costs. Then, the manner of calculating the financial surplus was presented, demonstrating the amount of free funds generated by the given investment. The comparison of discounted cash flow for the examined period allowed indicating calculations as to which form of the investment is more beneficial for the enterprise. Calculations indicated that it will be the operating lease. In the aforementioned example of the analysis of financing through operating lease, we may observe the maximum use of the tax shield. The result is also substantially influenced by the various distribution over time of tax benefits of both forms of financing. The relatively high amount of the entry fee was included in tax deductible costs already in the first year of the analysis, whereas amortization, as a tax cost, is charged equally during the five-year period under examination.

Summing up, it should be noted that the financial effectiveness of a bank credit and lease depends on so many factors that a change of any parameter may indicate the advantage of a bank credit over lease.

References

- Act of 26.07.2000 on the amendment of the Civil Code (Journal of Laws no. 74, item 857).

Brigham, E. S. (2005), Podstawy zarządzania finansami, PWE, Warsaw.

- Collective work edited by Panfil, M. (2008), *Finansowanie rozwoju przedsiębiorstwa*, published by DIFIN, Warsaw.
- Krzemińska, D. (2002), Finanse przedsiębiorstwa, published by WSB in Poznan, Warsaw.

- Okręglicka, M. (2004), Aspekty prawne, organizacyjne i ekonomiczne, published by DIFIN, Warsaw. Poradnik Gazety Prawnej PGP 2(912)/ February 2019.

- Regulation of the Council of Ministers of 10.12.2010 on the Classification of Fixed Assets (CFA).

Rutkowski, A. (2007), Zarządzanie finansami, PWE, Warsaw.

The Essence of Social Security Against the Background of National Security and Its Threats

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Abstract

The summary concerns issues related to the extremely important phenomenon of social security, which ensures the proper functioning of entire social groups, as well as an individual citizen. According to the author, the disruption of this security will have a significant impact on the functioning of the whole state, because it is closely related to a person, a citizen, who, when the security of the state is threatened, is obliged to defend it, protect it by performing various actions. In the substantive part of the article, contemporary threats to social security have been signaled, which would need to be carefully examined in order to counteract them.

Keywords: State Security, Social Security, Social Security Risks, Unemployment, Poverty

Introduction

Security is an extremely important element of the proper functioning of any state and is one of the basic human needs. Abraham Maslow (2016) identified five human needs: physiological, safety, belonging, appreciation, and self-realization. In his theory of the hierarchy of needs, safety is second only to physiological needs, such as getting food or needing sleep. In view of the many and varied factors, including the changing global situation and the development of modern technologies, security should be seen as a continuous process (Stańczyk, 1996), in which the aim is to ensure that security is maintained.

Nowadays, we talk about various kinds of security, which in the subjective dimension is divided into: political, military, economic, environmental, information, social and cultural security (Włodkowska, 2009).

Military security is related to ensuring the inviolability of borders, the constitutional order, the sovereignty of the country, no less important, linked to military security is political security aimed at maintaining the constitutional order, political stability and the development of the political system of the state. Preservation of economic security has an impact on the functioning of the state economy and its development, it is defined as a state in which the economic conditions necessary for the survival and ensuring the welfare and sustainable development of the society living within the borders of a given state, as well as for the survival and smooth functioning of the state institutions are ensured. The economic potential of the state is one of the basic conditions for the state's power and its prestige in the international arena (Kalata and Nowakowski and Protasowicki, 2016). Cultural security, on the other hand, is linked to the cultural heritage of the country concerned, which is currently under increasing threat due to open borders and access to the Internet. Ecological safety is a process associated with the pursuit of maintaining an adequate ecological state, ensuring the functioning of all elements of the ecosystem, contemporary climate change and the results of human activity, its interference with the environment, pose significant threats to the ecosystem. A relatively new concept is information security, which is defined as the legitimate trust of an entity in the quality and availability of the information it obtains and uses, so the concept of information security refers to an entity (person, organization) that may be at risk of losing information resources or receiving information of inadequate

quality (Liderman, 2012). An important type is social security, which will be discussed further in this article.

Social Security and Its Risks

When analyzing social security as a research issue, it should be addressed in the form of the following question. *Why is social security so important in the whole of national security?* In order to solve this important problem, the following two questions need to be answered, such as: who does social security refer to? (individuals, social groups, state) and the second question: what does social security concern? (national heritage, education for security, security media, demography, social assistance or social security). The above questions were briefly answered in the content of this article.

As already mentioned in the introduction, social security is an important area of national security which will affect all social groups operating in the state. In her publication, Aleksandra Skrabacz (2012) aptly described social security as: protecting the existential basis of people's lives, providing opportunities to satisfy individual (material and spiritual) and realize life aspirations by creating conditions for work and study, health protection and pension guarantees. A slightly broader view of social security was presented by Marek Leszczyński (2009), specifying that it is related to legal, organizational activities carried out by various entities, starting with the state, non-governmental organizations and citizens themselves, in order to enable citizens to live at an appropriate level and prevent their social exclusion.

According to Janusz Gierszewski (2018), social security means the activity of the state aimed at neutralizing social problems and aimed at ensuring existence, protecting the national heritage and the quality of life of its inhabitants through the use of internal and external factors that guarantee the nation's unthreatened development and social order, the disruption of which may result in a threat to the state's internal stability.

The current *National Security Strategy of the Republic of Poland* of 2014 defines social security as one of the national security subsystems, so it is an important element of the national security system, ensuring undisturbed functioning of the state together with other subsystems.

The structure of social security in Poland includes *the bodies managing social security*, these are state bodies and local government institutions, which due to the changes taking place in modern times related, among others, to globalization, the opening of borders must constantly adapt their activities to the changing social needs. *The social potential of the state*, i.e. human capital that contributes to the development of the economy, the functioning of the state or the development of civil society (Świerszcz, 2019). An extremely important element of social security is *counteracting demographic threats,* which are associated with insufficient natural growth, an ageing society or high scale of migration of Polish citizens abroad. Actions related to these phenomena should be pursued with an increased focus on family, migration and immigration policies. Another element is *welfare security,* whose task is to provide an appropriate system of social security, through a system of allowances, social benefits and a system of free legal and psychological advice. *Education for security* is a component raising public awareness in the area of security threats (it includes, among others: monitoring of threats, notification, calling the appropriate rescue and law and order services, securing property, self-defense, first aid skills). In the structure of social security, we also distinguish the *system of protection of national heritage,* which is an important element of the Polish identity, the material and spiritual achievements of the state and its citizens. Not without significance in this system is the role of *the media in ensuring social security,* whose main task is to provide information, knowledge, identification and appropriate response to threats (Wojnarowska-Szpucha, 2018 a).

Threats are a constant element in the life of entire communities, of a single person, but due to the changing environment, opportunities, development of technology, the type of modern threats and the consequences they cause are changing. The list of threats to social security is long, often one threat influences or triggers the occurrence of another. Today, the basic conditions for threats to Poland's

social security are unemployment, poverty and the related social exclusion, discrimination (Wojnarowska-Szpucha, 2018 a).

The task of the state and other supporting institutions is to ensure social security at an appropriate level, because an efficient, effectively functioning society influences the development of the national economy and the level of national security.

Unemployment is a multidimensional phenomenon because its effects have a direct impact on the unemployed, but also have an impact on other members of the family, society or, finally, on the state economy. The effects of unemployment are divided into: individual, social and economic (Ayleytner and Głąbicka, 2000). At the same time, as a result of unemployment, other social problems arise, such as the serious problem of economic migration of citizens (Wojnarowska-Szpucha, 2018 a). There are many reasons for unemployment, sometimes it is connected with the choice of a given citizen (e.g. when a job, its remuneration does not meet the expectations of an unemployed person), or it results from coercion caused by the situation on the market, lack of qualifications of a given person. The duration of unemployment is not insignificant, because when it lasts for a longer period of time, the effects of unemployment (social, economic) are exacerbated (Wojnarowska-Szpucha, 2018 b).
In the end, long-term unemployment can lead to poverty and then social exclusion.

Poverty is a state in which a citizen does not have the means to satisfy his/her basic, existential needs. Today, poverty is a phenomenon that occurs in both rich and poor countries. According to Aleksandra Skrabacz (2012) poverty has a major social impact, from the lack of demand for goods, through difficulties in obtaining education, maintaining good health, to the intensification of pathological phenomena such as: crime, drug addiction, homelessness, is therefore a phenomenon that affects the proper functioning of the state.

Social exclusion is a phenomenon whose causes should be seen, inter alia, in the above-mentioned unemployment and poverty, as they can cause other adverse pathological phenomena (e.g. drug addiction, alcoholism), causing the individual to be separated from the rest of the community, to be excluded from life in the human community. Discrimination is a similar mechanism of action that causes different treatment of an individual, but its causes are caused by other factors, such as: origin, education, nationality, sexual orientation or religion.

Summary

Social security is treated as one of the important areas (types) of national security, therefore the state and other institutions should counteract its threats by all possible means available, because social threats affect not only an individual citizen, but entire communities of a given state, which in consequence may lead to dysfunction of its functioning in all states of the state's defensive readiness.

Poland has been struggling with demographic problems for some time and has been recording an increase in labor migration, as a result of which the number of citizens is decreasing, which constitutes a threat to state security.

Bibliography

- Ayleytner, J. Głąbicka, K (2000) Polityka społeczna - pomiędzy opiekuńczością a pomocniczością [Social Policy - between Care and Subsidiarity], Higher School of Pedagogy in Warsaw, Warsaw, p.17-18
- Gierszewski,J. (2018), Bezpieczeństwo społeczne jako dziedzina bezpieczeństwa narodowego [Social security as an area of national security], History and politics no. 23 (30)
- Kalata, A. Nowakowski, Z. Protasowicki, I (2016), Determinanty bezpieczeństwa ekonomicznego Polski [Determinants of economic security of Poland], [Online], [Retrieved January 13, 2020], https://www.researchgate.net/publication/263571152_Determinanty_bezpieczenstwa_ekonomicznego_Polski/link/02e7e53b41a652fa30000000/download

- Leszczyński, M. (2009) Bezpieczeństwo społeczne a bezpieczeństwo państwa [Social security and state security], Jan Kochanowski University of Humanities and Life Sciences, [Online], [Retrieved January 22, 2020], https://www.amw.gdynia.pl/images/AMW/Menuzakladki/Nauka/Zeszyty_naukowe/Numery_archiwalne/2011/ZN_2_2011/Leszczynski%20M.pdf
- Liderman, K. (2012) Bezpieczeństwo informacyjne [Information Security], Wydawnictwo Naukowe PWN, Warsaw, p.22
- Maslow, A. (2016) Motywacja i osobowość [Motivation and personality], PWN, Warsaw, p.115-119
- Skrabacz, A. (2012) Bezpieczeństwo społeczne. Podstawy teoretyczne i praktyczne [Social Security. Theoretical and practical basics], Elipsa Publishing House, Warsaw, p.53; 128
- Stańczyk, J. (1996) Współczesne pojmowanie bezpieczeństwa [Contemporary understanding of security], Institute of Political Studies of the Polish Academy of Sciences, Warsaw, p.15
- Świerszcz, K. (2019), Potencjał kulturowy i społeczny [Cultural and social potential], in: ed. Stańczyk, K. Potencjał obronny Rzeczypospolitej Polskiej [Defense Potential of the Republic of Poland], PWN, Warsaw, p.541
- Włodkowska, A. (2009), Cultular seciurity, in. ed. K.A.Wojtaszczyk, A.Materska-Sosnowska, Bezpieczeństwo państwa [State security], Oficyna Wydawnicza ASPRA JR, Warszawa, p. 147
- Wojnarowska-Szpucha, S. (2018 a), Migracje ludności zagrożeniem bezpieczeństwa społecznego w Polsce [Migration of people as a threat to social security in Poland], in: ed. Z. Trejnis, L. Kościelecki, Wyzwania i zagrożenia bezpieczeństwa i obronności RP w XXI wieku w wymiarze społecznym i technologiczno-środowiskowym [Challenges and threats to the security and defense of the Republic of Poland in the 21st century in the social and technological-environmental dimension], Oficyna Wydawnicza ASPRA -JR, Warsaw, p.62-63; 67; 73-86
- Wojnarowska-Szpucha, S. (2018 b), Social security determinants, in: Ed. Professor Nikolay Radulov, International Scientific Journal, Security & Future, Issue 4/2018, Scientific Technical Union of Mechanical Engineering Industry-4.0, Sofia, p. 161
- National Security Strategy of Poland 2014, Warsaw 2014

Experience in Interactive Services, Computer Games and Specialized Software Applied in Teaching Mathematics

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Abstract

The authors summarize their experience in using current information technologies in teaching mathematics at a technical university. To succeed in mastering vocational subjects, first-year students need to learn the basics of differential and integral calculus. But the special research methods used in the course, such as infinitesimal calculus and the passage to the limit, require high conception thinking to develop, so many students cannot cope with the subject. To overcome this difficulty, in the authors' opinion, it is appropriate to use the opportunities of current teaching technologies (information and communication technologies) when having mathematics classes. The paper provides examples of learning computer games that the authors use to support teaching and learning processes, LearningApps.org web application and Maple computing environment. To carry out the survey, engineering students who are taught at Sholom-Aleichem Priamursky State University and Far Eastern State Transport University are selected. The results of the experiment show a quality progress increase by 15% in the experimental group. Thus, it has been shown by experiment that using interactive technologies in teaching and learning process generates a higher return from education. In addition, a teacher has an opportunity to use the class time more effectively, arrange for personalized and distant educational process.

Keywords: Information technologies in education, educational computer games, LearningApps.org, computer algebra system Maple.

Introduction

The proficiency in differential and integral calculus integrated in the standard course of further mathematics at university ensures a basis for studying numerous vocational subjects majoring in technical curricula. It is impossible to succeed in an engineering career for those who do not have the required skills.

It is necessary to use a mathematical apparatus in order to solve a variety of applied issues. A mathematical apparatus is connected to differential and integral calculus with functions of single or

several real variables. However, lots of freshmen are not good at Advanced Mathematics course and find it one of the most difficult to learn. The reasons for this belief are a lower number of class hours and a much-decreased level of mathematical proficiency among secondary school leavers. In addition, specific research approaches used in the course ('the calculus of infinitesimals', or 'infinitesimal calculus', 'limiting transition'), require students' well-developed abstract thinking for comprehending and practicing. In the authors' point of view, regular use of modern information technologies in the learning process allows to overcome these difficulties.

Many scholars explore the potential for using current information and communications technologies (ICT) in higher education institutions for training. They actually observe advantages and disadvantages of e-learning in teaching in higher education institutions [2, 14]. They evaluate educational resource quality presented on numerous online computing platforms: GeoGebra Materials, LearningApps, I2Geo [19]. The scientists examine the capacity of information and communication technologies for learning, and search for the crucial factors that contribute to use digital technologies in education successfully [7, 13].

Research shows that machine teaching provides a unique approach for improving education and developing optimal personalized lessons [31]. Machine teaching methods can improve student performance [8] and provide a personalized learning process [9, 10, 11].

The authors believe that educational mobile applications that specialize in different contents of studying [4, 20] have really high potential. Mobile learning, aimed at achieving double-subject educational outcomes, encourage the ability "learning for life" [17].

In mathematical education, the practice of using various computer algebra systems (CAS) becomes more widespread. These systems significantly improve the educational impact of teaching aids due to their excellent drawing utilities and symbolic computing techniques [18].

Computer algebra systems Maple and GeoGebra are considered to be the excellent means for performing geometric constructions of the objects observed. The visualization makes solving problems easier [15, 16].

Students are better equipped with animated images designed in computer algebra system (CAS) Maple, in learning the material when studying discrete mathematics [1], and numerical analysis [25].

The visualization capabilities provided by Maple let a learner to choose from several methods for solving a given problem [6]. Integration of Maple software into teaching the topic Integral Calculus at the university enables students to enhance understanding of integral calculus technology [3, 23].

The use of specialized software in educational process makes it possible to apply programming as a modern method of getting mathematical skills, since the algorithm for solving typical problems can serve as an instrument for cognition, control, and development of one's own knowledge of mathematics [27].

In addition, Maple TA software can be used for a catalogue of exam questions, maintain automatic point scoring. Thus, it makes the exam more convenient, as well as reduces examiners' work [30].

The authors also report on the positive effect of using computer games in training [21, 22, 24, 28, 29]. The game influences concentration, logical thinking positively, and suggests problem-solving skills [12]. Students are taught competences and skills when playing games [26]. All these factors are intended to improve their views on academic performance [5].

The purpose of the study is to present the experience of using educational computer games, web services LearningApps.org and CAS Maple.

Methods

When giving classes, lecturers used a specially developed teaching and methodological materials, including workbooks and dynamic presentations. Students were learning the basic integration methods, practicing and mastering their computing skills while doing assignments in workbooks. The lecturer used original interactive computer games to give some definitions. The lecturer also arranged individual work through LearningApps.org web service. The study of geometric applications of double integrals was guided by Maple graphical capabilities.

Original Computer Learning Games

Students learn the definition and geometric value of a certain integral using the interactive computer game Find the cross-section area of the river. First, a player selects the number of depth measurements, and computer displays the depth of the river at the selected points. Then, a student needs to calculate the cross-sectional area of the river according to the formulas of the left, right and middle rectangles. If the correct value is entered, the corresponding step figure is displayed on the screen (Fig. 1). The program checks the entered answers and evaluates the results. The game is available at https://constructortest.000webhostapp.com/gamePixel/river.php.

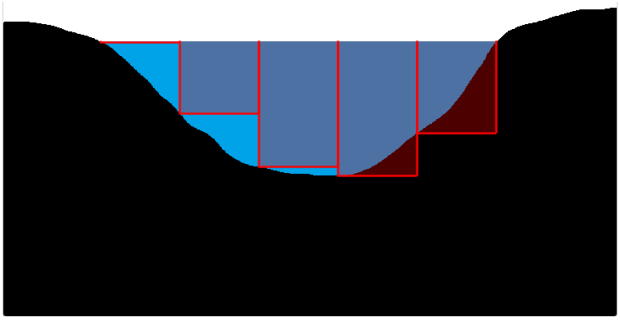

Fig.1: The game for calculating the cross-section area of the river with left rectangles for 5 measurements

Students learn the squarable figures, the Jordan inner and outer measure using Find the area of shadow computer game (https://constructortest.000webhostapp.com/gamePixel/game.php). Students are asked to calculate an approximation of the area of the shadow of different animals, flowers and other images. To do this, the shadow of the figure is split by means of graphical depiction or cell complex (the size of the cells is 1 cm or 0.5 cm for the game). A player can see two similar shadows of the selected picture via cellular decomposition on the screen. A student selects only those cells that are completely of the shadow of this figure in the left picture. And only those cells are selected that has at least one point of the shadow in the right picture (Fig. 2). The program counts the marked cells. Having selected all the cells, a student enters the value of the area, and the computer checks the result. Wrong cells are highlighted in red. The computer shows the points and a final grade.

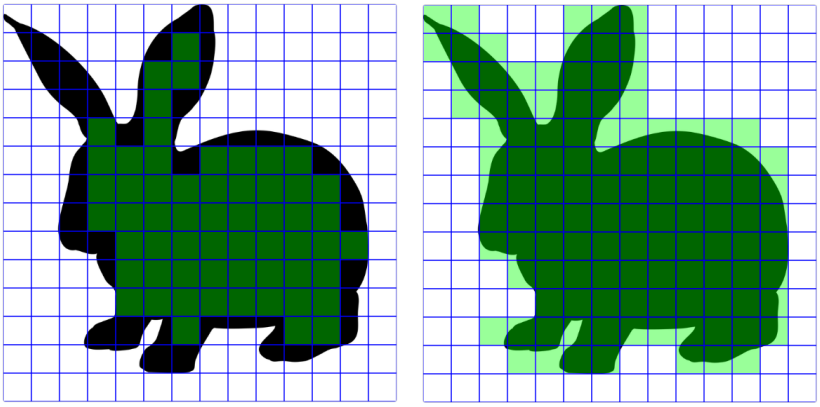

Fig. 2: The game to calculate the area of rabbit's shadow (the side of the cell is 1 cm)

LearningApps.org Web Service

Students' individual work is arranged through LearningApps.org web service. The developers designed various types of self-check assignments. They used this application template to assess students' competence and skills, and test the integration technique (Fig. 3-4).

To test priori knowledge, the authors choose the following templates:

- "Crossword" (https://learningapps.org/display?v=p2ak9zz2v18),
- "Hangman" (https://learningapps.org/display?v=paefvchbn18),
- "Matching Pairs" (https://learningapps.org/display?v=pxgismv3t18).

Students are offered to assess the solving antiderivatives skills (integration). The templates are given below:

- "Freetext input" (https://learningapps.org/watch?v=pjn9neqrk18),
- "Multiple-Choice Quiz" (https://learningapps.org/display?v=pnk2vewe218),
- "Horse race" (https://learningapps.org/watch?v=p8hvc5n5n18).

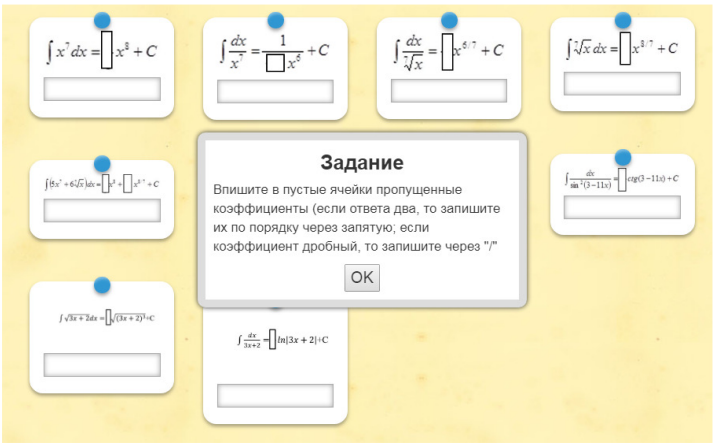

Fig. 3: Freetext input – The task: Enter the missing coefficients in the empty cells (if there are two answers, write them in order separated by commas, if the fractional coefficient, write through '/')

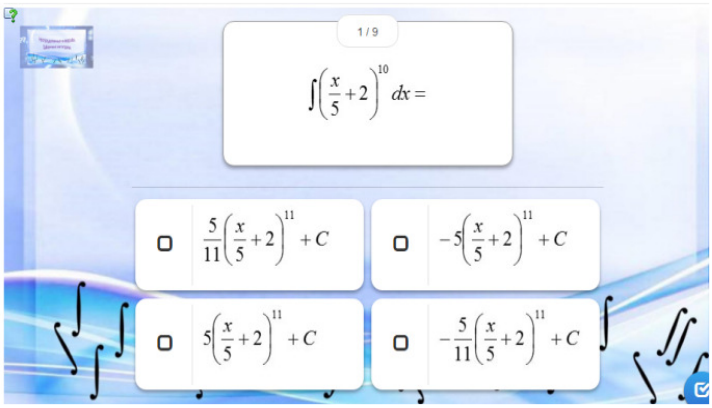

Fig. 4: Multiple-Choice Quiz – Testing the skill to find indefinite integrals

Maple Computing Software

The authors use a computer algebra system Maple when studying geometric applications of integrals. The graphical capabilities of this mathematical software visualize plain domains and space shapes. The areas and volumes of them have to be found through the use of an integral. Finally, students face particular problems with solving similar tasks when constructing known shapes and domains. Let the authors show it by specific examples.

Example 1. Solve the area of a domain delimited by lines by double integration $y = x$, $y = 2x$, $x = 1$ and $x = 2$ (Fig. 5).

Let the authors describe the commands used from the additional software of graphic extensions plots and plot tools:

- unequal creates a graphic object where d is an area delimited by the known inequalities and marks this area with the proper color;

- line creates a graphic object where l are dotted graphs showing the coordinates of the cross point of the given curves.

```
d := inequal({y − x ≥ 0, y − 2·x ≤ 0, x ≥ 1, x ≤ 2}, x = 0..3, y = 0..5, color
     = "DarkMagenta", scaling = constrained) :
l := line([0, 1], [1, 1], linestyle = 2), line([0, 2], [2, 2], linestyle = 2), line([0, 4], [2, 4],
     linestyle = 2) :
t := textplot([2.5, 4.3,'y = 2 x','font'= ["times", "roman", 17]]), textplot([2.5, 2.2,'y = x','font'
     = ["times", "roman", 17]]), textplot([1.5, 2.2,'Ω','font'= ["times", "roman", 17]]) :
display(d, l, t);
```

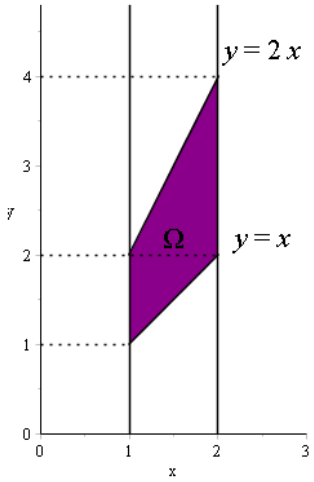

Fig. 5: The domain Ω delimited by the straight lines *y = x*, *y = 2x*, *x=1* and *x=2*

Example 2. Find the volume of a shape delimited by given surface areas by double integration: the paraboloid of revolution $z=x^2+y^2$, Cartesian planes and the plane $x + y = 1$.

First, it is necessary to understand that what the integrand function f (x, y) is in order to 'see' the shape, as well as what the integration domain is, i.e. on which planar domain the integrand function is given.

The first thing the authors begin with is depicting the known surfaces in order to answer all these questions. But each time they choose the best values of boundaries of coordinate changes. They make it possible to design a more informative image (Fig. 6).

```
implicitplot3d([z = x^2 + y^2, x + y = 1], x = −1.7..1.7, y = −1.7..1.7, z = 0..2.5, color = [blue,
     green], scaling = constrained, axes = normal)
```

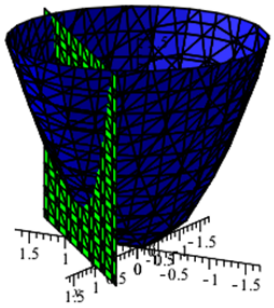

Fig. 6: The domain Ω delimited by the straight lines *y = x*, *y = 2x*, *x=1* and *x=2*

As it is seen from Fig. 6, the known shape is delimited by the paraboloid of revolution $z=x^2+y^2$ from above, and there is a triangle with the lines $x + y = 1$, $x = 0$ and $y = 0$ in the bottom base. The authors draw the lower and upper bases of a cylinder parallelepiped (Fig. 7).

```
> d := plot3d(0, x = 0 ..1 − y, y = 0 ..1, color = "BlueViolet") :
  f := plot3d(x^2 + y^2, x = 0 ..1 − y, y = 0 ..1, color = blue, scaling = constrained, axes
       = boxed) :
  display(d, f);
```

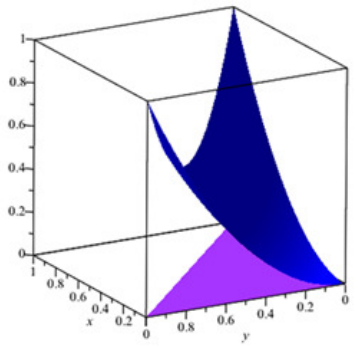

Fig. 7: Upper and lower bases of a cylinder parallelepiped

To add a lateral surface, they draw a collection of lines parallel to Z-axis, and connecting the corresponding points of the lower and upper bases (Fig. 8).

```
> N := 200 :
  for i from 1 to N do x[i] := i/N; y2[i] := i/N; y3[i] := (1 − x[i]); z1[i] := (x[i])^2; z2[i]
       := (y2[i])^2; z3[i] := (x[i])^2 + (y3[i])^2;
                  l1[i] := line([x[i], 0, 0], [x[i], 0, z1[i]], linestyle = 1, thickness = 2);
                  l2[i] := line([0, y2[i], 0], [0, y2[i], z2[i]], linestyle = 1, thickness = 2);
                  l3[i] := line([x[i], y3[i], 0], [x[i], y3[i], z3[i]], linestyle = 1, thickness = 2) od:
  bp1 := seq(l1[i], i = 1 ..N) :
  bp2 := seq(l2[i], i = 1 ..N) :
  bp3 := seq(l3[i], i = 1 ..N) :
  display(d, f, bp1, bp2, bp3, view = [0 ..1, 0 ..1, 0 ..1])
```

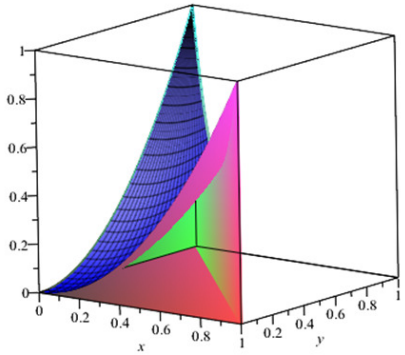

Fig. 8: Cylinder parallelepiped delimited by the paraboloid of revolution $z=x^2+y^2$, by the coordinate planes and the plane $x+y=1$

Results and Discussion

The educational experiment was run at Sholom-Aleichem Priamursky State University and Far Eastern State Transport University. The participants were the students whose major is Building Engineering, Electrical Engineering, Information Systems and Technology, Applied Mathematics and IT.

In the control group there were 69 students, in the experimental group there were 74 students. Before the beginning of the experiment, both groups showed the same proficiency level in general. It is proved by the results of calculus exam during the first examination time (Fig. 9). Scores on a five-point scale are marked along the horizontal axis. Number of students is marked along the vertical axis. Qualitative achievement in the control group is 44.9%, and 44.6% is in the experimental group. According to the results of the exam during the second examination time (in a half a year) (Fig. 10)

qualitative academic performance is 30.4% (in the control group) and 46% (in the experimental group). In the experimental group, qualitative academic performance is higher by 15%.

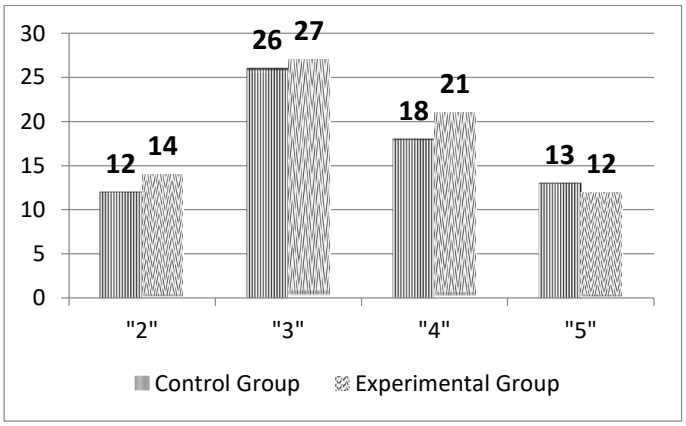

Fig. 9: The exam results at the first session (before experiment)

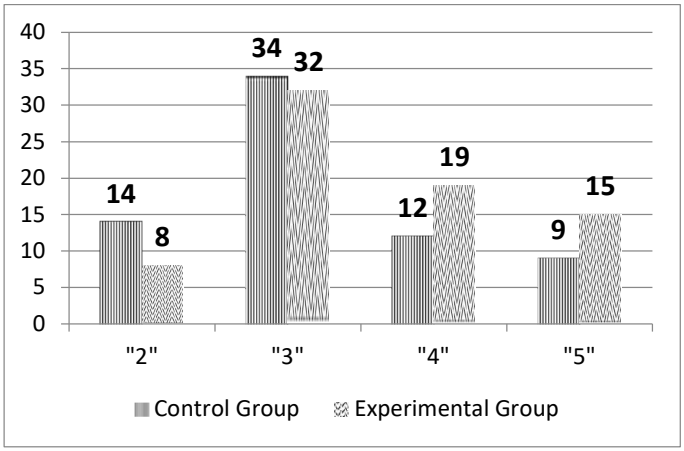

Fig. 10: The exam results at the second session (after experiment)

Conclusion

The research has proved a positive influence of interactive technologies on the educational process. Interactive educational process stimulates students' cognitive activity, contributes to their independent work, and directs them to understand the material they have been studying thoroughly.

References

1. Alharbi, A., Tcheir, F. and Siddique, M. (2016), 'A Mathematics E-book Application by Maple Animations,' *Proceedings of the International Conference on Frontiers in Education: Computer Science and Computer Engineering (FECS)*, 148–151.
2. Arkorful, V. and Abaidoo, N. (2015), 'The role of e-learning, advantages and disadvantages of its adoption in higher education,' *International Journal of Instructional Technology and Distance Learning* 12(1), 29–42.

3. Awang, TS. and Zakaria, E. (2013), 'Enhancing students' understanding in integral calculus through the integration of Maple in learning,' *Procedia - Social and Behavioral Sciences*, 102, 204–211.
4. Beutner, M. and Pechuel, R. (2014), 'Modern Ways of Learning with educational Apps,' *Proceedings of World Conference on E-Learning 2014*, 188–196.
5. Blumenfeld, P., Kempler, T., Krajcik, J. and Sawyer, R.K. (2006), 'Motivation and cognitive engagement in learning,' Cambridge, Cambridge University.
6. Blyth, B. (2013), 'Maximum problems without calculus: Design, teaching and assessment using Maple,' *The 9th Delta Conference on teaching and learning of undergraduate mathematics and statistics*, 12–29.
7. Brehm, L. and Holger, G. (2018), 'Learning Lab "Digital Technologies" - Concept Streams and Experiences,' *4th International Conference on Higher Education Advances (HEAd' '18). Universitat Politécnica de Valéncia Valéncia*, 1271–1278.
8. Ciolacu, M., Fallah Tehrani, A., Beer, R. and Popp H. (2017), 'Education 4.0 – Fostering student's performance with machine learning methods,' *2017 IEEE 23rd International Symposium for Design and Technology in Electronic Packaging (SIITME)*, 438–443.
9. Ciolacu, M., Fallah Tehrani, A., Binder, L. and Svasta, P.M. (2018), 'Education 4.0 - Artificial Intelligence Assisted Higher Education: Early recognition System with Machine Learning to support Students' Success,' *2018 IEEE 24th International Symposium for Design and Technology in Electronic Packaging (SIITME),* 23-30.
10. Ciolacu, M., Svasta, P., Berg, W. and Popp, H. (2017), 'Education 4.0 for Tall Thin Engineer in Data Driven Society,' *IEEE-23nd International Symposium SIITME*, 432–437.
11. Conati, C., Porayska-Pomsta, K. and Mavrikis, M. (2018), 'AI in Education needs interpretable machine learning: Lessons from Open Learner Modelling,' *ICML Workshop on Human Interpretability in Machine Learning (WHI 2018)*, 21–27.
12. De Aguilera, M. and Mendiz, A. (2003), 'Video games and Education,' *Computers in entertainment*, 1(1), 1–14.
13. Drijvers, P. (2015), 'Digital Technology in Mathematics Education: Why It Works (Or Doesn't),' *Selected Regular Lectures from the 12th International Congress on Mathematical Education*, 135–151.
14. Ennouamani, S. (2017), 'An overview of adaptive e-learning systems,' *IEEE 9th International Conference Intelligent Computing and Information Systems (ICICIS 2017)*, 342–347.
15. Eyrikh, N. V., Bazhenov, R. I., Markova, N. V. and Putkina, L. V. (2018), 'Applying Maple Computing Environment in Teaching Mathematics to University Students Majoring in Technical,' *2018 IEEE International Conference" Quality Management, Transport and Information Security, Information Technologies"(IT&QM&IS)*, 623–628.
16. Gainutdinova, T.Y., Denisova, M.Y. and Shirokova, O.A. (2017), 'Innovative Teaching Methods In Formation Of Professional Competencies Of Future Mathematics Teachers,' *IFTE 2017 III International Forum on Teacher Education*, 197–205.
17. Goryunova, M. and Lebedeva, M. (2017), 'The Study Of Pedagogical Practice Of Mobile Learning In Russia,' *EUREKA: Social and Humanities*, (1), 20–24.
18. Kaneko, M., Maeda, Y., Hamaguchi, N., Nozawa, T. and Takato, S. (2013), 'A scheme for demonstrating and improving the effect of CAS use in mathematics education,' *13th International Conference Computational Science and Its Applications (ICCSA)*, 62–70.
19. Kimeswenger, B. (2015), 'Identifying and assessing quality criteria for dynamic mathematics materials on platforms,' *Proceedings of the 7th conference on Mathematical Knowledge Management*, 5144, 520–535.
20. Krauss, C., Merceron, A., An, T.S., Zwickelbauer, M., Steglich, S. and Arbanowski, S. (2017), 'Teaching Advanced Web Technologies with a Mobile Learning Companion Application,'

Proceedings of the 16th ACM World Conference on Mobile and Contextual Learning (mlearn 2017), 1-4.

21. Maraffi, S., Sacerdoti, FM. and Paris, E. (2017), 'Learning on Gaming: A New Digital Game Based Learning Approach to Improve Education Outcomes,' *US-China Education Review A*, 7(9), 421-432.
22. Mateos, M.J., Muñoz-Merino, P.J., Kloos, C.D., Hernández-Leo, D. and Redondo-Martínez, D. (2016), 'Design and evaluation of a computer based game for education,' *2016 IEEE Frontiers in Education Conference (FIE)*, 1-8.
23. Ningsih, Y. L. and Paradesa, R. (2018), 'Improving students' understanding of mathematical concept using Maple,' *Journal of Physics: Conference Series*, 948(1), 012–034.
24. Novak, E. and Tassell, J. (2015), 'Using video game play to improve education-majors' mathematical performance: An experimental study,' *Computers in Human Behavior*, 53, 124-130.
25. Perjési-Hámori, I. (2015), 'Teaching numerical methods using CAS,' *Electronic Journal of Mathematics & Technology*, (9), 229–238.
26. Prensky, M. (2006), 'Don't bother me mom–I'm learning!,' St. Paul, Paragon House.
27. Semenikhina, E.V. (2015), 'Programming as a Method of Forming Mathematical Knowledge in Conditions of Informatization of Education,' *Proceedings of Francisk Scorina Gomel State University,* 2(89), 42-45.
28. Tokac, U., Novak, E. and Thompson, C.G. (2019), 'Effects of game-based learning on students' mathematics achievement: A meta-analysis,' *Journal of Computer Assisted Learning*, 35(3), 407-420.
29. Willis, J. (2016, September 12), '2 Hands-On Games To Build Thinking Skills In Students,' *by TeachThought Staff.* [Online], [Retrieved January 10, 2020], https://www.teachthought.com/learning/2-hands-on-games-to-help-students-understand-their-brains/.
30. Wu, L. (2013), 'Maple and Maple TA in Teaching College Mathematics,' *Journal of Shanghai Second Polytechnic University*, 2(30), 2.
31. Zhu, X. (2015), 'Machine Teaching: An Inverse Problem to Machine Learning and an Approach Toward Optimal Education,' *Proceedings of the Twenty-Ninth AAAI Conference on Artificial Intelligence (AAAI-15)*, 4083–4087.

Barriers to Effective Monitoring of Internal Audit Activities. Empirical Evidence from Poland

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Abstract

Recent research on internal audit in Poland suggests that internal audit is perceived as useful by entities of both public and private sector. However internal auditors do not always meet the expectations of their key stakeholders. Although effective monitoring of internal audit activities is regarded by the Institute of Internal Auditors and by the Polish legislators as one of the factors which can ensure internal audit quality, some internal auditors declare that their activities are not subject to monitoring of any kind. This study is aimed at identifying barriers to effective monitoring of internal audit activities from the perspective of the chief audit executives and internal audit staff. Empirical material for analysis was collected as part of interviews conducted in Poland, with respondent base represented by 28 internal auditors employed in 30 organizations. The results of the study indicate that, of all the identified barriers to effective monitoring of internal audit activities, lack of support of the senior management turned out to be the most common. Surprisingly, the respondents did not perceive the relationship between the effective monitoring of internal audit activities and the critical role of CAE and the skills of internal auditors. The respondents also seemed largely unaware of the role and significance of such factors as effective audit committee and board support.

Keywords: Monitoring, Internal Audit, Control.

Introduction

In general, the concept of monitoring is well known. In the colloquial sense of the word, monitoring is associated with constant observation and control of certain processes and phenomena or constant supervision over a protected object. In the area of management, the term is used in reference to activities of the entire organization as well as to individual processes, projects, and organizational units. According to the world's best-known concept of the internal control – the COSO model – internal audit is recognized as one of the elements of the monitoring subsystem (COSO 2013).

International Standards for the Professional Practice of Internal Auditing (IIA, 2016) define internal audit as an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes.

Recent research on internal audit in Poland suggests that it is perceived as useful by entities of both public and private sector (Bartoszewicz, 2009; Ciak, 2016; Ciak, Voss, 2017; Gmińska, Voss, 2018). In particular, the respondents notice that, as a result of implementing audit recommendations, the operating efficiency and value of the organization increases. In municipal governments, one can notice an increase in management rationality, not only in the area of operational activities but also in the sphere of financial management (Bartoszewicz, 2009). In turn, advisory activities, in the opinion of the respondents, guarantee that good decisions are made (Ciak, 2016).

However, research by J. Ciak and B. Voss (2017) revealed that internal auditors do not always meet the expectations of their key stakeholders, because senior management does not use all audit results. On this basis, it can be argued that internal audits, like other processes in the organization, should be monitored to be effective. Recent studies have shown that monitoring is one of the factors to

determine the achievement of desired results by internal audit (Bednarek 2018a). The importance of this process has long been recognized by the Institute of Internal Auditors and by the Polish legislators. The process is included in the International Standards for the Professional Practice of Internal Auditing (IIA, 2016, p. 44) and in the Regulation of the Minister of Finance (2015) on Internal Audit and Information about the Work and Results of the Audit.

Bednarek's (2018b) study has shown that, in practice, monitoring in internal audit is interpreted and practiced in many different ways. Entities of the public finance sector that employ only one internal auditor tend to interpret monitoring as self-control, reporting to the top management of partial audit results and checking the timeliness of the audit recommendations being carried out by the auditees. In multi-person audit functions, monitoring generally includes activities that assure the internal audit manager and his team that their activities are in line with standards. These activities include conversations, document reviews, and tracking of time required to complete each activity. Some practitioners believe that monitoring also involves conducting studies at the end of the audit task in the form of a survey or interview to find out opinions of the audited entities on the degree of meeting the expectations of the organization related to a given audit task, as well as to confirm internal assessments and to identify reasons for negative evaluations (if any). Some external service providers even go as far as requesting the audited entity for audit recommendations to ensure that the results meet the client's expectations. Others perform reviews of compliance between the working documentation and the adopted rules and procedures after each completed audit task. Some internal auditors declare that their activities are not subject to monitoring of any kind (Bednarek 2018a and 2018b; Bartoszewicz 2015).

This paper is an attempt to identify what are the barriers to effective monitoring of internal audit activities from the perspective of the chief audit executives and internal audit staff. Answers to this question will be provided based on opinions from 28 internal auditors employed in enterprises and public administration institutions in 2017.

This study's contribution to subject literature rests with presentation, organization, and evaluation of the current barriers to effective monitoring of internal audit activities. It complements publications on the effectiveness of internal audit in public sector entities by explaining why this function is not always effective. It can also serve as a indication for members of audit committees, senior management, and other personnel responsible for managing internal audit on how to increase the efficiency and effectiveness of internal audit.

The first part of the paper presents an overview of factors determining the effectiveness of monitoring internal audit activities from the perspective of current research. The second part provides a description of the research methodology. The third part presents the research results. The discourse culminates in a summary of fundamental observations and conclusions resulting from the conducted research.

Barriers to effective monitoring of internal audit activities from a theoretical perspective

Since monitoring serves to assure the internal audit team that audit engagements are carried out effectively and in accordance with the plan and standards, it means that there should be a relationship between the monitoring of internal audit activities and the effectiveness of internal audit. Due to the lack of sufficient empirical evidence confirming the existence of this relationship, for the time being, it should be assumed that the factors influencing the effectiveness of internal audit are also barriers to effective monitoring of internal audit activities.

A copious presentation of a wide set of factors determining the effectiveness of internal audit can be found in the latest literature review by Lenz and Hahn (2015). Their analysis shows that the whole set of factors determining the effectiveness of internal audit can be divided into factors of the macro and micro perspective (Table 1).

Table 1: Features that determine the effectiveness of internal audit - a theoretical perspective

Macro factors	Micro factors		
	Category	**IA perspective**	**IA stakeholders perspective**
Coercive forces Normative forces Mimetic forces Other macro factors	IA resources	The crucial role of CAE and skills and competencies of internal auditors	Effective internal auditors require skills and competences
	IA processes	IA is effective when it is risk-based	
	IA relationships	The high importance of the audit committee and the board Support from senior management is critical Serving two (or more) masters	IA is effective when meeting expectations of management IA is effective when meeting expectations of the board/AC IA is effective when meeting expectations of external auditors IA is effective when meeting expectations of auditees
	Organization	Organizational characteristics matter including politics and culture, role ambiguity and role conflict	

Source: own study based on: R. Lenz, U. Hahn, A synthesis of empirical internal audit effectiveness literature pointing to new research opportunities, Managerial Auditing Journal, Vol.30, No. 1, 2015, pp. 5-33.

Determinants identified in Table 1 can be defined as basic, meaning that they do not fully exhaust the possible barriers to effective monitoring of internal audit activities. At the moment, it should also be assumed that continuous analysis of the practice of internal auditors in the form of audits should be an important source of information about these factors. They will undoubtedly constitute a significant supplement to the list contained in Table 1 based on previous studies.

Research Methodology

This study is aimed at identifying barriers to effective monitoring of internal audit activities from the perspective of the chief audit executives and internal audit staff. To this end, the following research question was formulated:

What are the obstacles that impede the ongoing monitoring of internal audit activity in accordance with the 1311 standard or prevent the internal audit activity from allocating its time and other resources to this purpose?

Empirical evidence for analytical evaluation was obtained through interviews with 28 respondents - internal auditors working for 30 organizations in Poland. The choice of respondents was deliberate. To ensure different points of view, respondents were employed in both the private (7 people) and public (23 people) sectors. Both those managing internal audit (14 people) and members of the internal audit staff (16 people). Both internal auditors employed in single-person positions (8 people) and members of multi-person internal audit departments (22 people). Both members of organizations in which the audit committee was created (15 people) and from those where it does not occur (15 people). Most of the respondents had over 10 years of work experience as an internal auditor (21 people).

The organizations included universities, listed and unlisted companies, enterprises with State Treasury as the majority shareholder, marshal offices, banks, audit companies, municipality offices, pharmaceutical companies, ministries, central offices and institutions, courts, commune offices,

hospitals, local government organizational units. The interviews were conducted from March 9 to April 10, 2017, with the average duration of ca. 30 minutes each. The number of respondents was decided on the basis of observations suggesting adequate saturation of the collected research material. After 30 interviews, the observed increase in knowledge was marginal (MacQuarrie, 2010; Eisenhardt, 1989).

The research tool used in the study came in the shape of a partially structured interview questionnaire, with questions construed using a predetermined and unchanging number, order and form. The interview questionnaire consisted of three open questions designed to invite respondents to share their experiences and views on the nature, premises for and barriers to effective monitoring of internal audit activities. The use of open questions served the purpose of eliciting unconventional, original and surprising opinions from the respondents. Due to the extensive subject matter, research results regarding the nature of monitoring internal audit activities have been published in separate paper (Bednarek 2018b), and another paper will be published in near future on the premises for monitoring internal audit activities.

Barriers to Effective Monitoring of Internal Audit Activities

An interesting supplement to the current research on the effectiveness of internal audit is to provide an overview of the chief audit executives' and internal audit staff opinions on barriers to effective monitoring of internal audit activities. Opinions from respondents provide an insight into the daily practice of modern internal auditors, as seen through the eyes of study participants. Despite the threat of subjectivity in these opinions, the attempt to build a picture of monitoring activities in today's internal audit functions allows us to study the real extent of tasks assigned to internal auditors as well as the most important challenges associated with their functions (in their perceived order of importance). The value of this sample is also determined by the fact that the data had been collected as part of interviews, which resulted in a wide spectrum of views and opinions. And despite a certain risk of a lack of objectivity from the respondents, the data offered a peek behind the veil which typically obscures the perception of the chief audit executives and internal audit staff and their duties.

Statements collected as part of the interviews make it possible to identify those barriers to effective monitoring of internal audit activities, which, based on the respondents' experience, were pointed out by the examined the chief audit executives and internal audit staff (Table 2). To a large extent, they are consistent with the factors determining the effectiveness of internal audit identified on the basis of literature review (Table 1). In addition, responses in this segment allowed us to include barriers identified solely on the basis of the respondents' practical experience.

Table 2: Barriers to effective monitoring of internal audit activities, as observed from the perspective of the chief audit executives and internal audit staff

Respondents' views	Barriers to effective monitoring of internal audit activities
[R1] "from the point of view of one auditor, no desire"	- lack of auditors' motivation
[R2] "(...) employees and managers of internal audits change, (...) they come and do something their own way, they do not adapt to our rules, they have experience gained from their companies"	- high fluctuation of the internal audit staff
[R3] "(...) it is not possible to obtain information from an auditee. The biggest problem is the lack of interest in this monitoring, we do it more for our own sake, as no one expects it from us "	- unfavourable attitudes of the auditees - lack of senior management support
[R5] "Inadequate human resources of the internal audit unit"	- inadequate human resources

[R6] "Lack of objectivity of the auditees, for example, there are managers who do not intend to devote their work time to internal auditors, because they believe that internal audit is unnecessary in the organization, then regardless of the efforts of internal auditors, the auditees will misjudge the work of internal auditors, which will not be connected with reality and will not contribute to the improvement of internal audit "	- unfavourable attitudes of the auditees
[R8] "(...) it is impossible to perform audit tasks accurately with a small number of resources and relatively higher expectations of management"	- inadequate human resources
[R9] "Lack of formalization and regulation of formal and legal internal audit in Poland (just like the Act on Statutory Auditors), no audit department in the Ministry of Finance, doctrine is adopted but nobody implements it, the role of the audit department was quite important; an alternative - either a strong executive side based on the executive power or a legislative one, i.e. the Act on Auditing and Auditors (...), internal audit in the public sector, especially in the local government sector, is performed by many people who do not have powers"	- lack of formalization and formal and legal regulation of internal audit
[R10] "(...) surveying speeds up the assessment process, and conversations cost more time, although they are more useful; in conversation, you can always ask about the reason for the assessment and some factors facilitating inference. "	- carrying out only surveys not interviews
[R14] "(...) a situation where someone does not submit the audit questionnaire will not submit comments (...). Units that commission the audit do not contract it in contracts, they only contract the performance of tasks. For this reason, it is not known how to include a quality assurance program if the contract only pays for the completion of two audit engagements. You have to do it either at your own expense or I don't know how. Unfortunately, the entities that commission it do not know that such elements are needed, they cannot value it and they cannot approach it. "	- unfavourable attitudes of the auditees - lack of clauses relating to the quality assurance program in contracts with external service providers
[R15] "Unfortunately, there are too few auditors in Poland. In Poland, auditors are not independent enough, they are not objective enough, and the need for an audit is somewhat discretionary, the auditor is treated here with a grain of salt, nonchalantly, often this auditor makes some compromises with his conscience and with his attitude because he receives from audited entity a clear message about the senselessness of his work, unnecessary, low weight, low weight. (...) An undoubted technological obstacle is the lack of software - monitoring abroad at every step is built into each module (...). Unfortunately, there are no such possibilities in Poland. I know on one hand the units that would have an IT system ensuring internal audit management and, above all, monitoring. "	- lack of senior management support - inadequate human resources - lack of monitoring support software
[R16] "Little understanding of post-audit surveys, because units do not use such tools"	- unfavourable attitudes of the auditees
[R17] "Audits commissioned from the audit committee mean that the annual audit plan does not fulfil its task and cannot be the basis for assessing the effectiveness of internal audit (...). The style of management managing the internal audit - autocratic or loose. Organization management style. Regulations are increasingly inconsistent and imprecise. "	- inadequate human resources - management style in internal audit function - lack of formalization and formal and legal regulation of internal audit
[R18] "If the head of the internal audit is also an operational auditor, then it is difficult to spend time monitoring himself and others."	- inadequate division of tasks
[R20] "The resistance of the auditees, because this cooperation may also vary (...), maybe personal resources in relation to tasks limit these possibilities of full monitoring"	- unfavourable attitudes of the auditees - inadequate human

	resources
[R22] "If someone has more time, they may perform quality checks and other forms of self-assessment, but if someone does not have time, this task would take a dominant role and there would be no time for proper 'production' (...). If most internal audit functions are one-man tasks, then monitoring is an abstract concept. He may (...) think (...) how to monitor his activities, but if he completes the checklist, this point of view is enough for him. "	- inadequate human resources
[R23] "The specificity of our work is that we sometimes struggle to implement the recommendation for weeks, months, and sometimes for years. Others start to notice that we were right when something is broken down in a given plot and it is bad (...); the boss also has a lot of duties outside the hospital (...) and expects us all to do without him. Unfortunately, in reality, some things cannot be done without it. If he took certain actions, it would be more effective to require the implementation of recommendations from the heads of units. "	- unfavourable attitudes of the auditees - lack of senior management support
[R23] "Our work is negatively affected by the fact that we have very poor access to the boss (...). We can't get through with it for weeks or more. "	- lack of senior management support
[R24] "An obstacle may be delaying and extending the time to provide information (...). As a rule, when the results of the audit are reasonably more likely, the auditees cell responds to the survey, whereas when we have the opposite situation, it is very often the case that we do not receive the survey. "	- lack of senior management support

Source: own study.

The key barriers to effective monitoring of internal audit activities belonged to the group representing lack of support of senior management, which translates into the acceptance of internal audit by lower management. This lack of support manifests itself in three ways. First of all, half of the respondents underlined the importance of providing inadequate human resources for the internal audit function in relation to the scale of tasks performed. In particular, this means that the organization should employ at least two internal auditors so that, in addition to performing the tasks provided for in the annual audit plan, they have enough time for activities related to quality assurance, leave of absence, and audits commissioned by the audit committee and management. However, the manager of a larger internal audit team should resign from performing audit tasks in person and only deal with monitoring the work of his/her team.

Secondly, statements from one-third of the respondents also revealed the importance of utility offered by or attached to – the recommendations proposed by internal auditors from the viewpoint of the head of the unit or the management. As put by one of the respondents [R16], a problem arises when "the manager does not really want to use the internal auditor, because he does not see the benefits and the effects of the audit on the entity's activities". If the head of the entity or the management highly appreciates the rank of the audit recommendations, proper responses are duly implemented and effectively monitored. On the other hand, seeing the lack of support from the head of the entity or the management board for audit recommendations, the management displays resistance to their implementation, which significantly extends and complicates the monitoring process.

Thirdly, the auditors indicated the importance of managerial interest in the results of the monitoring of internal audit activities. Senior management should be interested in increasing the effectiveness of internal audit. One respondent characterized this situation as follows [R3]: "the biggest problem is the lack of interest in this monitoring, we do it more for our own sake, as no one expects it from us." One of the reasons for the lack of interest in the effectiveness of internal audit may be the low level of knowledge among managers as to the intended role and significance of internal audit. This is evidenced by the following statement [R14]: "it is difficult to prepare an audit in accordance with the expectations of the head of the entity, who often does not know what audit is, what internal control is,

has a slightly different perception of the world and its organization, and the audit is not quite compatible with how he sees it". Another reason may be the loose management style of the audit team or the organization in general [R17].

One-third of respondents also noted that the effective monitoring of internal audit activities is influenced by the attitude of lower management, which is most often audited. Based on the respondents' statements, a ‘catalogue of sins’ on the part of auditees can be formulated. These include reluctance to spend time on internal auditors and to implement audit recommendations. As a result, the auditees often exaggerate the shortcomings of internal auditors, or choose not to complete post-audit surveys at all.

Other barriers to the effective monitoring of internal audit activities, as indicated by some respondents, include insufficient formalization of legislative and formal regulations of internal audit in Poland, the lack of requirements for quality assurance in internal audit services in contracts with external service providers, and a loose style of management.

Interestingly, the respondents were not observant of the relationship between the effective monitoring of internal audit activities and the critical role of CAE and the skills of internal auditors. The respondents also seemed to lack proper perception of the roles of effective audit committee and board. One of the potential explanations for the observed situation may be the low activity of the audit committee or the board in assessing the effectiveness and efficiency of internal audit.

In addition, respondents pointed to several factors that allow for expanding the current discussion on barriers to the effective monitoring of internal audit activities to include new aspects. These include: high fluctuation of the audit staff (particularly the CAE position), the examination of opinions of auditees only through surveys and not through interviews, lack of formulation of a demanding work environment, lack of use of information technologies, and allocating more than 20 % of time to commissioned audits.

Conclusions

In conclusion, it should be added that the quest for answers to the question posed in this work, "what are the barriers to effective monitoring of internal audit activities?" proved quite challenging. Identification of actors determining the barriers to the effective monitoring of internal audit activities is hampered by the fact that the distribution of data may be the result of a variety of conditions in which internal audit operates, in particular, the expectations of the audit committee, the senior management or the auditees. The lack of support of the senior management is considered a key barrier to the effective monitoring of internal audit activities, which translates into the acceptance of internal audit by lower management and, consequently, the overall effectiveness of internal audit as such. It seems that identification of barriers to the effective monitoring of internal audit activities may constitute an important contribution to the development of our knowledge about the functioning of internal audit.

One obvious limitation of this research is the fact that information comes from only one source. The conclusions of the audit were formulated solely on the basis of what was said by internal auditors during the interviews. In addition, the size of the research sample was limited. Future studies should further confirm the research conclusions, by means of multiple case studies or quantitative studies.

Lastly, it is worth noting that the research results presented in this paper can be perceived as the next logical step in the expansion of knowledge on this subject. As such, they provide an interesting supplement to the existing research. It should be emphasized that previous research was primarily focused on studying the extent of internal audit practices in Western Europe, North America, Africa, and Asia. This study has identified barriers to the effective monitoring of internal audit activities of

both the public and private sector in Poland, i.e. in a country well-representative of Central and Eastern regions of Europe.

Acknowledgment

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References

- Bartoszewicz, A. (2015) 'Praktyczna realizacja Programu zapewnienia i poprawy jakości w komórkach audytu wewnętrznego na wybranych przykładach,' *Zeszyty Teoretyczne Rachunkowości*, 81, 9-28.

- Bednarek, P. (2018a) 'Factors Affecting the Internal Audit Effectiveness: A Survey of the Polish Private and Public Sectors,' *Efficiency in Business and Economics*, Springer, 1-16.

- Bednarek, P. (2018b) 'Bieżące monitorowanie w audycie wewnętrznym,' *Ekonomika i Organizacja Przedsiębiorstwa*, 2, 88-96.

- Ciak, J. (2016) 'Internal Audit as an Instrument of Support for the Public and Private Sector,' *Torun Business Review*, 15 (4), 17-29.

- Ciak, J., Voss, G. (2017) 'Rola audytu wewnętrznego w sektorze publicznym i prywatnym – wyniki badań w zakresie problemów wdrażania i korzyści z wykorzystania audytu wewnętrznego,' *Studia Prawno-ekonomiczne*, CIV, 235-254.

- COSO (2013) 'Internal control – Integrated Framework'.[Online], [Retrieved February 20, 2020], http://www.coso.org

- Eisenhardt, K.M. (1989) 'Building Theories from Case Study Research.' *The Academy of Management Review*, 14 (4), 532-550.

- IIA (2016), 'Definition of Internal Audit, Code of Ethics and International Standards of Professional Practice in Internal Audit,' *The Institute of Internal Auditors Research Foundation*, Altamonte Springs, FL.

- Lenz R., Hahn U. (2015) 'A synthesis of empirical internal audit effectiveness literature pointing to new research opportunities,' *Managerial Auditing Journal*, 30 (1), 5-33.

- MacQuarrie, C. (2010) Theoretical saturation, [in:] A.J. Mills, G. Durepos i E. Wiebe (ed.), Encyclopedia of Case Study Research. Sage Publications, 927-929.

- Rozporządzenie Ministra Finansów w sprawie audytu wewnętrznego oraz informacji o pracy i wynikach tego audytu, Dz.U. 2015 poz. 1480 z późn. zm. z 28.09.2015.

Modeling of the Impact of Investments on The Development of the GDP in Ukraine

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Abstract

The article presents results of the analysis of capital investment in the economy of Ukraine by the kinds of economic activity in the period of 2007-2019. The authors have studied the impact of seven kinds of investment (in agriculture, industry, construction, retail and wholesale trade; repair of motor vehicles and motorcycles, transport, information and telecommunications, financial and insurance activities) on the GDP. The investigation confirms a positive tendency of the GDP growth in 2007-2019. It is argued that investment in information and telecommunications, as well as investment in financial and insurance activities of the economy will provide the highest growth of the GDP per 1 million UAH of the invested funds. The work supplies pessimistic and optimistic forecasts of the impact of capital investment in the economy of Ukraine by the kinds of economic activity on the development of Ukraine's GDP for the period of 2020-2024.

Keywords: Capital Investment, Gross Domestic Product, Modeling, Economy Of Ukraine.

Introduction

From the position of the fundamental economic science, a gross domestic product is considered as a principal macroeconomic index, which reveals conditions and dynamics of development of the economy of any country. Investments are particularly important for the GDP development. The idea is noted in the Reference book NIPA (2019), which mentions four components of the gross domestic product, i.e. personal consumption, investments in business, state expenditures and net export.

Therefore, investments play an important role in functioning and development of the economy, whereas changes in the physical amounts and quantitative correlations of investments influence the volume of public production and employment, structural progress in the economy, development of branches and fields of economy.

Being the most important economic category, investments contribute to a growth of the economy, as well as development of its production potential. Studying the recent positions of Ukraine in terms of improvement of its investment attractiveness, one can affirm that Ukraine has good prospects concerning raise of investment and its attractiveness.

Literature Review

Investments can secure financial sustainability, stimulate economic development, as well as improve living standards of the society (OECD, 2008). Numeorus foreign scientists pay great attention to the study of theoretical and practical aspects of investment processes, impact of GDP on the country's economic development. In particular, general fundamentals of the theory of investment were revealed in the foreign works, written at the end of the 20th century, particularly by Bailey H.G. (1997), Hitman L.G. (1997), Jonk M.D. (1997), Masse P. (1971), Sharp U.F. (1997). Those ideas have been further developed in the modern works. Particularly, Reinhart and Rogoff (2010) argued the dependence between the figure of debt and economic growth, whereas Mehic, E., Silajdzic, S. and Babic-Hodovic V. (2013) studied the impact of GDP on the economic growth. However, those data of the research concerned the Southern-Eastern Europe.

A great deal of researches in the mentioned field has been done by Ukrainian scientists, including Maiorova T.V. (2009). The scientists revealed the essence of the concept of "investment activity", described the structure of investment market; specificity of financial, actual, innovative and foreign investments. Peresada A.L. (2002) suggested the process of improvement of the management of investment process. Reverchuk S.K. (2004) disclosed the ways and mechanisms of improvement of investments on the base of domestic and foreign experience. The scientist generalized and specified the investology as a science. Bochko O.Yu., Podvalna H.V., Kuziak V.V. studied the system of strategic planning of the investment attractiveness of enterprises (2018). Pawlowski G., Bochko O., Sytar L., Noga I., Pavlenchyk A, Zhavnerchyk O., Henyk O., Hladun V. (2019) were engaged in shaping of the financial strategy for the development of Ukraine.

Nowadays, one observes a general improvement of the investment activity of Ukraine. According to the results of 2019, after the many-year cooperation, Ukraine achieved the second position among the countries transacting with the EBRD by the amounts of annual investments. It is declared in the press-release on the website of the European Bank of Reconstruction and Development. Such result has become possible due to the extremely efficient dialogue between the Ukrainian Government and the EBRD, as well as stability of the key approaches of the Government concerning the principal directions of the reforms, i.e. de-emphasis of the state in the economy, improvement of the investment climate.

In Ukraine, the share of investments accounted for 2.7% of the GDP. It is the third position by the volume of direct foreign investments among the 23 developing countries in the period from 2015 to 2018. It is declared by the Rzeczpospolita referring to the global association of banks "Institute of International Finance" (IIF, 2019).

Moreover, in 2019, the EBRD approved 51 projects with the total fund of 1.1 billion EUR, including 680 million EUR classified as "green" investments. According to the share of "green" investments, Ukraine take the first position among the countries receiving funds from the EBRD (MFU, 2019). Having set close relations between the investments and level of the GDP, the authors of the work make calculation of pessimistic and optimistic forecasts of the dynamics of capital investment in Ukraine. According to the results of such calculations, it is possible to make a forecast about the general development of the country. It is also necessary to mention about the research conducted by the analysts of Credit Suisse, who suggest the growth of the GDP of Ukraine by 4% and more in the following year. "We expect that Ukrainian economy will grow by 4% and more in the nearest years" – is noted in the report. In case of a higher growth, the coefficient of repayments by the national liabilities in 2015 related with the GDP, will be higher. Thus, the authors' research about forecasting and relations of the GDP and investments is actual and well-timed.

Methodology

Modeling of the development of the gross domestic product of Ukraine is impossible without application of the modern methods of economic-mathematic modeling, statistical and economic analysis. The correlation-regression analysis supplies use of the regression equation for determination

of the analytical form of a relation between the features x_i and y_i, assessment of the significance of the relation between the efficient and factorial features on the base of the regressive analysis; interpret the results of calculations and their application for the following improvement of operation.

To determine the dependence of the studied economic indicators, the authors of the research conducted a correlation-regression analysis and composed an economic-mathematic model. The analysis of the volume of the capital investment impact on the GDP of Ukraine evaluates the tendencies, which have been established by the economic activity in 2007-2019. The authors made a quantitative assessment of the total impact of the studied factors on the efficient index. The calculation concerned seven essential values of the capital investment in the economy of Ukraine by the kinds of economic activity. A complex interaction of all factors with the effective index can be described by the equation of a linear multi-factorial regression of the following kind (formula 1):

$$Y = a_0 + a_1*x_1 + a_2*x_2 + a_3*x_3 + a_4*_{x4} + a_5*x_5 + a_6*x_6 + a_7*x_7 \quad (1)$$

The data of the correlation-regression analysis can be used to determine the impact of the following factors on the gross domestic production of Ukraine, y_i:

1) capital investment in agriculture, forestry and fisheries of Ukraine, x_1;
2) capital investment in industry, x_2;
3) capital investment in construction, x_3;
4) capital investment in wholesale and retail trade; repair of motor vehicles and motorcycles, x_4;
5) capital investment in transport, warehousing, postal and courier activities, x_5;
6) capital investment in information and telecommunications, x_6;
7) capital investment in financial and insurance activities, x_7.

Empirical analysis and discussions

Capital investment in the economy of Ukraine by the kinds of economic activity and the gross domestic product in the prices of the previous year for 2007-2019 (Table 1). The mentioned indices are found in the statistical information on the website of the State Statistic Service of Ukraine.

Table 1: Capital investment in the economy of Ukraine by the kinds of economic activity* and gross domestic product in the prices of the previous year for 2007-2019.**

Indicators, million UAH	Years												
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Agriculture. forestry, fisheries	9555	16951	9404	11062.6	16466.0	18883.7	18587.4	18795.7	30154.7	50484.0	64243.3	66104.1	55254.2
Industry	64341	76618	57658	55384.4	78725.8	91598.4	97574.1	86242.0	87656.0	117753.6	143300.0	199896.0	231849.5
Construction	9107	12469	5325	29767.0	31990.8	40760.3	40796.2	36056.7	43463.7	44444.0	52176.2	55993.9	59681.1
Wholesale and retail trade; repair of motor vehicles and motorcycles	17778	24695	14091	18550.4	24067.9	24531.6	22190.3	20715.7	20662.9	29956.8	33664.8	51817.6	43510.4
Transport, warehousing, postal and courier activities	19302	21767	15089	19322.4	25498.2	32413.0	18472.6	15498.2	18704.0	25107.8	37943.5	50078.3	41371.9
Information and telecommunications	12407	10791	9466	8625.8	9730.0	10167.7	9864.0	8175.1	22975.0	15651.2	18395.2	29884.9	20904
Financial and insurance activities	4165	4636	3359	5861.5	5972.3	7353.3	6646.8	6214.5	6448.0	7678.7	8055.3	10652.3	10887.7
Real estate transactions	39415	48840	25678	9861.0	14598.9	12368.6	13550.4	11230.2	11899.0	19665.0	22505.6	27556.8	24084
Others	12416.0	16314.0	11707.0	22140.4	34236.1	35179.4	22191.6	16491.8	31153.1	48475.0	68177.6	86742.5	96905.8
Total	188486	233081	151777	180575.5	241286.0	273256.0	249873.4	219419.9	273116.4	359216.1	448461.5	578726.4	584448.6
Gross domestic product	720731	948056	913345	1079346	1299991	1404669	1465198	1586915	1988544	2385367	2983882	3560596	4080200***

The data are presented with consideration of the temporary occupied territory of the Crimean Autonomous Republic, Sevastopol city, and for the period of 2014-2019 without the area of the temporary occupied territories in Donetsk and Luhansk region. **By the methodology of SNC 2008. * The forecasted GDP for 2019, the expected not final indicator. Source: statistical information of the official website of the State Statistic Service of Ukraine.*

Capital investment in the economy of Ukraine by the kinds of economic activity in the period of 2007-2019 (Fig. 1).

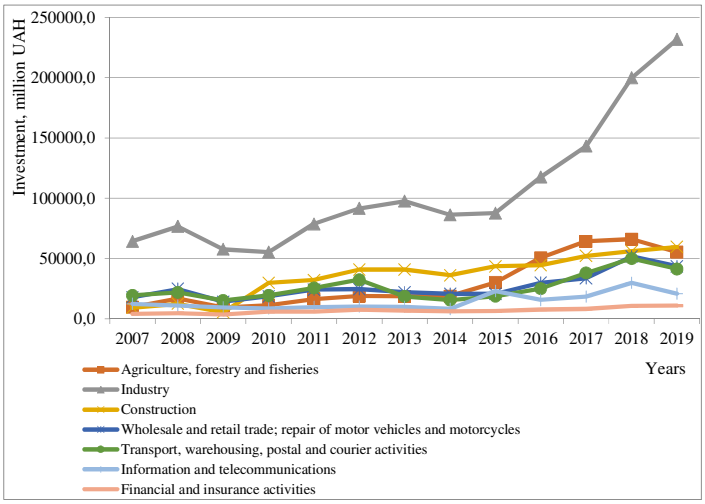


Fig. 1: Capital investment in the economy of Ukraine by the kinds of economic activity in the period of 2007-2019.

Source: developed by the authors.

Using the MS Office Excel, the authors of the work have got a linear multi-factorial equation of regression:

$$Y = - 93517{,}720 + 19{,}036\ x_1 + 13{,}913\ x_2 + 3{,}328\ x_3 - 31{,}469\ x_4 - 5{,}815\ x_5 + 12{,}911\ x_6 + 89{,}735\ x_7$$

The presented equation confirms that the impact of 7 factors on the efficient index will be manifested like:

1) investments in agriculture, forestry and fisheries of Ukraine, x_1 – in case the noted index increases by 1 million UAH, the gross domestic product will increase by 19.036 million UAH.
2) investments in industry, x_2 – in case the mentioned factor increases by 1 million UAH, the gross domestic product will increase by 13.913 million UAH.
3) investments in construction, x_3 – in case the mentioned factor increases by 1 million UAH, the gross domestic product will increase by 3.328 million UAH.
4) investments in wholesale and retail trade; repair of motor vehicles and motorcycles, x_4– in case the mentioned factor increases by 1 million UAH, the gross domestic product will decrease by 31.469 million UAH.

5) investments in transport, warehousing, postal and courier activities, x_5– in case the mentioned factor increases by 1 million UAH, the gross domestic product will decrease by 5.815 million UAH.

6) investments in information and telecommunications, x_6; – in case the mentioned factor increases by 1 million UAH, the gross domestic product will increase by 12.911 million UAH.

7) investments in financial and insurance activities, x_7. – in case the mentioned factor increases by 1 million UAH, the gross domestic product will increase by 89.735 million UAH.

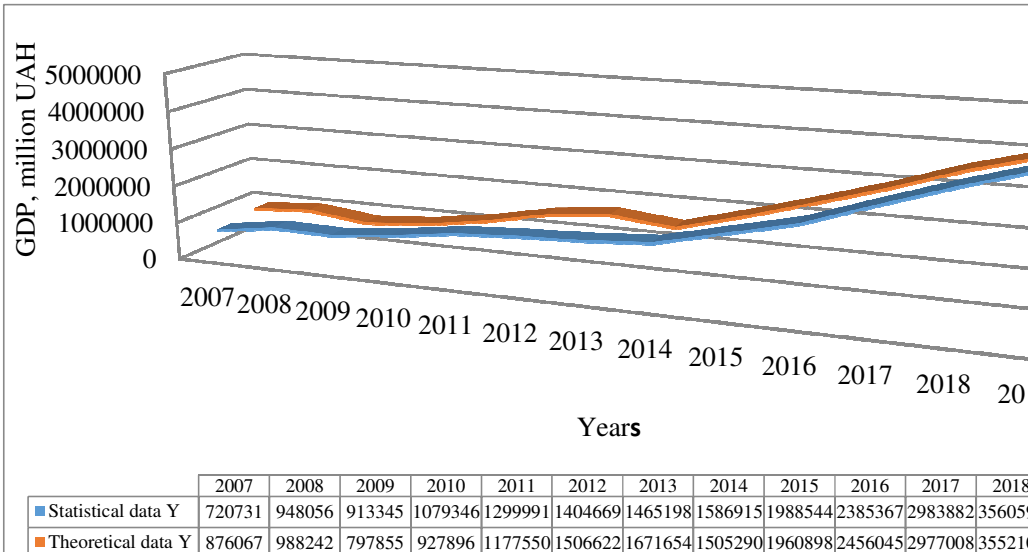
The theoretical values of the efficient index Y, i.e. the gross domestic index of Ukraine and its balances are demonstrated in the Table 2.

Table 2: Theoretical value of the efficient index Y, i.e. the gross domestic index of Ukraine and its balances

Observation	Theoretical value Y	Balances	Standard balances
1	876067.359	-155336.359	-1.407
2	988242.070	-40186.070	-0.364
3	797854.530	115490.470	1.046
4	927895.948	151450.052	1.372
5	1177549.723	122441.277	1.109
6	1506621.543	-101952.543	-0.924
7	1671653.861	-206455.861	-1.870
8	1505290.048	81624.952	0.739
9	1960897.913	27646.087	0.250
10	2456044.910	-70677.910	-0.640
11	2977008.492	6873.508	0.062
12	3552106.826	8489.174	0.077
13	4019606.776	60593.224	0.549

Source: composed by the authors

The graphic interpretation of the results of the regression analysis of the gross domestic product of Ukraine is presented by the Fig. 2



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Statistical data Y	720731	948056	913345	1079346	1299991	1404669	1465198	1586915	1988544	2385367	2983882	35605
Theoretical data Y	876067	988242	797855	927896	1177550	1506622	1671654	1505290	1960898	2456045	2977008	35521

Fig. 2: The graphic interpretation of the results of the regression analysis of the GDP of Ukraine in 2007-2019.

Source: composed by the authors

The obtained results of the regression statistics are presented in the Table 3.

Table 3: Coefficients of density of the relation between factorial and efficient features

Regression statistics	
Multiple R	0.994671429
R-square	0.989371251
Standard R-square	0.974491003
Standard deviation	171022.1255
Observation	13

Source: composed by the authors

The value of the coefficient of multiple correlation R features the quality of the multi-factorial model. Referring to the obtained calculations, the coefficient accounts for R = 0.994671429, confirming a high correlation of the model. It substantiates a close relation between the factorial and efficient features, i.e. capital investment in the economy of Ukraine by the kinds of economic activity and the GDP of the country. The value of R-square, i.e. a multiple coefficient of determination, argues the coherence of initial data and regression model, because its value is maximum approaching the figure 1 and accounts for R^2 = 0.989371251. The linear multi-factorial regression explains 98.94% of variation. It confirms adequacy of the choice of the studied factors of the model. Variation of the value of the gross domestic product of Ukraine is by 98.94% caused by the factors like capital investment by the kinds of economic activity, which are included in the correlation-regression model. The standard R-square = 0.974491003 proves high accuracy of approximation.

The obtained results of the dispersive analysis are composed in the Table 4.

Table 4: The indicators of credibility of the multi-factorial regression model

	Degrees of freedom df	SS Sum of Squares	MS Mean Square	Fisher F-test	Significance F
Regression	7	1.36129E+13	1.9447E+12	66.48889457	0.000124155
Balances	5	1.46243E+11	29248567398		
Total	12	1.37592E+13			

Source: composed by the authors

Examination of the relation essentiality according to the F-test: 66.48889457 > 3.367898748 under the significance level a = 0.1 and figures of the degrees of freedom $k_1 = 7$, $k_2 = 5$. Thus, the relation between the studied features, included in the multi-factorial regression model, is essential and non-spontaneous.

Statistical estimates of the values of the coefficients of multi-factorial regression (Table 5)

Table 5: Statistical estimates of the values of the coefficients of multi-factorial regression

Indicators	**Coefficients**		**Standard deviation S**	**Lower limit 90.0%**	**Upper limit 90.0%**
Efficient feature Y	-93517.720		351079.282	-800959.4559	613924.0165
Variable X_1	19.036		7.825218636	3.267424061	34.80381223
Variable X_2	13.913		3.850821515	6.152917343	21.6721006
Variable X_3	3.328		17.39107855	-31.71622569	38.3715034
Variable X_4	-31.469		26.94565932	-85.76592425	22.82768972
Variable X_5	-5.815		13.84578455	-33.71444985	22.08540143
Variable X_6	12.911		13.3797286	-14.0493909	39.8722098
Variable X_7	89.735		223.9244502	-361.4831235	540.9540748

Source: composed by the authors

We use the Student t-test to assess the significance of the multiple regression equation parameters. The statistical significance of the parameters means their difference from zero with a high probability. The actual value of the t-criterion for the regression parameter a1 = 2.432598887; for the regression parameter a2 = 3.612867779. The tabular value of the t-criterion for df = 5 and the significance level a = 0.1 is 2.01, therefore, the studied regression parameters are statistically significant.

At the current stage, there is a strong tendency to growth of the gross domestic product of Ukraine. The recent six years are characterized by a sustainable rapid growth of that index. It is confirmed by the analysis and forecast, conducted in the research progress, concerning the tendencies of the impact of capital investment in the economy on the development of the GDP of Ukraine.

The forecast of the dynamics of capital investment in the economy during the future five periods is made by applying the functions of TENDENCY and GROWTH in MS Office Excel. The function TENDENCY performs a linear approximation by the least square method. The function GROWTH is based on performance of an exponential trend. The optimistic and pessimistic dynamics of the forecasted indices of capital investment by the kinds of activity are presented in the table (Table 6).

Table 6: The forecast of the dynamics of capital investment in the economy of Ukraine for the period of 2020-2024

Indicators. million UAH	Forecast variant	Years				
		2020	2021	2022	2023	2024
Agriculture, forestry and fisheries	optimistic	76657.3	90782.2	107509.8	127319.7	150779.7
	pessimistic	63721.7	68583.6	73445.5	78307.4	83169.4
Industry	optimistic	197529.2	218718.2	242180.1	268158.8	296924.1
	pessimistic	190031.3	201919.3	213807.4	225695.4	237583.4
Construction	optimistic	91453.0	107611.3	126624.6	148997.2	175322.6
	pessimistic	65185.0	69419.8	73654.7	77889.6	82124.5
Wholesale and retail trade; repair of motor vehicles and motorcycles	optimistic	41997.2	45236.6	48725.9	52484.3	56532.6
	pessimistic	41706.2	43859.5	46012.7	48166.0	50319.3
Transport, warehousing, postal and courier activities	optimistic	38453.1	41041.7	43804.5	46753.3	49900.7
	pessimistic	39745.5	41680.9	43616.3	45551.8	47487.2
Information and telecommunications	optimistic	22720.4	24559.8	26548.1	28697.5	31020.8
	pessimistic	23146.8	24398.1	25649.4	26900.7	28152.1
Financial and insurance activities	optimistic	11104.4	12006.7	12982.3	14037.3	15177.9
	pessimistic	10397.2	10916.3	11435.3	11954.4	12473.4

Source: composed by the authors

Graphic visualization of pessimistic forecasting of capital investments dynamics in the Ukrainian economy by the kinds of activity for 4 future periods (Fig. 3)

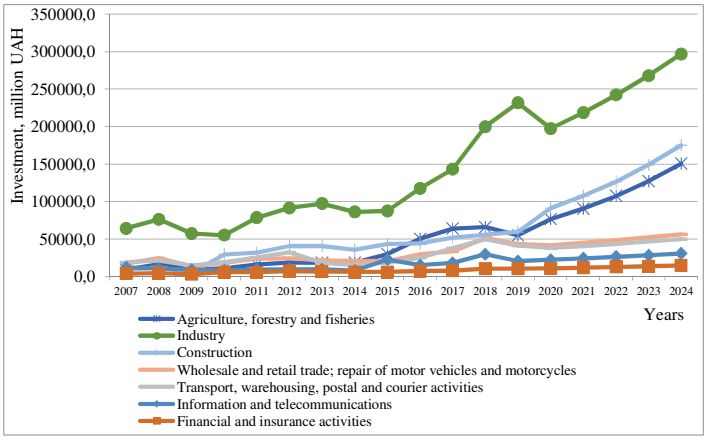


Fig. 3: The pessimistic forecast of the capital investment dynamics in the Ukrainian economy by the kinds of activity for the period of 2020-2024.

Source: composed by the authors

Graphical interpretation of the optimistic forecast of investment dynamics in the economy of Ukraine for the period 2020-2024. (Fig. 4)

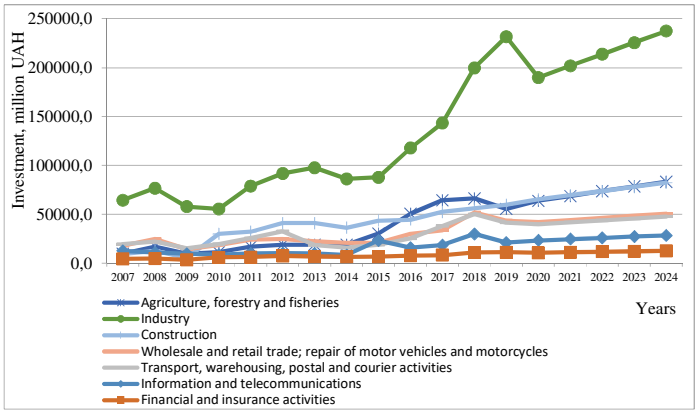


Fig. 4: The optimistic forecast of the capital investment dynamics in the Ukrainian economy by the kinds of activity for the period of 2020-2024.

Source: composed by the authors

The researchers expect a positive dynamics of the indicators of capital investment in the economy of Ukraine.

The authors of the work have composed a forecast of the tendencies in the change of the figure of Ukraine's GDP in the period of 2020-2024 with two possible options of development, particularly pessimistic and optimistic (Table 7). To make the forecast of future indicators, the following equation of regression is used:

$$Y = - 93517.720 + 19.036\ x_1 + 13.913\ x_2 + 3.328\ x_3 - 31.469\ x_4 - 5.815\ x_5 + 12.911\ x_6 + 89.735\ x_7$$

Table 7: The forecast of the impact of capital investment in the economy of Ukraine by the kinds of economic activity on the development of the GDP of Ukraine for the period of 2020-2024.

Years	Gross domestic product of Ukraine. million UAH	
	Optimistic forecast	Pessimistic forecast
2020	4162754.706	3668487.227
2021	4767921.154	3924239.908
2022	5463379.742	4179992.589
2023	6263345.673	4435745.269
2024	7184381.373	4691497.95

Source: composed by the authors

Optimistic and pessimistic forecast of the impact of capital investment by the kinds of economic activity on the development of the gross domestic product of Ukraine for the future five periods is presented by the figure (Fig. 5).

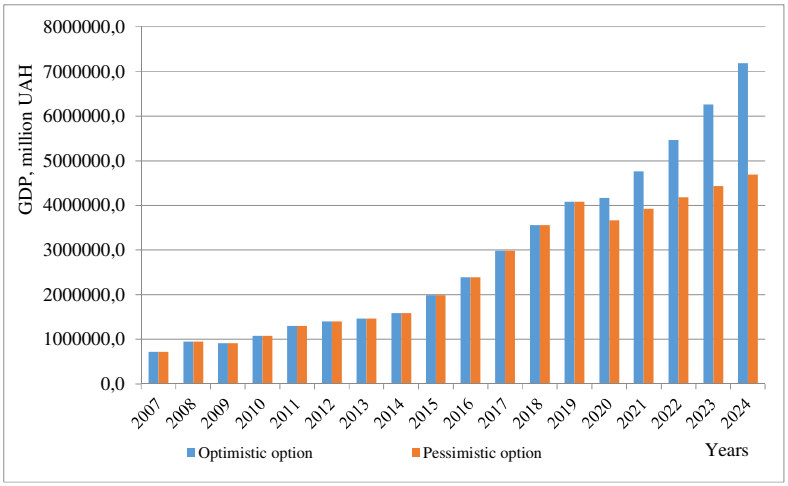


Fig. 5: The forecast of the dynamics of the GDP of Ukraine with consideration of the impact of capital investment for the period of 2020-2024.

Source: composed by the authors

Conclusions

Having analyzed the GDP dynamics in 2007-2019, it is worth noting that it was characterized by a positive dynamics in the studied period. However, the rate of the GDP growth in 2012-2014 was much slower than in 2015-2018, when the rate of growth accounted for almost 22% on average, as compared to the previous periods, although it was the start of the military conflict in 2014. It is explained by the impact of general macroeconomic tendencies at the global markets, characterized by recession conditions. Considering the significant impact of investments on the volume of the GDP of the country, the government of Ukraine is focused on attraction of more financial funds to those branches of the economy, which are capable to generate a higher growth of production and services. Analyzing the general tendencies of the volume of capital investment, it was marked that agriculture, industry, construction, transport services, wholesaling and logistic services were the priority branches the investors were interested. Such fields as information services and telecommunications, as well as financial and insurance activities were not much attractive for investors. Nevertheless, the presented regression model demonstrates that investment in those two fields of the economy will also secure relatively high growth of the GDP per 1 million UAH of invested funds, particularly 12.911 and 89.735 respectively. Thus, it is expedient to make stress on the attraction of investments in those branches.

References

- Borshch L.M., Herasymova S.V. (2007), 'Investing: theory and practice: manual'. Kyiv: Znannia.
- Bochko O.Yu., Podvalna H.V., Kuziak V.V. (2018), 'Strategic supply for the planning of investment attractiveness of an enterprise', *Scientific reports of Lviv University of Business and Law*, Lviv Liha-pres. Issue 20. P. 40-45.
- Bureau of Economic Analysis. Reference book of NIPA: concepts and methods of national accounts of earnings and products of the USA, (2019), [Online], [Retrieved December 19, 2019] URL: https://apps.bea.gov/iTable/index_nipa.cfm
- Hitman L.G., Jonk M.D. (1997). 'Fundamentals of investing' [Text]: translated from English. Moscow: Delo.
- 'Estimating the volume of annual investment, Ukraine has first reached the second position among the countries cooperating with the EBRD after the many-year cooperation' (2019), [Online], [Retrieved January 14, 2020], https://mof.gov.ua/uk/news/za_obsiagami_richnikh_investitsii_ukraina_vpershe_za_bagato_rokiv_spivpratsi_viishla_na_druge_mistse_sered_krain_z_iakimi_pratsiuie_iebrr-1988.
- Maiorova T.V. (2009), 'Investment activity', Kyiv: Center of educational literature.
- Masse P. (1971), 'Criteria and methods of the optimal determination of investing', Moscow.
- Peresada A.L. (2002), 'Management of the investing process', Kyiv: Libra.
- Reverchuk S.K., Vovchak O.D., Kubiv S.I. (2004), 'Institutional investology', monograph, Kyiv: Atika.'Ukraine has reached the 3rd position by the investment in the GDP among the developing countries', (2019), [Online], [Retrieved January 14, 2020], https://day.kyiv.ua/uk/news/240519-ukrayina-zaynyala-3-misce-za-investyciyamy-do-vvp-sered-krayin-shcho-rozvyvayutsya
- Kharuk V.A. (2013), 'Investment as an economic category: theoretical aspect' [Electronic resource], Materials of the 2nd scientific-practical Internet conference "Integral financial-

economic direction of Ukraine's development". P. 128-130. Available at: http://www.lac.lviv.ua/akademija/novini/novinadetalnishe/article/ii-naukovo-praktichna-internet-konferencija-integraci.

- 'What is told in Davos about the prospects of investing in the economy of Ukraine', (2020), [Online], [Retrieved January 14, 2020], Available at: https://inventure.com.ua/analytics/articles/otgoloski-investicij-v-ukrainu-iz-davosa

- Sharp U.F., Bailey H.G. (1997), 'Investment', Moscow: Infra. 10.

- Mehic, E., Silajdzic, S. and Babic-Hodovic V. (2013),'The Impact of FDI on Economic Growth: Some Evidence from Southeast Europe,' Emerging Market Finance & Trade. Vol 49. Supplement 1. P. 5—20

- Organisation for Economic co-operation and Development (OECD), (2008), Benchmark Definition of foreign Direct Investment: (4thed).

- Pawlowski G., Bochko O., Sytar L., Noga I., Pavlenchyk A, Zhavnerchyk O., Henyk O. and Hladun V. (2019), 'Evaluation of the Development Strategy of the Ukrainian Financial Sector', International Business Information Management Conference (34th IBIMA) Madrid, Spain 13-14 November, P. 9969-9975 https://ibima.org/accepted-paper/evaluation-of-the-development-strategy-of-the-ukrainian-financial-sector.

- Reinhart, Carmen M., et Kenneth S. Rogoff (2010), 'Growth in a time of debt', American Economic Review, 100(2).

Vocationally Active Students Facing the Need for Mentor Support

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Abstract

The aim of this paper is to determine whether people who continue their education and work at the same time show the need for support from a mentor, located in their current workplace (organization). A mentor is defined as an older and more experienced employee who, in a process of intensive interpersonal exchange, provides the protégé (mentee) with support, guidelines and feedback on professional and personal development plans. We conducted the survey in a group of 421 respondents using a survey questionnaire in 2019. Based on the results obtained, it can be concluded that only one in ten respondents felt the need for support from the mentor: men more often than women declared strong attitudes in this respect; in terms of generational differences, the greatest demand was indicated by representatives of Generation Y; differences in the declared level of demand were also revealed depending on the type of secondary school completed by the respondents.

Keywords: Mentoring, Corporate Mentoring, Mentor, Mentee, Graduate, Generations.

Introduction

Mentoring has been used for centuries; it means the relationship between master and student, aimed at developing and discovering the possibilities of the mentee. It is based on inspiration, stimulation and leadership. It consists in the student getting to know himself or herself, his or her abilities, developing self-awareness and gaining confidence in their skills thanks to the appropriate master's efforts. An important goal of mentoring is to eliminate potential fears (concerns) of the mentee in following the path of self-actualization. The mentor helps the mentee choose the right path of development, by transferring his or her experience and knowledge.

In corporate and industry mentoring, the mentor helps the employee to smoothly pass an adaptation period in the new company and achieve high work efficiency faster. As a result, they increase job satisfaction and motivation (Carter & Youssef-Morgan, 2019). Putting a new employee in the care of a mentor significantly weakens the effect of uncertainty and uncomfortable situation of "being new", improves commitment and loyalty to the company.

Studies have shown a number of benefits of a mentoring relationship for both the mentee and the mentor (DuBois et al., 2005; Rhodes et al., 2006; St-Jean, 2009). An important factor for the success of this relationship is the willingness and attitudes of the mentee himself or herself, since the quality and quantity of acquired knowledge depends on him or her; it can be assumed that feeling the need for support from the mentor is a key factor for the effectiveness of the mentoring relationship (Menges, 2016; Kraiger et al., 2019; Allen & Lentz, 2005; Megginson et al., 2008).

The aim of this paper is to examine whether vocationally active students show the need for support from a mentor.

In order to achieve this aim, we used:

- analysis of the related literature;
- a survey of 421 respondents.

Literature Review

The literature describes many criteria for the classification of mentoring. The most frequently emphasized ones include (Baran, 2018, p. 77-86; Allen & Poteet, 1999, p. 48-59; Strom & Strom, 2011, p. 4):

- the degree of the formalization of mentoring,
- the number of people taking part in mentoring,
- forms of meetings, bearing in mind the technological systems used,
- the nature of the relationship between the master and the protégé,
- the direction of links between members,
- the needs of the protégé,
- the kind of help that a mentor offers.

According to the level of formalization, there are the following types of mentoring:

- Casual mentoring – the meeting between master and student (protégé) occurs spontaneously, not necessarily in professional circumstances, and is episodic.
- Informal mentoring – free mentoring of a long-term and regular nature, but still unplanned and without any specific objectives; sometimes a mentoring relationship is established as a result of business contacts. The informal mentoring is based on the trust of both parties, i.e. the mentor and the mentee. It is traditional in nature and there is no need to conclude contracts or keep records. The relationship of people in this type of mentoring is based on mutual cooperation and is often accompanied by a willingness to devote time to the other party (Janssen et al., 2016; Garvey & Alred, 2001).
- Facilitated mentoring – mentoring taking place as part of a specific mentoring programme with a coordinator who combines mentors and mentees in pairs. The facilitated mentoring is used in accordance with the general principles established by the organization, has general objectives and a time frame, and is subject to the evaluation. It is also sometimes certified.
- Non-facilitated mentoring – informal mentoring set in a professional or institutional context with a structure agreed upon by the mentor and his or her mentee (e.g. frequency of meetings, objectives), but not formalized within the mentoring program (Benabou & Benabou, 1999).

Considering the form of meetings, there is direct and virtual mentoring. The former is based on a relationship in which mentor and protégé meet in a previously set physical location and discuss problems or doubts face to face. The virtual mentoring manifests itself in greater practicability, for those who for various reasons are unable to appear in a place more convenient for the mentor. It is certainly a cheaper form of communication, but due to the lack of direct meetings, the relationship between the parties may not be as good as the first type of mentoring. This is the cause of reduced trust

and distance. This type of mentoring also uses a number of technological facilities such as Skype, blogs and Internet forums.

The nature of the relationship between the mentor and the mentee justifies the division of mentoring into further subgroups i.e.:

- Peer mentoring (Collings et al., 2014; Hill & Reddy, 2007): this is a cooperation that does not reveal the superiority of one party of mentoring over the other. Its main objective is to create an atmosphere that will enable mutual support and willingness to help people in similar positions. It mainly covers managers and employees who start their career path. They should be guided in their actions by the willingness to support their colleagues. However, this relationship may lead to a risk of the difficulty in introducing a colleague to a higher position. If everyone wants to treat each other as equals, it is not easy to decide on promotions (Luecke, 2006, p. 183-189).

- Situational mentoring: it means the sudden support of a mentor at a specific moment when the mentee needs it. It is characterized by a short duration because the problem is solved on an ongoing basis.

- Authority mentoring, based on the mentor's primary influence over the mentor. A personal development program is developed for the subordinate. The program contains the expectations for the work the mentor is responsible for. The mentor is responsible for guiding the mentee on current assignments.

- Network mentoring – it consists in the activity of a greater number of mentors who provide help and advice to protégés. It offers a greater scope for action and enables the problem to be solved more quickly due to the possibility to use different tips from different mentors. It is considered to be a very evolutionary model (Luecke, 2006, p. 189).

Mentoring, understood as a system of care of an employee at different stages of his or her professional development and career in the enterprise (organization) from the moment of employment to reaching the top positions, is called corporate mentoring. It represents a transactional arrangement in which values are exchanged between the parties, leading to the creation of value added for the stakeholders, i.e. employees (mentor, mentee), the organization as a whole, and the broadly understood environment (Mazur, 2008).

The benefits that the protégés can derive from a mentoring relationship, regardless of its type, include (Zajączkowska et al., 2016, p. 15):

- access to the mentor's know-how and obtaining informal knowledge beyond the standard knowledge that can be acquired through studies, courses, etc.;

- the opportunity to use the mentor's network of contacts;

- the opportunity to consult and verify ideas and plans;

- an insight into the various options for an individual career path,

- discovering one's own potential, broadening the awareness of himself or herself and their environment (increasing self-awareness);

- identify and develop strengths and reduce the effect of weaknesses on actions taken;

- inspiration, stimulating curiosity and willingness to seek knowledge, and creativity and entrepreneurship (Pietroń-Pyszczek & Golej, 2018);

- increased motivation to work and develop;
- developing social competences.

A mentor is most often characterized as an experienced, highly qualified person, being a teacher for his or her protégés, willing to share his knowledge with someone less experienced, in a relationship characterized by mutual trust (Parsloe & Wray, 2002, p. 78). A mentor is a person who, thanks to his or her competence, experience in a given field, high personal culture and ethical attitude, is a role model for others. Having significant professional accomplishments, the mentor enjoys widespread respect and recognition in the organization, and is an authority, especially for his or her younger colleagues (Baran, 2016, p. 137–138). The main goal of the mentor is to support the personal and professional development of the mentee, to support him or her in the pursuit of becoming the person they want to become (Garvey, 2017, p. 21–24).

The role of a mentor is certainly not the easiest one. The mentor must perform three key functions: a collaborator, educator and role model. D. Clutterbuck (2014, p. 48) is the originator of a model in which he specified more functions of a mentor.

The mentor can also play ab negative role. Negative mentoring experiences in the enterprise are noted in various studies; these problems include (Klasen and Clutterbuck, 2002; Baran, 2016, p. 136):

- Promotion of elitism;
- Exclusion of people on the basis of social bias;
- Manipulation;
- Excessive commitment of mentee to mentor resulting in abdependent relationship;
- Transfer of excessive obligations to mentee;
- Unethical behaviour (sometimes the behavior of the mentor can also be seen as deceitful, sabotaging and harassing);
- No positive performance changes;
- Lack of trust between mentor and mentee;
- Sexual/racial/disability discrimination.

Methodology

An auditorium questionnaire was chosen as a research technique and filled in by respondents on their own in a specific place and time, in the presence of the interviewer. The questionnaire was anonymous. The survey was responded by persons currently studying at the second-cycle studies (the graduates obtain a master's degree). In the introduction to the survey, we included a definition of mentoring, i.e: “mentoring - a developmental relationship between two people, a more experienced older employee (mentor) and a less experienced younger employee (protégé, mentee). Mentor - in a process of intensive interpersonal exchange, a mentor provides the protégés with support, guidance and feedback on career plans and personal development.” Respondents indicated their gender, age, type of secondary school completed (technical or comprehensive secondary school) field of first-cycle studies. There were 421 respondents in the survey carried out in 2019. In Poland, graduates from comprehensive or technical secondary schools are eligible to start university studies after obtaining the secondary school-leaving certificate. A technical secondary school is considered to be a

vocational school whose graduate receives the vocational title of "technician", e.g. an electrician technician.

Results and Discussion

As can be seen in Fig. 1, the answers of all respondents concerning the need for mentoring in the realization of professional careers were distributed in a similar way. Of them, 12% of the respondents declared that the realization of their professional careers did not require this support and 12% answered affirmatively. However, it can be noted that the respondents more often indicated the “Rather yes” (40%) than “No” answers (36%).

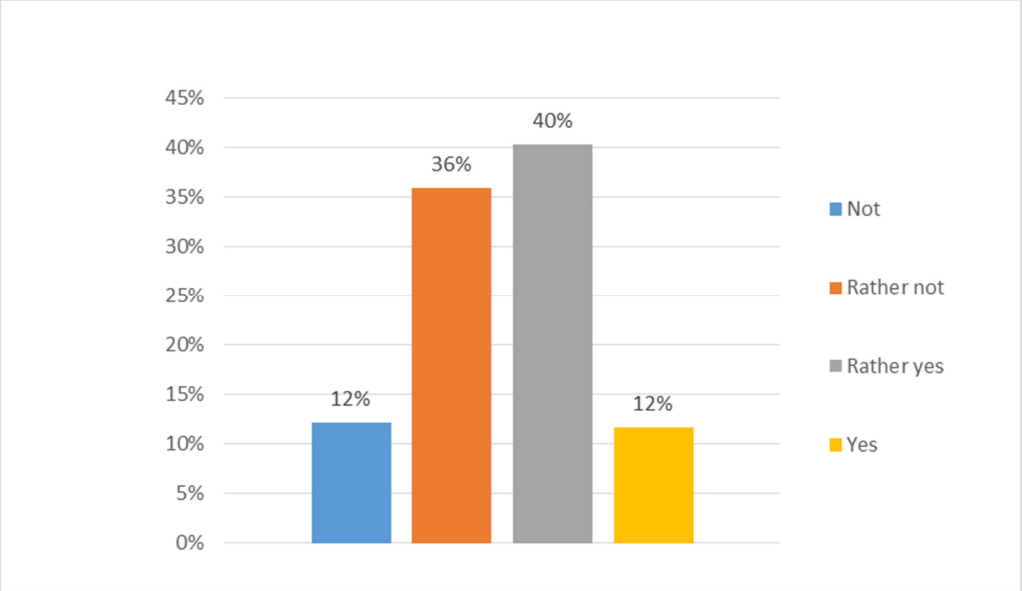

Fig. 1: Distribution of respondents' answers to the question "Does your professional career require support from a mentor?”

Source: author's own elaboration.

Men more often than women declared their mentoring needs (Figure 2), with 14% and 10%, respectively. In the overall assessment (“Yes” and “Rather yes” answers), men showed less needs in this respect (48%) than women (55%). Interestingly, 37% of the female respondents indicated that they rather did not need this support. It seems that this may be due to the growing awareness of women in terms of e.g. providing equal opportunities in business and economy.

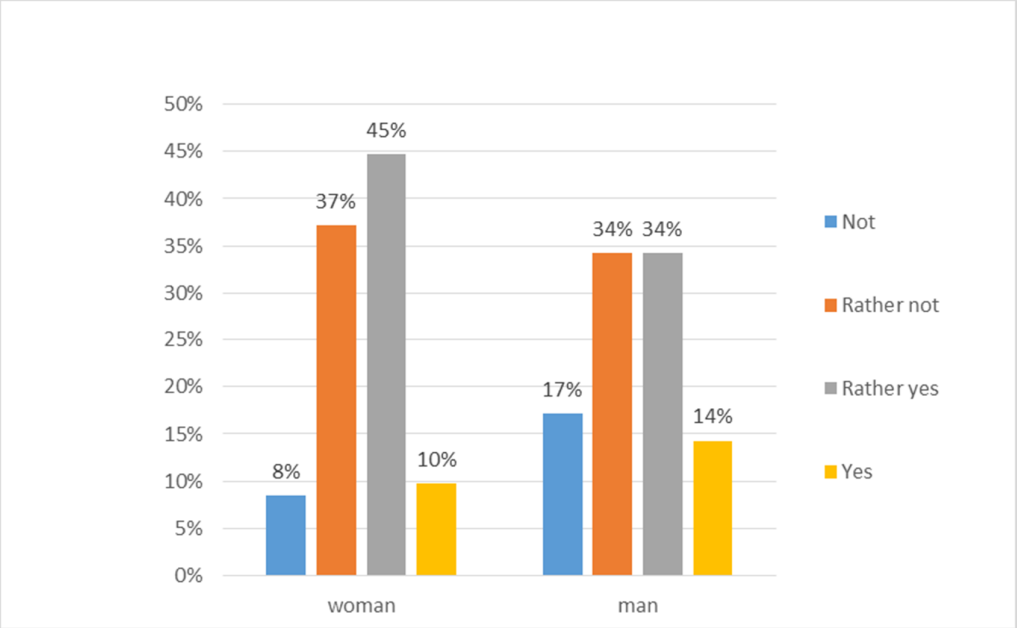

Fig. 2: Distribution of the answers to the question "Does your professional career require support from a mentor?" by gender of respondents

Source: author's own elaboration.

As shown in Fig. 3, the greatest demand for career support by mentors was shown by respondents of Generation Y (17% for "Yes", 39% for "Rather yes") and representatives of Generation Z (12% and 43%, respectively). We assumed Generation X is born in 1970-1983; Y (1984-1992); Z (1993 – upwards) (Lipka, 2017).This seems to be due to the personality traits typical of each generation. For example, it is often indicated that the members of Generation Z often show demanding attitudes, have difficulties with logical thinking and concentration, and consequently, they become independent very late. Furthermore, Generation Y shows the need for independence, but accompanied by someone who could be a mentor for them, and Generation X does everything independently, using the trial-and-error approach (Benson & Brown 2011; Smolbik-Jęczmień, 2013; Lipka, 2017).

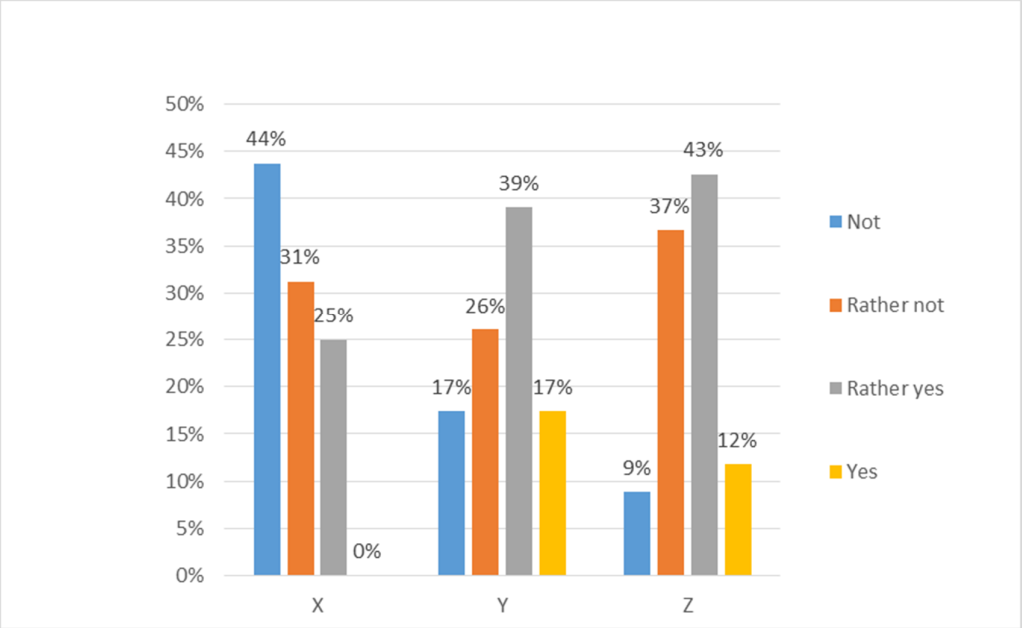

Fig. 3: Distribution of the answers to the question "Does your professional career require support from a mentor?" by being a member of a specific generation

Source: author's own elaboration.

The demand for mentoring in Generations Y and Z was also analysed by gender of respondents. In relation to female respondents, the following pattern was observed: women from Generation Y were more likely to say that they did not need mentoring support (53%) than representatives of generation Z (43%). The situation was different in the group of men. Men from Generation Y were more likely to declare that they needed a mentor (62%) than the members of Generation Z (50%).

Respondents who graduated from comprehensive secondary schools (Fig. 4) more often declared the need for support from a mentor for their professional careers (13% of "Yes", 41% of "Rather yes" replies) rather than those who graduated from technical secondary school. This may be due to the specifics of teaching in comprehensive secondary schools and technical secondary schools. The former schools prepare students for the secondary school final examinations, while the latter educate additionally for the examination confirming professional qualifications, which seems to guide young people to choose a particular profession, and at the same time to be more confident.

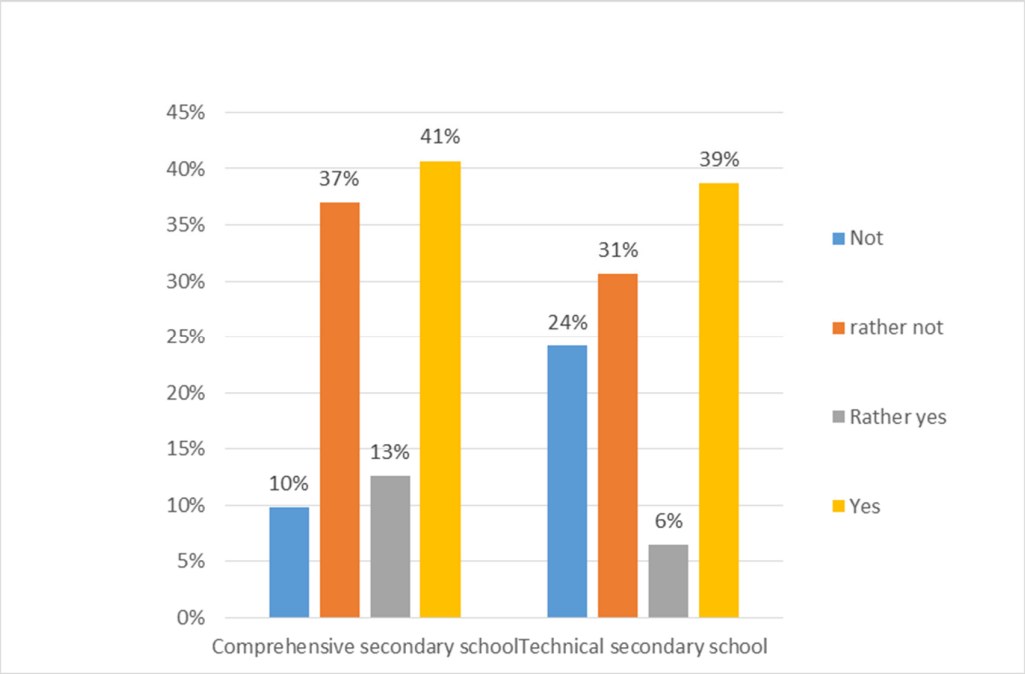

Fig. 4: Distribution of the answers to the question "Does your professional career require support from a mentor?" by the profile of the completed secondary school

Source: author's own elaboration.

As shown in Fig. 5, the profile of the university does not significantly differentiate the expectations of respondents in terms of support from the mentor. 50% of the respondents studying at economic universities declared the need in this respect and only 3% more respondents did so at technical universities.

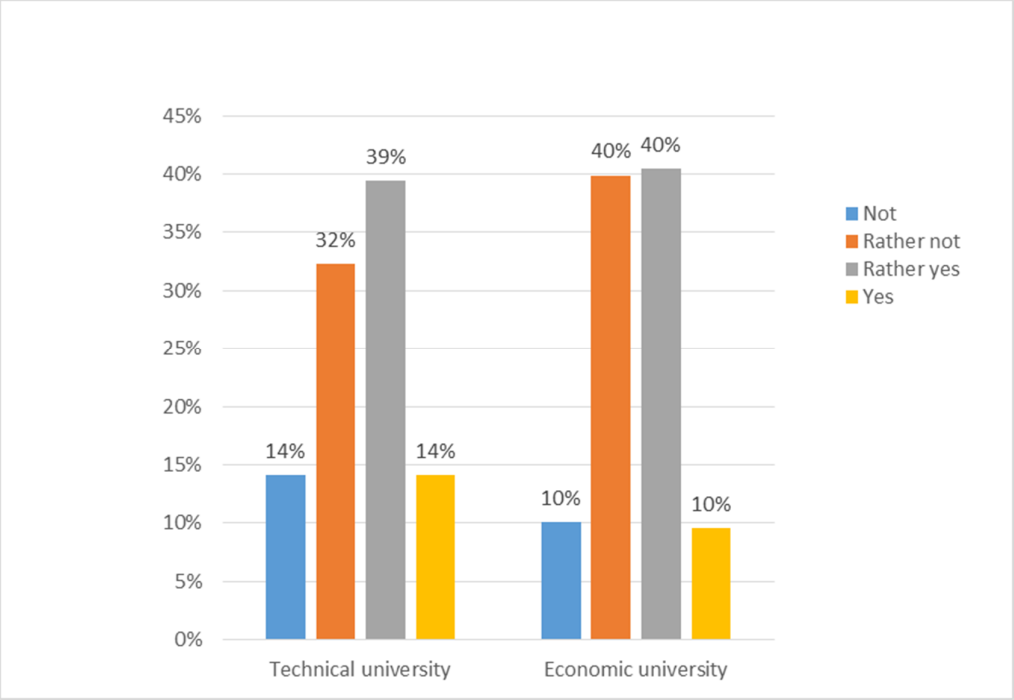

Fig. 5: Distribution of the answers to the question "Does your professional career require support from a mentor?" by the profile of the university

Source: author's own elaboration.

Analysis of the impact of a completed field of study on the needs of mentoring (Fig. 6) reveals, surprisingly, the high number of indications of respondents graduating from the courses related to technology, industry and construction (52% of "Yes" and "Rather yes"). This group consisted of graduates from the majors related to power engineering or construction. Respondents studying the natural sciences showed the least demand in these terms (33% of "Yes" and "Rather yes"). Among them there were mainly graduates of chemical, biochemical and biomedical studies. The same percentage of responses were recorded among the students majoring in the fields from the group of business and administration (e.g. finance, accounting, management and production engineering): 50% of the respondents considered that they needed the support of a mentor in the realization of their careers, whereas another 50% did not express such a need. The group "Others" includes graduates from fields related to education, tourism and recreation, agriculture, and philology. The greatest demand for mentoring was recorded in this group (65% of "Yes" and "Rather yes" in total).

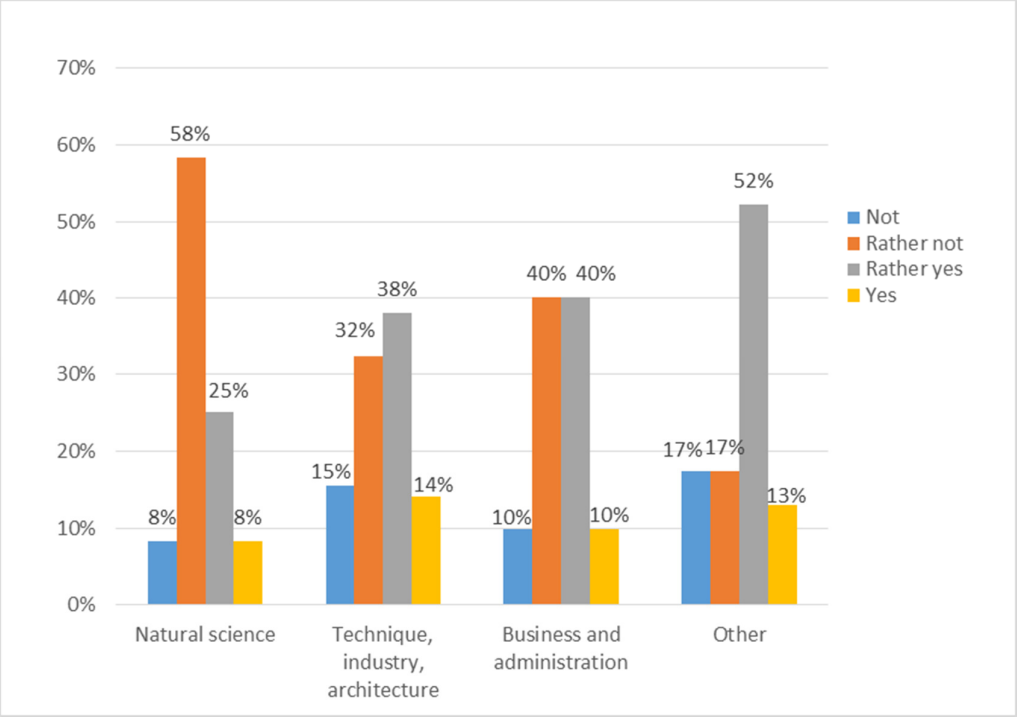

Fig. 6: Distribution of the answers to the question "Does your professional career require support from a mentor?" by the study major of respondents

Source: author's own elaboration.

Among men, the highest demand for mentoring was declared by graduates of faculties majoring in natural sciences (100%), while the lowest - in those studying business and administration (47%). In the group of women, the lowest demand for mentoring support was found for natural sciences (20%), while for other university majors, this ranged between 50% and 60%.

Conclusion

There is a widespread belief in the literature that the precondition for the success of mentoring programmes is the readiness of the potential mentee to communicate openly and his or her conviction (belief) about the high value of the potential mentor's competence. Against this background, the results obtained in the study seem to be worrying as only 12% of the respondents explicitly declared the need for support from the mentor. Superiors should check the quality of mentoring programs in their companies and effectively promote them. Our results also show the need to verify mentoring programs at universities.

We found that further research should focus on searching for links between the lack of the need for support from the mentor and the nature of the mentoring relationship experienced by the respondents, respondents' awareness of the potential benefits of participating in mentoring programs, assessment of the competences of candidates for mentors indicated in the respondent's enterprise, and self-assessed competences acquired by the respondents during their studies. Furthermore, assuming that the lack of interest in the help of a mentor may be due to the high self-assessment of competences, we considered the answer to the question whether people who continue their education and work show the need to take on the role of a mentor in their workplace (organization) as an interesting research problem.

Acknowledgment

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References

- Allen, T. D., Day, R. and Lentz, E. (2005), 'The role of interpersonal comfort in mentoring relationships,' *Journal of Career Development*, 31(3), 155–169.
- Allen, T. D. and Poteet, M. L. (1999), 'Developing effective mentoring relationships. strategies from the mentor's viewpoint,' *The Career Development Quarterly*, 48(1), 59–73.
- Baran, M. (2016), 'The Mentor's Role Within the Company,' *Studia i Materiały WZ UW*, 2 (21), part 1, 132–142.
- Baran, M. (2018). Uwarunkowania Skuteczności Mentoringu w Organizacji, PWN, Warszawa.
- Benabou, Ch. and Benabou, R. (1999), 'Establishing a formal mentoring program for organizational success,' *National Productivity Review*, 2, 7–14.
- Benson, J. and Brown, M. (2011), 'Generations at work: are there differences and do they matter?,' *The International Journal of Human Resource Management*, 22(9), 1843–1865.
- Carter, J. W. and Youssef-Morgan, C. M. (2019), 'The positive psychology of mentoring: A longitudinal analysis of psychological capital development and performance in a formal mentoring program,' *Human Resource Development Quarterly*, *30*(3), 383–405.
- Clutterbuck, D. (2014), Everyone Needs a Mentor*,* The Chartered Institute of Personnel & Development, Wimbledon.
- Collings, R., Swenson, V. and Watkins, W. (2014), 'The impact of peer mentoring on levels of student weelbeing, integration and retention: a comparative evaluation of residential students in UK,' *Higher Education*, 68, 927–942.
- DuBois, D. L. and Silverthorn, N. (2005), 'Natural mentoring relationships and adolescent health: Evidence from a national study,' *American Journal of Public Health*, 95(3), 518–524.
- Garvey, B. (2017), 'Philosophical origins of mentoring: the critical narrative analysis, The SAGE handbook of mentoring.' D. A. Clutterbuck, F. K. Kochan, L. Lunsford, N. Dominguez and J. Haddock-Millar (eds), Los Angeles, CA: Sage, 21–24.
- Garvey, B., Alred, G.(2001), 'Mentoring and the tolerance of complexity,' *Futures*, 33, 519–530.
- Hill, R. and Reddy, P. (2007, 'Undergraduate peer mentoring: an investigation into processes, activities and outcomes,' *Psychology Learning and Teaching*, 6, 98–103.
- Janssen, S., van Vuuren, M. and de Jong, M. D. T. (2016), 'Informal Mentoring at Work: A Review and Suggestions for Future Research,' *International Journal of Management Reviews*, *18*(4), 498–517.
- Klasen, N. and Clutterbuck, D. (2002), Implementing Mentoring Schemes. A practical guide to successful programs, Routledge, London and New York.

- Kraiger, K., Finkelstein, L. M., and Varghese, L. S. (2019), ' Enacting Effective Mentoring Behaviors: Development and Initial Investigation of the Cuboid of Mentoring,' *Journal of Business and Psychology*, *34*(4), 403–424.

- Lipka, A. (2017), 'Percepcja różnic generacyjnych - interpretacje i wnioski dla kierujących kreatywnymi zespołami,' *Edukacja Ekonomistów i Menedżerów. Problemy, innowacje, projekty*, 3 (45), 141-153.

- Luecke, R. (2006), Coaching i mentoring. Jak rozwijać największe talenty i osiągać lepsze wyniki, MT Biznes, Warszawa.

- Mazur, K. (2008), Mentoring jako narzędzie kształtowania kompetencji (komunikat ze studiów nad literaturą), Kompetencje a sukces zarządzania organizacją, S. A. Witkowski and T. Listwan (eds),: Difin, Warszawa.

- Megginson D., Clutterbuck, D., Garvey, B., Stokes, P. and Garret-Harris, R. (2008), Mentoring w działaniu. Przewodnik praktyczny, Dom Wydawniczy REBIS, Poznań.

- Menges, C. (2016). Toward Improving the Effectiveness of Formal Mentoring Programs: Matching by Personality Matters. *Group and Organization Management*, 41(1), 98–129.

- Parsloe, E., and Wray, M. (2002), *Trener i mentor. Udział coachingu i mentoringu w doskonaleniu procesu uczenia się,* Oficyna Wydawnicza, Kraków.

- Pietroń-Pyszczek, A., and Golej, R. (2018), Mentoring from the perspective of developing creative competences. *Studia i Prace WNEiZ US*, 51(2), 77–86.

- Rhodes, J. E., Spencer, R., Keller, T. E., Liang, B. and Noam, G. (2006), 'A model for the influence of mentoring relationships on youth development,' *Journal of Community Psychology,* 34(6), 691–707.

- Smolbik-Jęczmień, A. (2017), *Kształtowanie własnej kariery zawodowej w kontekście wielopokoleniowości. Monografie i Opracowania,* Uniwersytet Ekonomiczny we Wrocławiu, Wroclaw.

- St-Jean, E. (2009), The role of mentoring in the learning development of the novice entrepreneur', *International Entrepreneurship and Management Journal*, 8(1), 119–140.

- Strom, P. and Strom, R. (2011), A Paradigm for Intergenerational Learning, The Oxford handbook of lifelong learning, Oxford University Press, New York.

- Zajączkowska, A., Gałusa, H. and Gotowczyc, A. (2016), Vademecum mentoringu, wiedza w pigułce, Fundacja Forum Mentorów AHA EFFECT, Gdańsk.

Optimization Model for Relocating Items in A Radio-Shuttle Compact Storage System

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Abstract

In block stacking storage systems, the warehouse management has to decide whether to apply dedicated policy and store only one item in a lane with undisturbed access to it or to apply shared policy and mix different items in a lane. In the former case, the storage space is not utilized at as high level as in the latter one. The radio-shuttle compact storage systems which allow to automatically store and retrieve items can compromise both criteria. In such systems, a lane is divided into channels and a channel is dedicated only to one item. In this way, both: the possible number of stored items and storage space utilization is increased in contrary to traditional block stacking systems with dedicated policy. However, when the channels are quite long the increased potential of storage space can be utilized on a moderate level. The goal of this paper is the analysis of the implementation problems of shared policy in the radio-shuttle compact storage systems. First, a MILP model that minimizes the number of relocated items is presented. Then, using simulations two different layouts of the radio-shuttle system are compared. The equations for storage space utilization for the analyzed layouts are presented. The research indicates that the system efficiency is still the compromise between the accessibility to the items and storage space utilization but the space dedicated for storage can be utilized on a very high level.

Keywords: Warehousing, Dense Storage, AVS/R Systems, Unit-Load Warehouses

Introduction

The warehouse managers face up the challenge of how to effectively use the storage space without losing the accessibility to the items. There are many reasons why the storage area should be efficiently utilized: heating, cooling, lighting and ventilating a warehouse consume a lot of energy, and the firms by costs reduction can improve the financial result and obtain the social perception as environmentally friendly (Boysen et al., 2017). Besides that, the storage space near agglomeration centers is limited and more and more expensive. For this reason, the storage has to be compact and the warehouse infrastructure can be even moved underground (Kaliampakos et al., 2016).

When the storage area is limited the dense storage systems can be applied. The example of such a system is the block stacking system, where pallets with stock keeping units (SKUs) are placed very densely in the warehouse (on top of one another) in lanes on a warehouse floor. In such a system, the items can be stored in pallets, boxes, marine containers, and steel plates (Kim and Hong, 2004). The SKUs are very often placed on top of each other in stacks. Matson et al. (2014) indicate a field where the block stacking is applied: “appliances, beverages, consumer packaged goods, frozen food, intermodal shipping containers, tires, bags of potting mix and fertilizer, and construction materials, such as cinder blocks, bricks, lumber, piping, and tubing”. Two different concepts of storage policies can be adopted for block stacking: a dedicated policy and a shared policy. In a dedicated policy in a

lane only one SKU can be stored, while in a shared policy few different items can be mixed in a lane. The former concept guarantees direct access to all SKUs but the storage area is usually utilized on a moderate level. The latter one optimizes the storage area utilization with the risk of an enlarged effort for retrieving the item that is not directly available. In this case, the same SKU can be stored in different locations and lanes. The main goal while picking the ordered items is then the minimization of the number of relocated pallets that interfere the retrieving process.

The radio-shuttle compact storage systems divide lanes into channels and increase the possible number of stored SKUs without the necessity of relocating the interfering items. For layout and material flow purposes the channels are blocked together and all channels in one block have usually the same depth. In the compact radio-shuttle storage system the pallets with items are driven by the electric motor device called a shuttle. The shuttle follows the orders sent by the operator using a tablet with a Wi-Fi connection and runs on rails inside a storage channel. During the storage process, the shuttle automatically deposits the load in the first free placement location. The retrieving process can be performed by the same end of the channel or by the other end.

The inspiration for this paper was a real decision problem noticed by the Polish food industry manufacturer. Although the depth of the lanes was adapted to the production batch sizes, the problem of losing space for potential storage that guarantees the accessibility of items called honeycombing (Bartholdi and Hackman, 2017) occurred. Initially, production batches fill the whole channels, but the particular channel could not be filled again until it was completely cleared. The temporary loss of space in channels averaged on the whole storage system was quite substantial. That was the reason why the warehouse management considered a shared storage policy in a channel. In order to improve the picking process, the optimization model was discovered.

The remainder of the paper is organized as follows. In the next chapter, the literature review concerning both: dense storage and shuttle-based systems is shown. The description of the analyzed in this paper radio-shuttle storage system is the subject of chapter 3. Chapter 4 presents the mixed-integer linear programming (MILP) model for the optimal number of relocations during the picking process. The results of simulations for different layouts and numbers of picking items are included in chapter 5. The paper is concluded in chapter 6.

Literature Review

While order-picking, the main disadvantage of classical block stacking systems is that the pallets are stored on top of one another, and pallets located on the lower floor are not directly accessible. The problem of relocating blocks during the picking process has been analyzed very thoroughly. Kim and Hong (2004) propose the branch and bound algorithm for determining the locations of relocated blocks. Caserta et al. (2012) present the MILP model for solving the relocation problem and prove its NP-hardness. The appropriate heuristics with different sets of assumptions are proposed by e.g.: Caserta et al. (2009), Bortfeldt and Forster (2012), Forster and Bortfeldt (2012), Petering and Hussein (2013), Jin et al. (2015), Tanaka and Mizuno (2018). Quite a different approach to the problem of relocating blocks is presented by Boysen and Emde (2016). They analyze a special case of storage location problem called parallel stack loading problem (PSLP). The goal is to "intermediately store an incoming stream of items in a storage area consisting of parallel stacks so that they can, later on, be retrieved without excessive effort for relocating items".

The answer to the problem of limited accessibility in common block stacking systems is the automated unit-load storage and retrieval system. Considering the classification of automated systems presented by Azadeh et al. (2019), the systems analyzed in this paper are the autonomous vehicle-based storage and retrieval (AVS/R) systems with shuttles performing aisle-based multi-deep storage. In the literature, the single- or double-deep storage shuttle-based systems are better investigated than the multi-deep systems. For example, Malmborg (2012, 2013) presents the equations for a single-command and dual-command cycle times while the semi-open queuing network models for single-deep storage systems are presented by Heragu et al. (2011), Marchet et al. (2012), Roy et al. (2012, 2013, 2015) and Epp et al. (2017). A simulation study of single-deep AVS/R systems is performed by Lerher et al.

(2017). For multi-deep storage, Azadeh et al. (2019) describe the AVS/R systems with the only one-way stream of the items in the channel. The systems analyzed in this paper are more flexible, although for practical reasons the one-way stream is generally in use. The models for travel time are presented by Manzini et al. (2016). Tappia et al. (2017) develop queuing network models to estimate the performance of both: single-tier and multi-tier systems. A deep storage system based on autonomous shuttles and a stacker crane is modeled by Wang et al. (2020). Guerrazzi et al. (2019) use analytical models and simulations to investigate a deep-lane AVS/R system provided with an energy recovery module. The systems analyzed by the mentioned above authors slightly differ from the system analyzed in this paper.

Description of the radio-shuttle compact storage system

The radio-shuttle compact storage system considered in this paper is the system where lanes are divided into channels (each tier in a lane constitutes a separate channel) and in each channel, a different SKU can be stored (figure 1). Such a solution increases the number of different SKUs which can be retrieved without the necessity of relocating the interfering items. However, the problem of honeycombing may appear, especially when the lanes are quite long. In the mentioned in this paper a real case, the storage space has reached only the level of about 60%. This is the reason why the warehouse management considered a shared storage policy within a channel. The shared policy reduces the honeycombing effect and increases the number of different SKUs stored in a system. The lanes are usually the same capacity but the system is so flexible that when some obstacles (e.g. pillars supporting the roof) exclude the same storage depth in all lanes, some lanes can have a different lengths (figure 2). Access to the channels can be single-sided and double-sided. In the first case, the items have to be retrieved only according to the Last In – First Out (LIFO) method. In the second case, the First In – First Out (FIFO) method can be applied, too. For double-sided channels, the storage can be performed from both sides, but in the real storage system analyzed in this paper typically only one side was used. Although the system is flexible to change the location of the unoccupied slots from one side to another, from practical purposes such a process is not commonly used. First of all, the FIFO picking method is preferred. Moreover, the storage is performed at the side of lanes that is closer to the warehouse input point where the items arrive from production.

Figure 1: Compact radio-shuttle system (https://www.mecalux.co.uk/pallet-racking/pallet-shuttle)

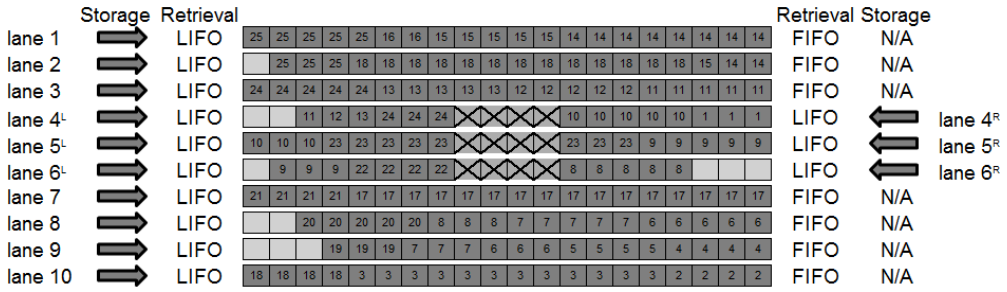

Figure 2: Layout example – 7 lanes with double-sided picking accessibility and 6 lanes with only LIFO access

MILP model for minimal number of relocating items

In the end-of-line warehouses in product flow manufacturing systems, the production batch sizes are often adapted to the depth of storage channels (and vice versa). Initially, the channel is completely filled, but the problem of honeycombing arises when in many channels only a few pallets are stored. In order to decrease the honeycombing effect a shared storage policy at least in some channels can be implemented. A shared storage policy increases the real storage utilization but access to some items can be impeded. In particular, one SKU can be stored in many lanes and channels. Then the decision problem arises on how to get the needed items: the selection of location from which the pallet should be extracted is crucial to reduce the picking effort connected with the need for relocation of blocking items. In this chapter the MILP model that minimizes the number of interfering items while picking a set of needed items (i.e. a customer order or a batch of orders) is presented. It is assumed that the storage of SKUs can be completely random, i.e. the same SKU can be stored in many lanes and channels. The depth of a channel is measured by the number of slots available for storing in this channel. In one slot one pallet with any SKU can be stored. Although the channels can have a different depth, for generalization purposes it is assumed that the depth of all channels is the same and equal to the highest depth value. If a channel is less deep then some unoccupied slots are left free at one of its ends. Similarly, not all slots in a channel have to be occupied by SKUs. For requirements of the model, a freely chosen slots can be empty, although in practice the pallets stored in a channel create a compact area. The picking policy (FIFO, LIFO or both policies) can be adjusted for each channel separately.
The notation used for the optimization model is as follows:

Indexes:

i – channel index, $i = 1, 2, \dots, I$,
j – slot index, $j = 1, 2, \dots, J$,
k – item (SKU) index, $k = 1, 2, \dots, K$,
Parameters:
I – number of channels,
K – number of SKUs stored in the warehouse,
J – maximum number of slots in a channel,
b_i^{FIFO} – FIFO picking accessibility to channel i, $i = 1, 2, \dots, I$,

$$b_i^{FIFO} = \begin{cases} 1 & \text{when items stored in channel } i \text{ can be picked according to FIFO method,} \\ 0 & \text{otherwise} \end{cases}$$

b_i^{LIFO} – LIFO picking accessibility to channel i, $i = 1, 2, \dots, I$,

$$b_i^{LIFO} = \begin{cases} 1 & \text{when items stored in channel } i \text{ can be picked according to LIFO method,} \\ 0 & \text{otherwise} \end{cases}$$

a_{kij} – item accessibility in the storage system, $i = 1, 2, \dots, I, \quad j = 1, 2, \dots, J, \quad k = 1, 2, \dots, K$,

$$a_{kij} = \begin{cases} 1 & \text{when a pallet with item } k \text{ is stored in channel } i \text{ in slot } j, \\ 0 & \text{otherwise} \end{cases}$$

d_k – demand on item k (in pallets), , $\quad k = 1, 2, \dots, K, \quad d_k \in \{0, 1, \dots, \sum_{i=1}^{I} \sum_{j=1}^{J} a_{kij}\}$.
Decision variables:

x_{ij}^{FIFO} – assignment of an item stored in channel i in slot j for picking from the other end of aisle than the storage process performs (binary),

$x_{ij}^{FIFO} = \begin{cases} 1 & \text{when a pallet stored in channel } i \text{ in slot } j \text{ is picked according to FIFO method,} \\ 0 & \text{otherwise} \end{cases}$

x_{ij}^{LIFO} – assignment of an item stored in channel i in slot j for picking from the same end of aisle as the storage process performs (binary),

$x_{ij}^{LIFO} = \begin{cases} 1 & \text{when a pallet stored in channel } i \text{ in slot } j \text{ is picked according to LIFO method,} \\ 0 & \text{otherwise} \end{cases}$

The MILP optimization model:

$$\text{Minimize} \quad \sum_{i=1}^{I}\sum_{j=1}^{J}\left(\left(x_{ij}^{FIFO}+x_{ij}^{LIFO}\right)\sum_{k=1}^{K}a_{kij}\right) \qquad [1]$$

subject to

$$\sum_{i=1}^{I}\sum_{j=1}^{J}a_{kij}\left(b_i^{FIFO}x_{ij}^{FIFO}+b_i^{LIFO}x_{ij}^{LIFO}\right) \geq d_k \quad \text{for } k = 1,2,\dots,K, \qquad [2]$$

$$x_{ij}^{LIFO} - x_{i,j+1}^{LIFO} \geq 0 \quad \text{for } i = 1,2,\dots,I, \quad j = 1,2,\dots,J-1, \qquad [3]$$

$$x_{ij}^{FIFO} - x_{i,j+1}^{FIFO} \leq 0 \quad \text{for } i = 1,2,\dots,I, \quad j = 1,2,\dots,J-1, \qquad [4]$$

$$x_{ij}^{FIFO}+x_{ij}^{LIFO} \leq 1 \quad \text{for } i = 1,2,\dots,I, \quad j = 1,2,\dots,J, \qquad [5]$$

$$x_{ij}^{FIFO} \in \{0,1\} \quad \text{for } i = 1,2,\dots,I, \quad j = 1,2,\dots,J, \qquad [6]$$

$$x_{ij}^{LIFO} \in \{0,1\} \quad \text{for } i = 1,2,\dots,I, \quad j = 1,2,\dots,J. \qquad [7]$$

The objective function [1] minimizes the total number of pallets picked from the channels according to the picking policy (FIFO and LIFO) allowed in a particular channel. The sum $\sum_{k=1}^{K}a_{kij}$ can be only 0 or 1. If $\sum_{k=1}^{K}a_{kij} = 1$ then a slot j in channel i is occupied and the pallet can be picked. If $\sum_{k=1}^{K}a_{kij} = 0$ then a slot j in channel i is empty and does not affect the objective criterion. Constraints [2] guarantee that the demand for each item will be satisfied. The parameters b_i^{FIFO} and b_i^{LIFO} allow for picking items only from the proper side of the channel. As we want to pick an appropriate pallet, all pallets locating closer to the channel's end wherein we start picking have to be taken, too (constraints [3] and [4]). Constraints [5] ensure that each item can be picked only from one side of the channel. The decision variables are binary (constraints [6] and [7]).

Figure 3 shows an example of optimal solution for quite random storage and 14 pallets to be picked (SKU no. 1, 1, 1, 5, 5, 13, 13, 13, 15, 18, 18, 20, 20, 21, i.e. d_1=3, d_5=2, d_{13}=3, d_{15}=1, d_{18}=2, d_{20}=2 and d_{21}=1). The minimal number of retrieved items to fulfill the order is 24, which means 10 interfering pallets have to be relocated. In figure 3, the pallets that need to be retrieved are colored green, and the interfering pallets are colored red.

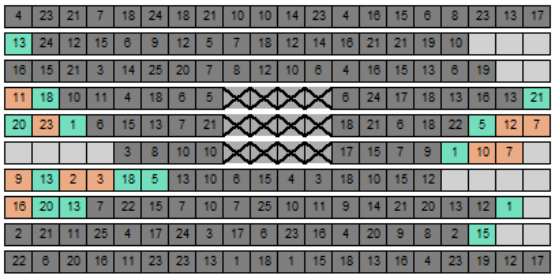

Figure 3: Optimal solution example – dark squares: pallets with SKU number; light squares: empty slots; green squares: needed items; red squares: interfering items; crossed out squares: area not available for storage

Items accessibility and storage area utilization

In this chapter, the simulations are used in order to check out how different warehouse layouts affect the accessibility of items and the storage area utilization. The system with both sides access to the channels is compared with the system with only one end of a channel available for both: storing and picking (LIFO method). The analyzed types of layouts are presented in figure 4. In the first layout type (called one-sided), only one aisle is available, and the lanes begin directly by the walls. In the second layout type (called two-sided), three picking aisles are available to allow picking from both sides of a channel, and a cross aisle for changing picking aisles is added. For each general layout type, five particular layouts with different numbers of lanes and lane depth are generated and compared.

For simulations, it is assumed that for each layout a total number of 3000 pallets can be stored. In each experiment, 300 different SKUs occupy random channels, lanes, and slots. Each SKU is stored in 7-12 pallets (scattered throughout the lanes, channels, and slots). The pick list consists of 10, 20, 30, 50 or 100 pallets with random SKUs. For each layout type, parameters, and pick list size, 10 replications of the simulation were performed. For each replication, the randomization process of storage of items and generation of a pick list was repeated and the optimal solution (using the MILP model presented in the previous chapter) was obtained.

Additionally, the storage space utilization for each variant of the layout was obtained using an analytical formula. For the calculations it was assumed that the slots are squares and the width of aisles is three times greater than the side of a slot.

The area occupied by storage system $V_{storage}$ is equal for both analyzed layouts and can be calculated using the equation:

$$V_{storage} = s_w L \cdot s_l J, \qquad [8]$$

where: L - number of lanes (summarized in both blocks), J – number of slots in a channel, s_w – width of a slot, s_l - length of a slot.

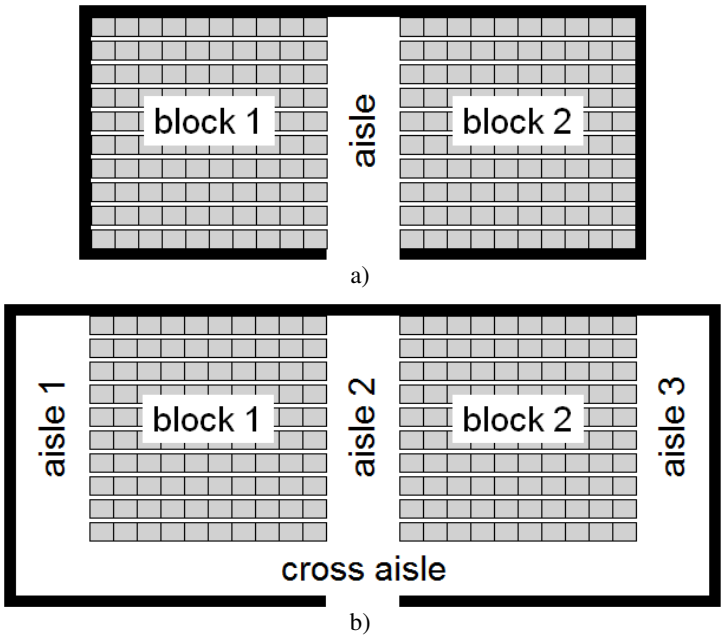

Figure 4: Two warehouse layouts: a) one-sided access to the channels; b) two-sided access to the channels

The area intended for aisles V_{aisles}^{layout} differs for both cases. In the first layout, there is only one aisle and one can use the following equation:

$$V_{aisles}^{layout\ a} = \frac{1}{2} s_w L r, \quad [9]$$

where: r – aisle width.

In the second layout type, in order to access the channels from both sides, three aisles and one cross aisle have to be arranged. Then:

$$V_{aisles}^{layout\ b} = \frac{3}{2} s_w L r + (2 s_l J + 3r) r. \quad [10]$$

Storage space utilization can be calculated using a general formula:

$$M^{layout} = \frac{V_{storage}}{V_{storage} + V_{aisles}^{layout}} \cdot 100\%, \quad [11]$$

where $layout$ can be $layout\ a$ or $layout\ b$.

Table 1 shows the results of simulations for both types of layout. The calculations were performed using Open Solver - an add-on tool for MS-Excel (Mason, 2012). For all analyzed layouts it was assumed that the pallets are stored on five tiers (each lane consists of five channels). The first layout contains 10 quite deep lanes with 60 slots in each channel (this variant is only theoretical study, in practice such long channels are not available). For the one-sided type, the number of relocated pallets was about 3-3,5 times greater than the number of needed items, while for the two-sided type the number of interfering items was about twice greater than the number of items from pick-list. This type of layout had the worse values of the possible number of relocations. The best layout type for the criterion of items availability was, as expected, the one with the greatest number of quite short lanes (60 lanes with 10 slots in a channel). For a one-sided variant, only about 40% of retrieved pallets in the one-sided variant and 10-20% in the two-sided variant were the interfering items.

Table 2 contains the storage space utilization for all investigated layouts obtained using the formula [11]. For one sided layouts the storage space utilization can even exceed 90% and the highest value was obtained for the smallest number of deepest lanes. For two sided layouts the best utilization of storage area is when the blocks have a shape close to squares (the value of 68% of warehouse area dedicated for storage for 15 lanes grouped in a block with 20 slots in a channel). This layout is especially interesting as it has a moderate value of needed relocations.

Table 1: Average number of interfering items obtained for different layouts

Number of lanes	Number of channels in a lane	Number of slots in a channel	Number of interfering items									
			Two-sided	One-sided	Two-sided	One-sided	Two-sided	One-sided	Two-sided	One-sided	Two-sided	One-sided
			10 pallets		20 pallets		30 pallets		50 pallets		100 pallets	
10	5	60	20,8	38,3	41,0	70,0	53,7	105,7	102,7	161,8	206,8	346,0
20	5	30	9,2	19,2	16,7	33,7	24,7	53,5	40,5	87,8	117,7	216,2
30	5	20	3,3	10,5	9,7	23,5	14,0	35,8	28,5	62,5	64,0	134,5
40	5	15	2,7	8,2	4,8	13,7	8,8	26,2	17,2	41,8	47,7	112,7
60	5	10	1,2	6,2	4,0	11,0	5,0	15,0	8,3	36,5	23,3	68,5

Table 2: Storage space utilization

Number of lanes	Number of channels in a	Number of slots in a	Storage area utilization (%)	
			Two-sided	One-sided
10	5	60	58,14	97,56
20	5	30	66,89	95,24
30	5	20	68,03	93,02
40	5	15	66,89	90,91
60	5	10	62,70	86,96

Table 3: Average number of decision variables and constraints in the reduced models

Number of lanes	Number of channels in a lane	Number of slots in a channel	Number of decision variables			Number of constraints		
			From original model	Reduced for two-sided picking	Reduced for one-sided picking	From original model	Reduced for two-sided picking	Reduced for one-sided picking
10	5	60	6000	5760	2880	9200	5731	2851
20	5	30	6000	4880	2440	9100	4818	2378
30	5	20	6000	4120	2060	9000	4036	1976
40	5	15	6000	3620	1810	8900	3518	1708
60	5	10	6000	2693	1347	8700	2578	1231

Although the optimal solution for the MILP model can be obtained quite fast, the number of decision variables and constraints can be limited. It is reasonable to consider for calculations only the decision variables with available picking policy. Furthermore, there is no need to include in the model the channels without needed items. To contain in the model only required decision variables and constraints, a macro in Visual Basic constructing the "minimal size" model was written. Table 3 presents the sizes of original and reduced models. The highest values of reduction were possible for the layout with 300 channels (60x5) where the number of decision variables was reduced by 55% and 78%, while the number of constraints was diminished by 70% to 86% for two-sided and one-sided picking, respectively. For all analyzed problems the size of the model was reduced and the computation time was about 1 second.

Conclusions

The radio-shuttle compact system is a dense storage system in which the increased number of SKUs can be stored and picked in an uninterrupted way through the division of lanes into channels. However, in practice, the real storage space utilization can be limited as the honeycombing effect occurs. Then, the shared storage policy can be implemented and the picking process should be optimized in order to minimize the number of items needed relocation. The presented MILP model is quite fast, but for very large problems it can be adjusted to reduce the number of decision variables and constraints.

The highest values of storage space utilization can be obtained for a small number of quite deep lanes and only LIFO picking policy. Unfortunately, in the end-of-line warehouses in product flow manufacturing systems from the food industry, the LIFO method is not preferred due to the expiration date of items. Considering both side access to the items the area intended for storage should be square-like. In this case, the coefficient of storage area utilization achieves the highest possible value and the accessibility of items is limited in a moderate way.

For future work, we see the potential of the use of the PSLP algorithm for storage optimization. Boysen and Emde (2016) assume that picking priority values are known for all items. However, the storage decision in a radio-shuttle system is made under risk and uncertainty: while storing we can only try to estimate the probability distribution for the demand on SKUs. Although the total avoidance of the necessity of relocating items is impossible, it could be probably significantly reduced through the proper item assignment to the queue in a channel. The more smooth flow of the pallets through the channels can be achieved by order-batching, too. Another way for the reduction of the number of relocations is the establishment of the sequence of processing orders. Then the temporary easy accessible storage locations for relocated items needed for the next order should be thoroughly designated, too.

References

- Azadeh, K., De Koster, R. and Roy, D. (2019) 'Robotized and automated warehouse systems: Review and recent developments,' *Transportation Science*, 53 (4), 917-945.
- Bartholdi, J.J. and Hackman, S.T. (2017) Warehouse & distribution science: Release 0.98, Supply Chain and Logistics Institute.
- Bortfeldt, A., and Forster, F. (2012) 'A tree search procedure for the container pre-marshalling problem,' *European Journal of Operational Research*, 217 (3), 531-540.
- Boysen N., Briskorn D. and Emde, S. (2017) 'Sequencing of picking orders in mobile rack warehouses,' *European Journal of Operational Research*, 259 (1), 293-307.
- Boysen, N., and Emde, S. (2016) 'The parallel stack loading problem to minimize blockages,' *European Journal of Operational Research*, 249 (2), 618-627.
- Caserta, M., Schwarze, S. and Voß, S. (2012) 'A mathematical formulation and complexity considerations for the blocks relocation problem,' *European Journal of Operational Research*, 219 (1), 96-104.
- Caserta, M., Voß, S. and Sniedovich, M. (2011) 'Applying the corridor method to a blocks relocation problem,' *OR Spectrum*, 33 (4), 915-929.
- D'Antonio, G., De Maddis, M., Bedolla, J.S., Chiabert, P., and Lombardi, F. (2018) 'Analytical models for the evaluation of deep-lane autonomous vehicle storage and retrieval system performance,' *International Journal of Advanced Manufacturing Technology*, 94 (5-8), 1811-1824.
- Epp, M., Wiedemann, S. and Furmans, K. (2017) 'A discrete-time queueing network approach to performance evaluation of autonomous vehicle storage and retrieval systems,' *International Journal of Production Research*, 55 (4), 960-978.
- Forster, F. and Bortfeldt, A. (2012) 'A tree search procedure for the container relocation problem,' *Computers & Operations Research*, 39 (2), 299-309.
- Guerrazzi, E., Mininno, V., Aloini, D., Dulmin, R., Scarpelli, C. and Sabatini, M. (2019) 'Energy Evaluation of Deep-Lane Autonomous Vehicle Storage and Retrieval System,' *Sustainability*, 11 (14), 3817.
- Heragu, S.S., Cai, X., Krishnamurthy, A. and Malmborg, C.J. (2011) 'Analytical models for analysis of automated warehouse material handling systems,' *International Journal of Production Research*, 49 (22), 6833-6861.
- Jin, B., Zhu, W. and Lim, A. (2015) 'Solving the container relocation problem by an improved greedy look-ahead heuristic,' *European Journal of Operational Research*, 240 (3), 837-847.
- Kaliampakos, D., Benardos, A. and Mavrikos, A. (2016) 'A review on the economics of underground space utilization,' *Tunnelling and Underground Space Technology*, 55, 236-244.

- Kim, K.H. and Hong, G.P. (2006) 'A heuristic rule for relocating blocks,' *Computers & Operations Research*, 33 (4), 940-954.
- Lerher, T., Borovinsek, M., Ficko, M. and Palcic, I. (2017) 'Parametric study of throughput performance in SBS/RS based on simulation,' *International Journal of Simulation Modelling*, 16 (1), 96-107.
- Malmborg, C.J. (2002) 'Conceptualizing tools for autonomous vehicle storage and retrieval systems,' *International Journal of Production Research*, 40 (8), 1807-1822.
- Malmborg, C.J. (2003) 'Interleaving dynamics in autonomous vehicle storage and retrieval systems,' *International Journal of Production Research*, 41 (5), 1057-1069.
- Manzini, R., Accorsi, R., Baruffaldi, G., Cennerazzo, T. and Gamberi, M. (2016) 'Travel time models for deep-lane unit-load autonomous vehicle storage and retrieval system (AVS/RS),' *International Journal of Production Research*, 54 (14), 4286-4304.
- Marchet, G., Melacini, M., Perotti, S. and Tappia, E. (2012) 'Analytical model to estimate performances of autonomous vehicle storage and retrieval systems for product totes,' *International Journal of Production Research*, 50 (24), 7134-7148.
- Mason, A.J. (2012) 'OpenSolver-an open source add-in to solve linear and integer progammes in Excel,' Operations Research Proceedings 2011 (pp. 401-406). Springer, Berlin, Heidelberg.
- Matson, J.O., Sonnentag, J.J., White, J.A. and Imhoff, R.C. (2014) 'An analysis of block stacking with lot splitting,' IIE Annual Conference Proceedings (p. 497), Institute of Industrial and Systems Engineers (IISE).
- Petering, M.E. and Hussein, M.I. (2013) 'A new mixed integer program and extended look-ahead heuristic algorithm for the block relocation problem,' *European Journal of Operational Research*, 231 (1), 120-130.
- Roy, D., Krishnamurthy, A., Heragu, S.S. and Malmborg, C.J. (2012) 'Performance analysis and design trade-offs in warehouses with autonomous vehicle technology,' *IIE Transactions*, 44 (12), 1045-1060.
- Roy, D., Krishnamurthy, A., Heragu, S.S., and Malmborg, C.J. (2013) 'Blocking effects in warehouse systems with autonomous vehicles,' *IEEE Transactions on Automation Science and Engineering*, 11 (2), 439-451.
- Roy, D., Krishnamurthy, A., Heragu, S. and Malmborg, C.J. (2015) 'Queuing models to analyze dwell-point and cross-aisle location in autonomous vehicle-based warehouse systems,' *European Journal of Operational Research*, 242 (1), 72-87.
- Tanaka, S. and Mizuno, F. (2018) 'An exact algorithm for the unrestricted block relocation problem,' *Computers & Operations Research*, 95, 12-31.
- Tappia, E., Roy, D., De Koster, R. and Melacini, M. (2017) 'Modeling, analysis, and design insights for shuttle-based compact storage systems,' *Transportation Science*, 51 (1), 269-295.
- Wang, Y., Man, R., Zhao, X. and Liu, H. (2020) 'Modeling of parallel movement for deep-lane unit load autonomous shuttle and stacker crane warehousing systems,' *Processes*, 8 (1), 80.

Development of The International Business in Post-Industrial Economy

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Abstact

This article examines that transition of world economy to a stage of the post-industrial development, connected with increase in a share of non-material production and growth of information streams, significantly changes conditions of the international business and change logic of its maintaining.

Keywords: Post-Industrial Economy, International Business.

Introduction

The process of establishing a modern economy leads to a qualitative change in the nature of international business. The transition of the world economy to the stage of post-industrial development, associated with an increase in the share of intangible products and an increase in information flows, significantly changes the conditions of international business and, at the same time, the logic of its conduct. This necessitates a critical reconsideration.

At the end of the 20th century, leading developed countries have already formed a contemporary society. In the book by Anderson (2003), moreover, this innovative leap has led to an increase in the gap between the levels of development of the leaders' countries, in particular, between the United States and advanced European countries, on the one hand, and the remaining countries, on the other.

The processes of globalization and the development of information technology have become the basis for changing the logic of thinking from industrial to digital economy. New phenomena (including the monetary expansion, massive financial spillovers between different countries, the consolidation of companies and banks, and the growth of external debt) can no longer be explained by a traditional analysis of the development of the world economy.

Modern telecommunication systems have greatly simplified the problem of contacts between transaction partners and coordination of their decisions, regardless of geographic location. Now distance is no longer a limiting factor in international business.

The range of objects (goods) of commercial transactions is also actively expanding as social production develops, not only due to the emergence of new types of products and services, but also the inclusion of intangible assets, titles of property rights or claim rights in transactions. In the study by Harmon (2019) the fact that usually the consideration of world trade is limited to commodity circulation of goods and services seems to be a tribute to outdated traditions.

Along with states and transnational corporations, new participants are actively operating in the modern world market - international economic organizations, integration unions, international exchanges and auctions, rapidly growing megacities, and various informal economic unions. Many non-profit, public, political, religious organizations and even individual businessmen have a significant impact on the nature of international economic relations and thereby on the conditions of international trade, significantly complicating the process of commercial negotiations, real deliveries, transaction settlement.

Review of relevant studies and problem statement

The process of evolution and development of the world economy after the Second World War has been the subject of a large number of works by Russian and foreign researchers, where the problems of international business are considered in sufficient detail, and an assessment is also given of the features of globalization of the world economy. At the same time, an analysis of the publications of these authors leads to the conclusion that the approaches and conceptual positions that they advocate require a priority rethinking. According to Rana and Morgan (2019) research study, due to the fundamental change in the logic of conducting international business in contemporary economics, it is important to develop evidence-based approaches to forecasting new contours of international business.

In this article, the concepts of international trade and international business are not identical. International business is a broader concept, closer in meaning to the international economy, including, in addition to trade, investment operations, operations for the diffusion of innovations and intellectual activity results. Thus, by international business we mean the production and economic or investment activities of groups of companies, firms and enterprises with common economic or business interests that cover two or more states, or the economic activities of the parent company of the home country and its foreign branches or subsidiaries, as well as dependent enterprises. In this view, international trade is certainly an important, but not the only, part of international business.

Research Methodology

Forms, methods of conducting international trade transactions should naturally change depending on the characteristics of goods, services, and items of trade. These changes apply not only to the external, visible sides of trading operations. The principles of pricing of new goods, and above all, the intangible products of creative and intellectual work, as well as the principles of assessing the economic benefits of commodity transactions are changing, which, in fact, entails a change in the external forms and methods of trading operations. And all these changes relate to the essential, institutional characteristics of international business.

Navrotskaia et al (2018) mentioned that the statistical picture of international commodity flows is constantly changing under the influence of many factors - both the achievements of scientific and technological progress, and the successes of economic development of countries, and market turbulence in world markets, and the specifics of emerging interstate relations.

The volume of world exports as of 2018, according to the UN and the World Bank, exceeded 18 trillion. $ US and makes up about 21% of world GDP (figure 1).

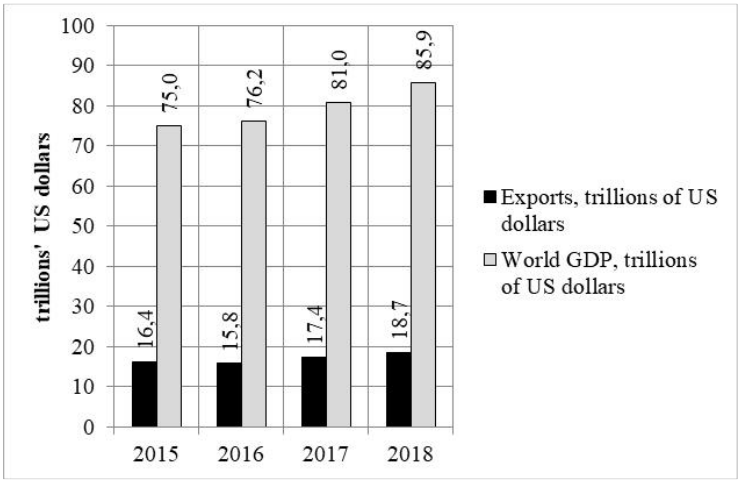

Fig. 1: Dynamics of world exports and GDP (2015-2018) (compiled by the authors; based on the World Bank national accounts data and OECD National Accounts data files (2018), UNSD Databases. International merchandise trade (2018))

As a rule, when considering statistical data on international trade turnover, the first thing that is noted is the high growth rate of its volume, or rather, relatively higher than the growth rate of the world's GDP. Indeed, for almost five post-war decades, world trade grew three times as much as GDP.

Among the main factors of this growth, it is necessary to highlight, first of all, scientific and technical achievements in industrial technology, which stimulated the developed capitalist countries' economy structural reorganization. These are due to the accelerated industrial products obsolescence, as well as the accelerated funds renewal, which entails an increase in international supplies of equipment and technology and an increase in the share (up to 10%) of annual product manufacturing renewal in world markets. According to Kotler et al (2019) the growing variety of products inevitably leads to a deepening of international production's specialisation, since no country in the world can produce the entire rapidly changing product range.

The World Bank national accounts data, and OECD National Accounts data files. Industry (including construction) (2018) show, however, despite such an impressive growth rate in international trade turnover, the share of industry in global GDP is declining (from 31% in 1995 to 25% in 2018),

The regional (country) structure of international trade turnover has not undergone radical changes over the past decades. Still, more than 70% of the total world trade volume is accounted for by the OECD countries, and, above all, by the EU countries, whose share consistently exceeds 30%. U.S. and Japanese exports are about 10%, respectively. For more accurate estimation of the regions' economic role as real world markets subjects, data on intraregional trade turnover within the EU, North America, Australia and New Zealand should be excluded from the general international trade statistical indicators. According to International statistical committee of the Commonwealth of Independent States (2019) the relative shares of the main world trade subjects are converging: the EU's share is about 32% in exports and imports in 2018, the U.S. and Japan's share is about 10%.

The exclusion of economic unions' statistical indicators of intraregional goods flows when considering general trends in the world trade development is methodologically quite justified. Katsioloudes and Hadjidakis (2007) showed that there are practically no customs duties and restrictions on the production's factors movement, and cross-country trade is intra-national in nature. These features are especially noticeable when considering trade in industrial products, in particular, accessories and components in mechanical engineering (for which, as already noted, the difference in statistical accounting in foreign trade and domestic trade turnover is most affected).

Intraregional trade, where the exchanging goods' conditions are more favorable, is growing faster than the world trade, which leads to increased interregional isolation in world trade.

Changes in the institutional structure of the international goods exchange system are no less important for characterising world trade than changes in its goods or regional structure.

An important factor that determined the world trade development at the turn of the 21st century was the active introduction of forward transactions in international trade. Such "fixed-term" contracts were concluded, as a rule, for the purchase of agricultural products, the delivery dates of which are clearly predetermined. In a research study by Blackburne and Buckley (2019) is shown that they spread to logging and mineral raw materials' mining, in order to attract the buyer's funds for their production.

Forward transactions are also used in financial markets. Futures trading, as a modern form of international trade transactions, with standardised conditions for the cost, time of performance and terms of obligations, formed in the foreign exchange market, returned and became the leading form of trade in the raw materials market. Ibrahim et al (2016) mentioned the introduction of the option trading principle, which gave rise to numerous forms of financial derivatives in the money market, is gaining recognition in other markets today.

But today, forward transactions are used for purely speculative purposes, often without any connection with the actual goods' exchange. A lot of contracts are signed by sellers who do not have real goods, and buyers who do not actually have money to pay for them. Such "forward transactions" have become a familiar tool of world trade, opening up the possibility of conducting not one, but a number of trade transactions for the sale and purchase, sale and resale of the same product until its actual delivery to the final buyer. The trade transactions' value is much higher than the specific products' value, that are repeatedly used as the object of trade transactions.

The introduction of the option trading principle, which has given rise to numerous forms of financial derivatives on the money-market, is gaining recognition in other goods markets.

It's not just trade statistics that are changing. The nature of relationships in global markets is changing. The increased forward transactions' risk level required strengthening the institution of intermediaries – market participants, who assume additional responsibility for fulfilling contractual trade transactions obligations. In a research study by Yao (2019) mentioned that the traditional bilateral deal between the product manufacturer and its consumer include new participants, among which an important place was taken by international exchanges and auction markets. They act as intermediaries for trade transactions, taking responsibility for the contracts execution.

Bilateral deals have not disappeared, they are necessary for many products that have individual characteristics. But for standard products that are more or less homogeneous in their quality characteristics (and these conditions are met by a significant part of mineral raw materials and food), selling through an auction market or goods exchange allows you to really expand the range of potential buyers, initiating a competition mechanism. According to Yang and Gabrielsson (2017), at the same time, the risks of foreign trade operations are reduced, due to additional performance bonds by the auction market or goods exchange.

Myasnikova et al (2018) emphasized that on the industrial products market the classic relationship between the seller and the buyer during a trade transaction – the transfer of ownership and responsibility for the product upon receipt of payment – does not stop, but continues in the industrial products' consumption sphere or rather its operation. The conditions of the industrial product's consumption significantly change this product's market value assessment.

Today, the trade transactions' mechanism is invariably integrated with the international cooperation's mechanism, where, as a rule, other tools are used.

The immateriality of new products has predetermined the objective necessity of pricing principles' changing and restructuring the competition's mechanism on the world markets. The absence of a direct relationship between the creative and intellectual products' market price and the direct costs of their production immediately required a change in the pricing logic, shifting the focus from measuring costs to evaluating the products' utility and potential profitability. Kahiya (2020) noted that the expediency of this approach has been confirmed in the currencies and financial assets markets.

The market of material goods still retains its previous pricing principles (at least in theoretical studies), but gradually obeys the new logic of the international goods exchange effectiveness' evaluating. Today, no one disputes the obvious fact that the real utility (and, consequently, the value) of modern industrial products largely depends not on their production's conditions, but on their consumption's conditions. No low price will increase the product's demand if there are no prerequisites for its effective use. The choice of information products, new technologies and engineering services on the market is determined not by cost savings, but by their actual consumption's utility.

Heathcote and Perri (2014) noted that on the non-material products markets, where the problem of effective quality control and the process of property rights' alienation are always most acute, there is a gradual introduction of forms and methods of non-trade relations – lease, hiring, delegations, trust, assignment of rights of claim and obligations, investment, joint production activities. As a result, the line between a classic international trade transaction and other forms of international commercial work and investment is blurred.

Results

Today, there is a problem related to the regulation of non-material goods' flows, because customs instruments are simply not effective for regulating them.

For many services, claim assignment agreements, trading operations on world currency and stock exchanges abroad, etc. there is simply no fact of crossing customs borders, and customs control relies on its registration.

It turns out, that as a result of objective changes in the forms and methods of conducting international business, new tools for international trade transactions regulation are required. Accordingly, the theoretical ideas about the forms and methods of conducting international business should also change. Similarly, states need to adapt to changing international business conditions in order to control the growing volume of commercial transactions involving non-material goods.

Conclusions

To sum up, it should be emphasized, that international business is currently undergoing profound changes, due to the growing share of commercial transactions with intellectual and creative goods, money and financial assets. Dislocations in the commodity composition of international trade change the relative effectiveness of the usual government external economic activity regulation methods and cause the new methods and tools' development and implementation in the international business practice.

References

- Anderson W T. (2003), All Connected Now. Life in the First Global Civilization, Westview Press.
- Blackburne, GD and Buckley, PJ. (2019), 'The international business incubator as a foreign market entry mode,' *Long Range Planning*, 52 (1), 32-50.

- Harmon, P. (2019), Business Process Change (Fourth Edition), Chapter 7 – An executive-level business process management group, Harmon, P. (ed), Morgan Kaufmann, 151-175.

- Heathcote, J and Perri, F. (2014), 'Chapter 9 - Assessing International Efficiency,' *Handbook of International Economics*, 4, 523-584.

- International statistical committee of the Commonwealth of Independent States (2019). 'Share of the CIS and EU countries and other major players in international trade in world exports and imports in 2018'. [Online], [Retrieved December 22, 2019], http://www.cisstat.com/eng/gr_f_trade2019.pdf.

- Kahiya, E T. (2020) 'Context in international business: Entrepreneurial internationalization from a distant small open economy,' *International Business Review*, 29 (1), 101621.

- Katsioloudes, MI and Hadjidakis, S. (2007), International Business, Chapter 1 – Challenges in International Business, Katsioloudes, M I. and Hadjidakis, S. (ed), Butterworth-Heinemann, 3-29.

- Kotler, P., Manrai, LA., Lascu, D-N. and Manrai, AK. (2019), 'Influence of country and company characteristics on international business decisions: A review, conceptual model, and propositions,' *International Business Review*, 28 (3), 482-498.

- Myasnikova, OY., Shatalova, II., Bogacheva, TV., Kutlyeva, GM., Zenkina, EV. and Illeritsky, NI. (2018), 'Promising directions of cooperation among Eurasian Economic Union countries,' *International Journal of Engineering and Technology (UAE)*, 7 (3.14), Special Issue 14, 386-391.

- Navrotskaia, NA., Kovaleva, EA., Kutlyeva, GM., Bogacheva, TV., Zenkina, EV. and Bondarchuk, NV. (2018), 'Technological cooperation trends under conditions of the modern world economy,' *International Journal of Engineering and Technology (UAE)*, 7 (3.15), Special Issue 15, 288-292.

- Rana, MB and Morgan, G. (2019), 'Twenty-five years of business systems research and lessons for international business studies,' *International Business Review*, 28 (3), 513-532.

- The World Bank national accounts data and OECD National Accounts data files (2018), 'GDP (current US$)'. [Online], [Retrieved December 22, 2019], https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?view=chart.

- The World Bank national accounts data and OECD National Accounts data files (2018), 'Industry (including construction), value added (% of GDP)'. [Online], [Retrieved December 22, 2019], https://data.worldbank.org/indicator/NV.IND.TOTL.ZS?end=2018&start=1980&view=chart

- UNSD Databases. International merchandise trade. (2018), 'Total imports, exports and balance of trade'. [Online], [Retrieved December 22, 2019], http://data.un.org/_Docs/SYB/PDFs/SYB62_123_201907_Total%20Imports,%20exports,%20and%20balance%20of%20trade.pdf

- Yang, M and Gabrielsson, P. (2017), 'Entrepreneurial marketing of international high-tech business-to-business new ventures: A decision-making process perspective,' *Industrial Marketing Management*, 64, 147-160.

- Yao, W. (2019), 'International business cycles and financial frictions,' *Journal of International Economics*, 118, 283-291.

- Zalina, I., Firdaus, A. and Azman, I. (2016), 'International Business Competence and Small and Medium Enterprises,' *Procedia - Social and Behavioral Sciences*, 224, 393-400.

Regulation of Clustering Processes and Innovative Development of The Volga Federal District

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Abstract

The article deals with the analysis of investment, scientific, technical and institutional conditions for regulating clustering processes and innovative development of the Volga Federal dictrict (Volga region). The subject of the study is a modern mechanism for solving scientific and practical problems of clustering. The aim of the work is to summarize the main directions for state support of clusters in Russia and, in particular, in the regions of the Volga Federal district. The scientific novelty of the work lies in the identification of the most effective mechanisms for coordinated innovation and cluster development of regions. Main problems of regulation and factors of clustering processes and innovative development of Russian regions were also highlighted. The advantage of using the mechanisms of state support for innovation clusters that are successfully used in Russian regions is the possibility of forming a set of models for cluster development in order to select the optimal strategy of clustering the economy for each specific territory. It is concluded that the availability of innovative infrastructure and development institutions has a significant impact on the effectiveness of clustering processes and innovative development of economic systems in the Volga region.

Keywords*:* Innovation Clusters, Institutional Environment, Public Investment, Scientific And Technical Development.

Introdution

To date the theoretical and methodological foundations of coordinated regulation of clustering processes and innovative development of regions within the framework of Russian economic science are at the stage of active development. Implementation of the state policy to support innovative clusters based on the experience of successful Russian cluster initiatives, as well as on foreign approaches to the formation and support of clusters. The research is aimed at solving the problem of the absence of a complex model of clustering and innovative development of regional economic systems. Search is focused on identifying promising models of transformation of the economic space of the macro-region (Volga region), taking into account the heterogeneity of the distribution the factors of economic growth and development potential of innovation clusters.

As the most significant European cluster development programs, the leading Russian scientific school for the study of economic clustering processes, established at the Higher school of Economics (Abashkin, V.L., S.V. Artemov, A.N. Gusev, 2018), identifies the following: The Federal program for state support of innovative development of clusters in Germany "Spitzencluster Wettbewerb" (InnoRegio. Bundesministerium fur Bildung und Forschung, 2020); the state program for supporting the competitiveness of French clusters "Poles de Compultitivite" within the concept of "poles of growth" (Competitiveness Clusters in France, 2020). The fundamental contribution of this research team to the solution of this scientific problem is the analysis of the number and quality indicators for the development of innovation clusters in the Russian Federation, as a key aspect of the problem considered the influence of state programs on the processes of innovative development.

At the same time, it should be noted that the unadapted application of foreign experience in regulating the processes of clustering and innovative development of regional economic systems to Russian realities is not a rational approach to the practice of state regulation of the economy. Thus, V.

L. Abashkin, E. S. Kutsenko and E. A. Islankina (2016) note that of the 277 cluster initiatives they identified from 2008 to 2016, 170 (61.3%) were not implemented and ceased to exist, of which 123 cluster initiatives ceased to exist by 2012. Most of these initiatives did not correspond to the cluster model adopted in economic science and international practice and were a reaction of regional authorities and economic development institutions to changes in the market situation, in particular, the priorities of the Federal policy for regional economic development.

The relevance of the development of methodological foundations for regulating the clustering of the regional economy is focused on the following aspects of this scientific problem: determining the risks of implementing existing strategies for cluster development of the region, developing a set of measures to reduce the gap between the economic development of regions and their territories based on the formation of high-tech industries. Thus, the research is aimed at solving the scientific problem of searching for effective institutional forms and mechanisms of state regulation in the framework of the cluster model of development of the Volga macro-region in an innovative economy. Accordingly, the need to take into account both global and Russian-specific problems of improving mechanisms for regulating clustering processes has determined the purpose and objectives of this study.

The purpose of the study is to identify the main problems and effective mechanisms for regulating the processes of clustering and innovative development of regional economic systems. The study set the following **tasks**:

- analysis of the development features of innovation clusters formed in the regions of the Volga Federal district;
- identification of the main problems of regulation and efficiency factors of clustering processes and innovative development of economic systems in Russian regions;
- identification of effective mechanisms for regulating clustering processes and innovative development of economic systems in the regions of the Volga Federal district.

Research Methodology

The study is based on the dialectical method of scientific cognition, which involves the consideration of economic relations within the framework of innovative clusters in their relationship and development. In the course of the study, a systematic approach is widely used, which involves a comprehensive study and structural and logical ordering of the cluster as a complex economic system. The study also sought out methods of structural and comparative analysis, the solution of the scientific objectives of the research demanded the application of such theoretical methods as an abstraction and concretization, analysis and synthesis, induction and deduction, compare and contrast. The solution of scientific problems of the project requires the use of a set of statistical methods used by economic science, in particular methods of summary and grouping, sample observation, index method, the study of statistical relationships on the basis of correlation analysis.

For the regions of the Russian Federation the labor productivity index was calculated for the region's economy as a whole using the following formula:

$$I_{LP} = (I_{GRP} / I_t) \times 100\%,$$

where I_{LP} – the index of labor productivity;

I_{GRP} – index of the physical volume of the gross regional product in the main prices of the period t for the period t-1;

I_t – the index of total labor costs for the region of period t and period t-1.

Indicator of the average degree of depreciation of fixed assets in the region is the ratio of the accumulated depreciation of existing fixed assets by a certain date (the difference between their full accounting and residual book value) to the full accounting value of these fixed assets at the same date, as a percentage.

The methodology for evaluating clustering processes and innovative development of the economy is based on the author's own developments, as well as the following set of approaches to the study of cluster formation and development: cluster model of M. Porter (2009); neoclassical cluster model; Ö. Sölvell (2009) network model of interaction between organizations participating in the cluster; institutional model of the cluster of Ch. Ketels and G. Lindquist (2013). One of the basic concepts of the regional economy is the economic space that develops the initial ideas about the territory. The economic space is a rich territory, accommodating many objects and connections between them: settlements, industrial enterprises, economically developed and recreational areas, transport and engineering networks. Each region has its own internal space and connections with the external space. The main characteristics of economic space are: density (population, gross regional product, natural resources, fixed capital, etc. per unit area); location (indicators of uniformity, differentiation, concentration, distribution of population and economic activities, including the economic existence of developed and undeveloped areas); connectivity (intensity of economic relations between parts and elements of space, conditions of mobility of goods, services, capital and people, determined by the development of transport and communication networks).

The main problems of regulation and factors of efficiency of clustering processes and innovative development of economic systems in Russian regions. The study identified the main factors that influence the results of cluster initiatives in Russian regions. The main factor in the formation and development of innovation clusters is the level of development of the regional innovation system. We would like to emphasize that 27 innovative territorial clusters created within the framework of the Ministry of economic development program are located on the territory of the subjects of the Russian Federation that have a high level of innovative development, including an innovation infrastructure. The presence of science cities, special economic zones of technical and industrial types, and research complexes with the status of a closed administrative-territorial entity in their economic space has a significant impact on the synchronization of clustering processes and innovative development of economic systems in Russian regions (Russian cluster Observatory, 2020).

The key factor of cluster development for the Russian Federation is the implementation of Federal programs for state support of clusters in the region. In the regions of the Volga Federal district, 20 clusters out of 24 (83.3 %) received state support under Federal programs. Since 2010, the Ministry of economic development has launched a program to create cluster development centers in Russian regions. The program covered 33 regions of the Russian Federation where regional cluster development centers were established. In Volga Federal district cluster development centers were created in the following regions: Nizhny Novgorod region, Samara region, Ulyanovsk region, Penza region, Kirov region, Tatarstan, Bashkortostan, Udmurtia; Perm region. These regions of the Volga region have a high level of cluster activity, which makes it possible to include the presence of specialized cluster development institutions in the set of factors for effective regulation of clustering processes in the Volga region.

Note that all 28 clusters that do not participate in state programs to support cluster development are at a low level of organizational development. At the same time, 15 clusters located in 11 Russian regions that do not participate in Federal programs to support cluster development were created in regions where at the time of cluster creation there were no clusters that receive state support and no cluster development centers were created. In the Volga Federal district, there are 2 clusters created on the territory of 3 regions. The Association "Innovative territorial electrotechnical cluster of the Chuvash Republic" includes organizations located mainly on the territory of the Republic of Chuvashia, as well as the Republic of Mari El. Note Zarechenskiy cluster integration technologies (Penza region), created in 2010 and supported by the center for cluster development of the Penza region in the framework of the Ministry of economic development to support small and medium enterprises (Russian cluster Observatory, 2020).
There are also 8 clusters (3 clusters in the regions of the Volga Federal district) that do not participate in Federal programs to support cluster development, while those formed on the territory of the subjects of the Russian Federation, within the borders of which cluster initiatives that receive state support were implemented at the time of their creation, or cluster development centers were created.

The development of an integrated approach to the regulation of clustering processes in the regions of the Volga Federal district is due to the following economic and institutional problems:

– high risks of long-term investment in high-tech production;
– insufficient level of competitiveness of the industry, due to the preservation of a low level of motivation for a serious increase in labor productivity;
– differentiation of development of regional innovation systems, insufficient efficiency of market mechanisms for integration of education, science and business.

Let's look at these problems in more detail. The index of labor productivity in the regions of the Volga Federal district is presented in table 1.

Table 1: Labor Productivity Index in the regions of the Volga Federal district (as a percentage of the previous year)

The subject of the Volga Federal district	2014	2015	2016	2017	2017
Republic of Bashkortostan	104,5	103,4	100,3	101,1	103,0
Republic Of Mari El	104,1	107,9	104,2	96,8	104,9
Republic of Mordovia	103,6	108,3	101,8	104,0	103,2
Republic of Tatarstan	103,1	102,8	100,7	100,8	101,2
Udmurt Republic	102,2	103,4	100,6	101,4	101,3
Chuvash Republic	99,0	101,6	98,9	104,3	104,8
Perm region	101,5	104,0	100,5	95,7	106,3
Kirov region	102,2	102,5	100,3	100,5	101,1
Nizhny Novgorod region	103,8	103,7	98,7	103,9	101,1
Orenburg region	102,3	100,4	98,2	98,6	102,1
Penza region	104,2	104,0	104,2	96,1	104,8
Samara region	105,4	102,5	98,6	98,8	103,1
Saratov region	106,1	102,2	101,6	102,3	105,6
Ulyanovsk region	102,7	101,6	99,5	101,4	101,8

Data from the Federal state statistics service of the Russian Federation

Note the slow pace of productivity growth in the regions of the Volga Federal district, as well as the unstable nature of the dynamics (the presence of values less than 100%) of the index of labor productivity for 2013 to 2017 for these regions: Mari El, Chuvashia, Perm region, Nizhny Novgorod region, Orenburg region, Penza region, Samara region Ulyanovsk region. Also consider the degree of depreciation of fixed assets for the regions of the Volga Federal district (table 2).

Table 2: Depreciation of fixed assets in the regions of the Volga Federal district (%)

The subject of the Volga Federal district	2014	2015	2016	2017	2018
Republic of Bashkortostan	51,6	52,0	51,9	51,3	48,8
Republic Of Mari El	52,5	55,2	55,1	53,0	53,9
Republic of Mordovia	51,0	47,7	48,5	53,3	54,1
Republic of Tatarstan	54,7	48,8	49,9	44,0	41,4
Udmurt Republic	54,3	55,0	56,1	54,4	55,3
Chuvash Republic	48,1	47,3	49,0	50,0	50,3

Perm region	63,6	63,7	65,5	65,3	63,5
Kirov region	53,4	49,4	49,1	48,3	48,5
Nizhny Novgorod region	45,7	26,3	42,1	49,1	50,2
Orenburg region	55,1	54,9	57,1	56,9	56,5
Penza region	57,0	52,0	51,7	46,9	48,2
Samara region	51,4	51,2	51,0	51,1	51,2
Saratov region	50,6	53,0	54,1	53,1	53,7
Ulyanovsk region	43,9	45,2	48,2	48,1	45,8

Data from the Federal state statistics service of the Russian Federation

Note the high level of depreciation of fixed assets (more than 40%) for 2018 for all regions of the Volga Federal district, for the following regions from 2014 to 2018, the degree of wear increased: The Republic of Mari El, the Republic of Mordovia, the Udmurt Republic, the Chuvash Republic, and the Nizhny Novgorod region, Orenburg region, Saratov region, Ulyanovsk region. The need for an active role of the state and a comprehensive approach to the regulation of clustering processes in the Volga region is due to the following restrictions on the formation and development of clusters based only on market mechanisms:

– maintaining low productivity in the economic sectors of the regions that dominate the GRP structure due to the high level of depreciation of fixed assets;
– the predominance of capital-intensive, material-intensive and energy-intensive production capacities in the region's industrial structure;
– maintaining the limitations of the regional policy of improving the investment climate in the field of legal and personnel support.

Mechanisms of state support for clusters

The complexity of the approach to the regulation of regional clustering processes consists in taking into account all the main components of cluster development. As part of the implementation of the cluster policy of the Russian Federation, the author identified three" waves of clustering " of the economic space of Russian regions: the first – 2009-2011, the second – 2011-2013, and the third-2013-2016. In the third wave were created most successfully functioning today clusters (70 innovative and industrial clusters) consider the most effective mechanisms of state support of clusters and their effectiveness based on program data support pilot innovative clusters and industrial cluster support by the Ministry of economic development of the Russian Federation and the Ministry of industry and trade of the Russian Federation. The Ministry of economic development of the Russian Federation used the following mechanisms for state support of clusters:

1. public investment in the creation of innovative and educational infrastructure within the framework of cluster initiatives;
2. implementation of the cluster marketing package: formation of the brand and mission, development of intra-cluster cooperation for the purpose of competitiveness in foreign markets, holding events aimed at promoting the products of enterprises in the cluster of initiatives.
3. organizational and legal support for the implementation of cluster initiatives;
4. information and methodological support of the processes of formation and development of innovative clusters, including the examination of projects and development programs, analysis and forecasting of economic processes;
5. formation of personnel potential of cluster development through programs of professional retraining and advanced training of employees of organizations participating in innovation clusters.

We will also consider the effectiveness of the above mechanisms for state support of clusters for 2013-2015 (the largest number of successfully implemented cluster initiatives) in table 3 (the indicators are given in prices for 2013).

Table 3: Effectiveness of state support mechanisms for innovation clusters for 2013-2015

Performance indicator of state support for innovation clusters	2013.	2014.	2014 to 2013	2015	2015 to 2014	Total for 3 years
Total amount of public investment in the development of innovation clusters, billion rubles.	31,35	34,06	109%	33,21	98%	98,62
Total volume of private investment in the development of innovative clusters, billion rubles.	91,2	132,28	145%	139,4	105%	362,88
The volume of goods, works and services produced by participants of innovative clusters, trillion. rub.	1,54	1,71	111%	1,97	115%	5,22
Number of new (upgraded) high-performance jobs, thousand units.	27,2	32,7	120%	36,1	110%	96
Number of employees of organizations participating in innovation clusters who have undergone professional retraining and advanced training, thousand people	8,29	15,23	184%	16,22	107%	39,74

Calculated based on data from the Russian Ministry of economic development and higher school of Economics

We note the positive dynamics of cluster development indicators against the background of negative trends in the development of the Russian economy in 2014-2015. Thus, with a decrease in the volume of public investment in 2015, this figure was 98% by 2014.) the dynamics of private investment in innovative clusters is characterized by an increase of 5 %. In total, over the three analyzed years, the total amount of public investment in innovation clusters amounted to 98.62 billion rubles, and private investment 362.88 billion rubles. Accordingly, the key indicator of the effectiveness of state support for cluster initiatives, "the volume of attracted private investment per 1 ruble of public investment", is 3.67 rubles.

There was also a steady increase in the volume of production of goods, works and services within the territorial innovation clusters that receive state support, from 1.54 to 1.97 trillion rubles (127.9 %). One of the factors for the growth of production within clusters is the increase in costs for joint scientific and technical projects of organizations participating in innovation clusters. during the analyzed three years, the financing of these projects exceeded 75 billion rubles.

The number of employees of organizations participating in innovation clusters who have undergone professional retraining and advanced training amounted to 39.74 thousand people. The result of the implementation of this mechanism of state support for innovative clusters is an increase in output per employee of organizations participating in clusters from 2630 thousand rubles in 2013 to 2899 thousand rubles in 2014. At the same time, the number of new or upgraded high – performance jobs created at enterprises that are part of innovation clusters exceeded 96,000 in three years, in 2014 this figure increased by 120% and in 2015 by 110%. According to the Ministry of economic development of the Russian Federation, the performance indicators of enterprises in innovative clusters that receive state support significantly exceed similar indicators on average in the region of their localization. The average revenue from the sale of products by enterprises participating in innovative clusters in foreign markets exceeds the same indicator for other enterprises in the region by 20%, while the volume of innovative goods, works and services produced by 60%.

28 January 2016 the Russian Government approved the procedure of competitive selection of joint cluster projects, as well as subsidy costs at all stages of the product life cycle from development to serial production in the implementation of joint projects of enterprises of the industrial cluster (the

Government Decree No. 41 of 28.01.2016). It should be noted that the activities of the cluster participants, which can be used to compensate for the costs of the subsidy, have an innovative and technological orientation, in particular: independent or contract development of design documentation for products; technical testing of prototypes of new products, organization and launch of pilot production of these products; development and introduction of new technologies and technological processes into production; purchase of technical equipment for production facilities; acquisition of specialized software products, including ERP systems and their individual modules. Also, the Federal subsidy can be spent on technological re-equipment of enterprises participating in the cluster as part of payment of lease payments for fixed assets (Abashkin, V.L., S.V. Artemov, A.N. Gusev, 2018). To date, industrial clusters supported by the Ministry of industry and trade of the Russian Federation combine more than 590 industrial enterprises that employ more than 300 thousand people; the average revenue for the year is more than 1.3 trillion rubles, and the amount of tax deductions to the consolidated budget of the Russian Federation exceeds 155 billion rubles.

As a result of the analysis, the following conclusions were obtained. An integrated approach to the scientific problem of regulating the processes of clustering and innovative development of Russian regions is the study of the innovation cluster as a set of infrastructure components and interdependent functional contours. In the course of the study, the following conclusions and results were obtained. The main factor in the formation and development of innovation clusters is the level of development of the regional innovation system's human resources potential. A significant impact on the synchronization of clustering processes and innovative development of economic systems is provided by the presence of a developed innovation infrastructure and a system for training highly qualified personnel.

Based on the dynamics of performance indicators for state support of innovative clusters for 2013-2015, the author concludes that the mechanisms considered correspond to the tasks of regulating clustering processes and innovative development of economic systems in Russian regions at the current stage of cluster policy implementation. The work is addressed to the representatives of academic community and a wide circle of practitioners, scientific and practical significance of the research lies in the possibility of further use of the results obtained in the framework of scientific discussions in a designated field of economic knowledge, as well as the application in practice of management the processes of formation and development of innovation clusters.

The main priority of this stage of the cluster policy was to strengthen the transfer of innovative technologies to the real sector of the economy and the integration of enterprises and scientific and educational organizations of innovative clusters within a single innovation ecosystem. The following mechanisms of state support for clusters were used: public investment in the creation of innovative and educational infrastructure in the framework of cluster initiatives; implementation of a complex of marketing of the cluster: the formation of brand and mission, the development of intra-cluster cooperation with the objective of competitiveness on foreign markets, carrying out activities aimed at promoting the production of enterprises cluster initiatives; organizational support of implementation of cluster initiatives; information and methodological support of the processes of formation and development of innovation clusters; formation of the personnel potential of cluster development through programs of professional retraining and professional development of employees.

Conclusions

In the course of the study, the following conclusions and results were obtained. The main factor in the formation and development of innovation clusters is the level of development of the regional innovation system. The presence of a developed innovation infrastructure has a significant impact on the synchronization of clustering processes and innovative development of economic systems in Russian regions. 27 innovative territorial clusters created under the program of the Ministry of economic development are located on the territory of subjects of the Russian Federation that have a high level of innovative development.

The following mechanisms of state support for innovative clusters that are successfully used in Russian regions are highlighted: state investments for creating innovative and educational infrastructure, building a brand and mission, developing intra-cluster cooperation for the purpose of competitiveness in foreign markets, organizational and legal support for the implementation of cluster initiatives, information and methodological support for the formation and development of innovative clusters, expertise of development projects and programs, analysis and forecasting of economic processes, formation of the personnel potential of cluster development through programs of professional retraining and professional development of employees of organizations participating in innovative clusters.

As a debatable frame of study of the issue, it is necessary to highlight the possibility of building an adequate approach to modern Russian conditions to synchronize the processes of clustering and innovative development of the economic system of the regions. The development of methodological bases of regulation of clustering processes and innovative development of economic systems of Russian regions is focused on the following additional aspects of this scientific problem:

1. The development of a unified system formally clear quantitative criteria for identification of regional industrial clusters, innovation clusters, multi-cluster formations, as well as their differentiation from territorial production complexes, quadilateral etc.
2. Development of an interrelated set of methods and tools for the formation of an empirical base for a coordinated study of the spatial, sectoral, infrastructural and institutional structure of clusters.
3. Development of methods for studying the evolutionary dynamics of clusters through the comparison of changes in the internal structure of the cluster and identification of models for the implementation of these changes in the economic space of the region.

The target group of consumers of the results of scientific activities includes officials, state authorities and local self-government of constituent entities of the Russian Federation, Federal Supervisory authorities, utilities companies and other bodies of coordination and management clusters, the management of industrial enterprises, institutions of territorial and sectoral development. The obtained scientific results will be the theoretical and methodological basis for analytical and project activities in the following areas:

1. methodological support for the formation and development of regional industrial and innovative clusters, analysis of the effectiveness of the implementation of measures of state support for cluster initiatives;
2. organizational design of development institutions and objects of the innovation infrastructure of clusters as the basis of its investment attractiveness;
3. formation on the basis of the cluster concept of an integrated approach to the policy of territorial development of municipalities.

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References

- Abashkin, V.L., E.S. Kucenko, E.A. Islankina (2016). The fate of cluster initiatives in Russia: assessing the role of the state, neighborhood, age, and innovation environment. Moscow, April 22, 2016, [Online]. [Retrieved 23 January, 2020], https://cluster.hse.ru/mirror/pubs/share/216051054

- Abashkin, V.L., S.V. Artemov, A.N. Gusev (2018). Cluster policy: achieving global competitiveness. Issue 2. Publisher of Ministry of economic development of Russia and National Research University Higher School of Economics, Moscow.

- Competitiveness Clusters in France [Online], [Retrieved 25 January, 2020], http://competitivite.gouv .fr/documents/commun/Documentation_poles/ brochures_poles/anglais/brochure-ang-internet.pdf

- Etzkowitz, H., Leydesdorff, L. (2000) The dynamics of innovation: From national systems and "Mode 2" to a triple helix of university-industry-government relations, Research Policy, Vol.29, no. 2, 109—123.

- Federal state statistics service of the Russian Federation [Online], [Retrieved 23 January, 2020], https://www.gks.ru/

- Hart D.A. (2006) 'Innovation clusters: key concepts,' [Online], [Retrieved August 23, 2019], www.reading.ac.uk/lm/lm/fulltxt/0600.pdf.

- InnoRegio. Bundesministerium fur Bildung und Forschung [Online], [Retrieved 25 January, 2020], https://www.unternehmen-region.de/de/159.php

- Ketels, C.H. (2013), Cluster policy: A guide to the state of the debate. In: Meusburger, P.Glückler, J., el Meskioui, M. (eds.) Knowledge and the economy, Publisher of Springer, Dordrecht, p. 249—269.

- Lindqvist, G. (2009) Disentangling Clusters: Agglomeration and Proximity Effects, Publisher of EFI, Stockholm.

- Napolskikh, D.L. (2014) Institutionalization of innovation clusters in the modern Russian economy. Dissertation for the degree of candidate of economic Sciences. Kazan Federal University. Kazan.

- Porter, M.E., Ketels, C.H. (2009) Clusters and industrial districts: Common roots, differentperspectives. In: Becattini, G., Bellandi, M., de Propis, L. (eds.) A handbook of industrial districts, Cheltenham, Edward Elgar, p. 172—183.

- Russian cluster Observatory [Online], [Retrieved 23 January, 2020], https://cluster.hse.ru

- Sölvell, Ö. (2009) Clusters – Balancing Evolutionary and Constructive Forces, Ivory Tower Pub, Stockholm.

Towards Smart and Sustainable Manufacturing – an Overview

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Abstract

On the perspective of sustainability the Smart manufacturing (SM) has the potential to bring fundamental improvements. Technology influences and interacts with the economic dimension (e.g. it allows new business solutions), with the environment (e.g. providing solutions to nature and resource conservation) and with the society (e.g. it supports new living models), besides acting as a powerful tool to give resources for "meeting the needs of the present generation without compromising the ability of future generations to meet their own needs". In other words, it is not possible to look for solutions to the sustainability manufacturing issue without considering technology as an integral component of the development. This paper presents a literature review identifying themes and trends of smart manufacturing and their expected effect on sustainable manufacturing. The findings from the literature survey show potential effect of the smart manufacturing technologies on sustainability.

Keywords: Smart Manufacturing, Industry 4.0, Sustainable Manufacturing,

Introduction

Since the end of the 1980s, because of the "Our common future" report published by the World Environment and Development Committee, politics, economy and science have been dominated by the term "sustainable development". In the Report, "sustainable development" has been defined as a "process of change, in which exploitation of resources, new investments, orientation on technology development and institutional changes are focused on the current and future needs of society". In order to deal with serious issues such as environment pollution and global warming the concept of sustainable manufacturing was proposed. Bonvoisin et al. (2017) defined the sustainable manufacturing scope in four areas: (1) manufacturing technologies –"how things are produced"; (2) product development – "what is being produced"; (3) value creation networks –"in which organizational context" and global manufacturing impacts – "how to make a systemic change". For manufacturers sustainability has been emerging as a new competitive requirement. Companies that choose to become more sustainable in their everyday practices adopt goals and targets consistent with sustainable manufacturing principles and develop goals and strategies for their implementation, implement them and measure their effectiveness.

From the other hand, the emerging technologies such as Internet of Things (IoT), wireless sensor networks, big data, artificial intelligence, cloud computing, and mobile Internet) are being introduced into the manufacturing environment. In the literature on manufacturing, the changes are referred to as the next industrial revolution, which is often referred as "Smart manufacturing" (predominantly used in the USA), "Industry 4.0" (predominantly used in Germany/Europe) and "Smart Factory" (predominantly used in Korea/Asia/Europe) (Kang et al., 2016;Thoben et al, 2017). The Boston Consulting Group (BCG) has proposed nine pillars of Industry 4.0 namely the use of the cloud, augmented reality, big data and analytics, autonomous robots, simulation, horizontal and vertical integration, the industrial Internet of Things, additive manufacturing and cyber security (Rüßmann et

al., 2015). According Rüßmann et al. (2015), these characteristics represent the behavioural and other shifts that enable company to operate according to the principles of the new manufacturing paradigm. Manufacturers and scientists alike have high expectations of new technologies of Industry 4.0 including modern modelling methods (Waszkowski, 2018). Industry 4.0 technologies can provide manufacturers with the ability to leverage advanced manufacturing and IT capabilities throughout the entire product life cycle, thus enabling more efficient and sustainable manufacturing processes.

Industry 4.0, and Sustainability are important concerns for the manufacturing companies, principally, the influence of Industry 4.0, in the three main pillars of sustainability: economic, environmental, and social. The purpose of this paper is to present a literature review identifying themes and trends of smart manufacturing and their expected effect on sustainable manufacturing.

Literature Research

Smart Manufacturing

Smart manufacturing, a term originated in the United States has gained significant momentum in industry and academia in recent years. Many manufacturing systems are presenting themselves as SM systems. However, although the term "smart manufacturing"is very often used in the literature, there is still a lack of a unified definition of SM and commonly accepted understanding about what defines a manufacturing system as "smart" (Qu et al., 2019). Intelligent manufacturing, additive manufacturing, digital manufacturing, smart factory, smart manufacturing and Industry 4.0 are actually being used synonymously. Some examples of definitions of SM are introduced in the table 1.

Table 1: Smart manufacturing definition – examples

Author	Definition
NIST	"fully-integrated, collaborative manufacturing systems that respond in real time to meet changing demands and conditions in the factory, in the supply network, and in customer needs"
Wallace & Riddick, 2013	"a data intensive application of information technology at the shop floor level and above to enable intelligent, efficient and responsive operations"
Davis et al., 2015	"is a set of manufacturing practices that use networked data and information and communication technologies (ICTs) for governing manufacturing operations"
Smart Manufacturing Leadership Coalition, 2011	"is the intensified application of advanced intelligence systems to enable rapid manufacturing of new products, dynamic response to product demand, and real-time optimization of manufacturing production and supply chain networks"

According (Qu et al., 2019) the key objective requirements of SM are: autonomous lean operation (Autonomous operation, Lean manufacturing), Sustainable value (Economic value, Environmental value and Social value) and Win-win partnership (Multi-stakeholder such as customer, supplier, communities and manufacturers). Smart manufacturing characteristics include digitalization and service-orientation, smart devices and smart software, collaborative supply networks enabled by advanced analytics tools, with the goal of enabling cost-efficient, flexible, and personalized mass-production (Radziwon et al., 2014, Grzybowska et al., 2014; Lu, et al. 2016). The differences between a today's factory and an Industry 4.0 factory are presented in the table 2.

Table 2: Comparison of today's factory and Smart/Industry 4.0 factory (Lee et al., 2014)

Lewel	Data source	Today's factory	Factory 4.0	
		Key attributes	Key attributes	Key technologies
Component	Sensor	Precision	Self-Aware Self-Predict	Degradation Monitoring & Remaining Useful Life Prediction
Machine	Controller	Productivity & Performance	Self-Aware Self-Predict Self-Compare	Up Time with Predictive Health Monitoring
Production system	Networked manufacturing system	Productivity & OEE	Self-Configure Self – Maintain Self - Organize	Worry-free Productivity

The technology represents main components of SM. Based on literature analysis, Mittal et al. (2019) identified 38 technologies that are associated with SM, for example: Intelligent control; Augmented Reality (AR), Virtual Reality (VR), real-time communication, big data, IoT, Cloud computing, additive manufacturing, smart sensors, data analytics, predictive analytics, data visualization, GIS, RFID, simulation, etc. With the implementation of these technologies, the manufacturing industry will be enabled to dynamically change its performance levels to meet fluctuating customer and stakeholders demand. The examples of definitions of SM/Industry 4.0 technologies are presented in the Table 3.

Table 3: Definitions of Selected SM/Industry 4.0 Technologies

Technologies	Definition	Authors
Additive Manufacturing	"the process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive and formative manufacturing methodologies"	ISO/ASTM 52900:2015
Cloud Manufacturing	"a new networked manufacturing paradigm that organizes manufacturing resources over networks (manufacturing clouds) according to consumers' needs and demand to provide a variety of on-demand manufacturing services via networks (e.g., the Internet) and cloud manufacturing service platforms"	Xu, 2012
Predictive Analytics	" the process of discovering meaningful patterns of data using pattern recognition techniques, statistics, machine learning, artificial intelligence and data mining"	Abbott, 2014
(Big) Data Analytics	"the process of applying serious computing power, the latest in machine learning and artificial intelligence, to seriously massive and often highly complex sets of information"	Microsoft, 2013
Augmented Reality	"a real-time direct or indirect view of a physical real-world environment that has been enhanced/*augmented* by adding virtual computer-generated information to it"	Wikipedia
RFID	"is a generic term for technologies that use radio waves to automatically identify people or objects from a distance of several inches to hundreds of feet"	Parkas et al., 2012
Cyber-Physical Systems	"systems that consist of physical and software components that are deeply intertwined, each operating on different spatial and temporal scales, exhibiting multiple and distinct behavioral modalities, and interacting with each other in a myriad of ways that change with context"	NSF, 2010

Smart manufacturing is not only related to the technological development, but also related to the dynamic requirements of stakeholders. Smart manufacturing systems get real-time data which improves the

accuracy of decision making and enhances the efficiency and performance of the manufacturing processes and equipment.

Sustainable Manufacturing

Manufacturing systems have spanned fourth major phases: mass production, lean manufacturing, green manufacturing and now sustainable manufacturing. First, mass production introduced the principle of improving job efficiency in place of improving labor productivity. Second, globalization triggered manufacturers to adopt lean manufacturing principles of waste reduction and continuous improvement. Third, increasing demands for eco-friendly products from customers and environmental concerns triggered manufacturers to adopt green manufacturing principles, and the forth, social responsibility have motivated sustainable manufacturing (Jasiulewicz-Kaczmarek, 2019). According to the definition provided by the Department of Commerce in the US, Sustainable Manufacturing is "the creation of manufactured products that use processes that minimize negative environmental impacts, conserve energy and natural resources, are safe for employees, communities and consumers, and are economically sound". Sustainable manufacturing is defined in many ways (as a strategy or approach, as a paradigm or a system, as a process or a feature), depending on the author and the direction of their research. Examples of the "Sustainable manufacturing" definitions are shown in Table 4.

Table 4: Sustainable manufacturing definition – examples

Authors	Definition
LCSP, 1998	"creation of goods and services using processes and systems that are non-polluting; conserving of energy and natural resources; economically viable; safe and healthful for employees, communities and consumers; and socially and creatively rewarding for all working people"
Garetti & Taisch, 2012	"the ability to smartly use natural resources for manufacturing by creating products and solutions that, thanks to new technology, regulatory measures and coherent social behaviors, are able to satisfy economic, environmental and social objectives, thus preserving the environment, while continuing to improve the quality of human life"
Moldavska & Martinsen, 2018	"a complex behaviour pattern to which any manufacturing organization should tend to evolve"

Rachuri et al. (2010) argue that sustainable manufacturing can be viewed as a systems approach for the creation and distribution (supply chain) of innovative products and services that minimizes resources (e.g., materials, energy, water, and land); eliminates toxic substances; and produces zero waste across the entire life cycle of products and services. According to Lee at al. (2017) "in all definitions, sustainability within a manufacturing system must be considered in the context of a closed system using spatially- and temporally-defined boundaries".

Literature studies indicate that the main expectations of sustainable manufacturing system are (Kannegiesser & Günther, 2014; Gola 2019; Kishawy et al., 2018): to reduce the energy consumption, minimize the waste, improve the product durability, decrease the environmental and health concerns, enhance the quality of the product, and develop renewable energy resources. To meet these expectations, developing adequate strategies, introducing them to the company's everyday practices and measuring the results of their effectiveness are required. Manufacturing strategies based on these pillars of sustainability were the impulse for developing numerous practices and projects undertaken by companies. The majority of studies on sustainability practices have tackled mainly environmental practices such as eco-design, renewable energy usage, energy and material optimization, recycling, product life cycle management, waste minimization and noise reduction (Paszkowski & Sobiech, 2018; Paszkowski, 2019). Regarding social sustainability the most often implemented practices, specifically about workers are: internal safety inspections, external work environment audits, employee training on

hazardous risks, health and safety management systems, training plans and career development programs (Jasiulewicz-Kaczmarek, 2018). With regard to economic sustainability the most often implemented by manufacturing organization practices are e.g. financial KPI measurement, monitoring and assessing the business objectives, and technology investment prioritization.

Despite the fact that the literature provides numerous strategies and practices supporting the implementation of sustainability in manufacturing e.g. based on: TBL (Rosen & Kishawy, 2012), product life cycle (de Bruckeret et al., 2013), stakeholders (de Bruckeret et al., 2013; Matos & Silvestre, 2013), supply chain management (Giovanni & Vinzi, 2012), it is still a significant challenge for practitioners. According Dubey et al. (2017) and Luthra et al. (2016), the main barriers of sustainable manufacturing are, among others,): lack of expertise and experience that people of the organization should have in the field of sustainability, especially environmental sustainability, lack of collected and analyzed data from the flow of materials and energy leading to savings and reduced pollution, lack of sustainability standards and appropriate regulations, lack of top management commitment to initiate sustainability efforts, lack of technology and infrastructure readiness, etc.

Smart and Sustainable Manufacturing

Smart manufacturing and sustainable manufacturing are important themes in manufacturing enterprises. Recently, some studies (e.g. Machado et al., 2019; Varela et al., 2019) have identified several interlinks between Industry 4.0 technologies and sustainable operations. De Man and Strandhagen (2017) discuss the influence of Industry 4.0 on sustainable business models, Kamble et all, (2019) focus on the effects of Industry 4.0 technologies on Lean Manufacturing Practices for sustainable organizations. Figure 1 describes the three application areas and technical enablers from Industry 4.0. The technology enablers (presented in the outer rim of the circle) include smart sensors, smart maintenance, robotics, smart logistics, machine-to-machine communication (M2M), monitoring tools and others.

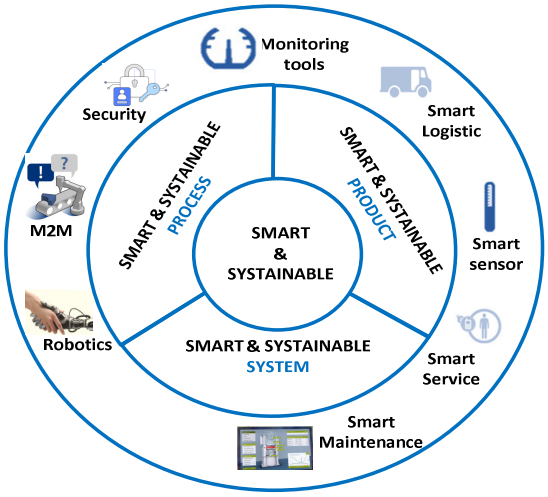

Fig. 1: Opportunities from Industry 4.0 for sustainability, and its key enablers.

In the manufacturing context, a **product is defined as smart** if it has the ability to know its state, position, history, target product and flow alternatives. According Wright (2014) and Almada-Lobo (2016) smart products in manufacturing currently use sensing systems to monitor their behaviour. The 'smart' concept connotes products that are intelligent. Thus, decision-making processes therein use artificial intelligence control algorithms such as fuzzy logic and genetic algorithms, which play a crucial role in information processing (Molina et al. 2014).

An **smart & sustainable (S&S) product** could comprise a physical structure, sensors, actuators, a smart module (for information processing and control), a wireless module, wireless data transmission and user interfaces, which may be even automatically generated (Waszkowski, 2019). The concept of sustainability is represented by a description of the three phases of a product's life cycle: Beginning of Life (BOL), Middle of Life (MOL), and End of Life (EOL). Table 5 shows the lifecycle phases and the related factors that are classified according to the triple bottom line to be considered during an S&S product development process. S&S products are a new generation of products. These products take advantage of the concomitant resources (connectivity, flexibility, customization and environmental care, among others) and consider sustainability in economic, social and environmental terms

Table 5: Sustainability considerations throughout different stages of an S&S product's life cycle

Phases of a product's life cycle:	Sustainability dimension	Economic	Environmental	Social
	BOL	• Raw material cost • Production cost • Packaging cost • Energy cost • Transportation cost	• Production energy • Hazardous wastes • Renewable energy	• Social responsibility • Work safety • Ergonomics
	MOL	• Maintenance cost • Repair cost • Consumer injury • Consumer warranty	• Emissions • Functionality • Hazardous wastes	• Product pricing • Human safety • Upgradeability • Complaints
	EOL	• Recycling cost • Disassembly cost • Disposal cost • Remanufacturing cost	• Recyclability • Re-manufacturability • Redesign • Landfill contribution	• Take back • Reuse • Recover

In **production processes "smartness"** is achieved using electronic hardware/software, as well as networking of production resources. Compared with traditional manufacturing, more ancillary hardware and software, like RFID tags, barcodes, laser markers, sensors, as well as communication infrastructure, will be embedded into the factory to enable machines to collaborate with each other using intelligent analytics.

From the system layer, by collecting, monitoring, and analysing data collected from relevant sources within and beyond the manufacturing system itself, smart manufacturing system provide information to decision makers. In this way, smart manufacturing system can help manufacturers identify and respond to system-level manufacturing inefficiencies (Dornfeld et al., 2009).

According to Kusiak (2019) "the scope and implications of sustainability is much larger than any other attribute of sustainability and it makes an important characteristic of smart manufacturing". Implementations of Industry 4.0 technologies in production processes have several sustainability impacts. The illustration (Figure 2) from the Boston Consulting Group shows some of these possibilities.

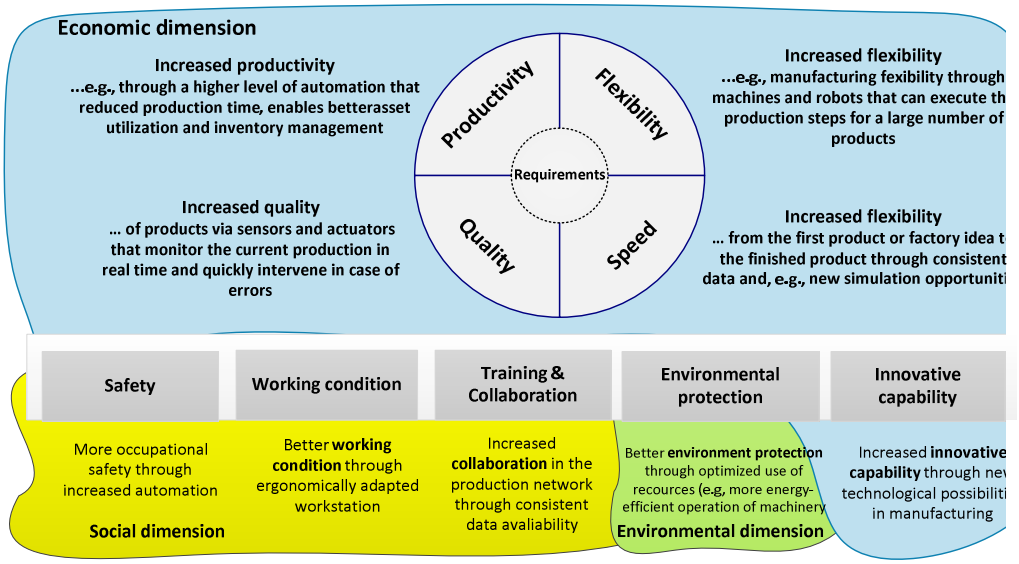

Fig. 2: Benefits from Industry 4.0 technologies (based on Rose et al., 2016)

Referring to the economic perspective of sustainability, transparency and interconnection of processes allow their optimization, increasing efficiency, flexibility, quality, and customization (Demartini et al., 2019; Juszczyński & Kowalski, 2013). Regarding the ecological dimension of sustainability, Industry 4.0 enables several benefits, too (Jabbour et al., 2018). This is based for example on simulation (Müller et al., 2018), digitalization (Burritt & Christ, 2016, Doni et al., 2019) and additive technologies (Bonilla et al., 2018). Finally, with regards to the impact on the social dimension, literature shows that Industry 4.0 technologies support a safer workplace (Müller et al., 2018; Gobbo et al., 2018). A safer workplace is a consequence of the reduction of safety incidents, and the increased morale of the employees (Braccini & Margherita, 2019). According Xu et al., (2018) "the arrival of Industry 4.0 will affect the style of work, transforming the traditional work-as-survival to work-for-life, to a final life-as-work".

Conclusions

In this paper, the authors introduced the basic concepts of the two manufacturing paradigms namely Smart manufacturing and Sustainable manufacturing. Then, the main technologies of smart manufacturing were discussed, which highlighted the benefits for sustainable manufacturing. The traditional manufacturing fails to meet current environmental and social requirements since it consumes the future generations' resources and harms the environment and society. Thus, the importance of new technologies is widely recognized. The application of Industry 4.0 technologies allows organisations to learn more about their manufacturing processes and resources than was previously possible. By simultaneously performing horizontal integration (strengthening the cooperation among companies), vertical integration (integration among different subsystems in company), and end-to-end integration (combination of design, customers' needs, and dynamic adjustment of production), smart manufacturing is able to make the production process more sustainable.

Future studies should de focused on assessing the real manufacturing context through in-depth case studies will be required to gain deeper understanding of how smart manufacturing technologies support sustainability practices in enterprises. Such in-depth case studies will contribute to understanding of how organizations can deploy smart technologies to innovate and transform their business practices to enhance economic, environmental and social performance.

References

- Abbott, D. (2014) Applied Predictive Analytics: Principles and Techniques for the Professional Data Analyst, John Wiley & Sons.

- Almada-Lobo, F. (2016) 'The Industry 4.0 revolution and the future of Manufacturing Execution Systems,' *Journal of Innovation Management,* 3(4), 16-21

- Bonilla, SH., Silva, HRO., da Silva, MT., Gonçalves, RF and Sacomano, JB. (2018) 'Industry 4.0 and Sustainability Implications: A Scenario-Based Analysis of the Impacts and Challenges,' *Sustainability* 10 3740 doi:10.3390/su10103740

- Bonvoisin, J., Stark, R. and Seliger, G. (2017), Field of Research in Sustainable Manufacturing. Sustainable Manufacturing, Sustainable Production Life Cycle Engineering and Management, Stark R., Seliger G., Bonvoisin J. (ed), Springer, Cham

- Braccini, AM. and Margherita, EG. (2019) 'Exploring Organizational Sustainability of Industry 4.0 under the Triple Bottom Line: The Case of a Manufacturing Company,' *Sustainability,* 11 36 doi:10.3390/su11010036

- Burritt, R. and Christ, K. (2016) 'Industry 4.0 and environmental accounting: A new revolution?,' *Asian Journal* of *Sustainability* and Social *Responsibility* (AJSSR), 1, 23–38.

- Davis, J., Edgar. T., Graybill, R., Korambath, P., Schott, B., Swink,D., Wang, J. and Wetzel, J. (2015) 'Smart manufacturing,' *Annual Review of Chemical and Biomolecular Engineering,* 6, 141–160.

- De Brucker, K., Macharis, C. and Verbeke, A. (2013) ,Multi-criteria analysis and the resolution of sustainable development dilemmas: a stakeholder management approach,' *European Journal of Operational Research,* 224(1), 122–131.

- De Man, JC. and Strandhagen, JO. (2017) 'An Industry 4.0 Research Agenda for Sustainable Business Models,' *Procedia CIRP,* 63721–726.

- Demartini, M., Evans, S. and Tonelli, F. (2019) 'Digitalization Technologies for Industrial Sustainability,' *Procedia Manufacturing*, 33, 264–271.

- Doni, F., Corvino, A. and Martini, SB. (2019) 'Servitization and sustainability actions. Evidence from European manufacturing companies,' *Journal of Environmental Management*, 234, 367–378.

- Dornfeld, DA., Wright, PK., Vijayaraghavan, A. and Helu, M. (2009) 'Enabling manufacturing research through interoperability,' Transactions of the NAMRI/SME. 37,443–444

- Dubey, R., Gunasekaran, A., Papadopoulos, T., Childe, SJ., Shibin, KT. and Wamba, SF. (2017) 'Sustainable supply chain management: framework and further research directions,' *Journal of Cleaner Production,* 142(2), 1119-1130.

- Faulkner, W. and Badurdeen, F. (2014) 'Sustainable Value Stream Mapping (Sus-VSM): methodology to visualize and assess manufacturing sustainability performance,' *Journal of Cleaner Production*, 85, 8-18

- Garetti, M. and Taisch, M. (2012) 'Sustainable manufacturing: trends and research challenges,' *Production Planning and Control* 23(2-3), 83-104.
- Giovanni, PD. and Vinzi, VE. (2012) 'Covariance versus component-based estimations of performance in green supply chain management,' *International Journal of Production Economics*, 135(2), 907–916.

- Gobbo. JA., Busso, CM., Gobbo, SCO. and Carreão, H. (2018) 'Making the links among environmental protection, process safety, and industry 4.0,' *Process* Safety and *Environmental Protection,* 117, 372–382.

- Gola, A. (2019) 'Reliability analysis of reconfigurable manufacturing system structures using computer simulation methods,' *Eksploatacja i Niezawodnosc – Maintenance and Reliability,* 21(1), 90-102.

- Grzybowska, K., Awasthi, A. and Hussain, M. (2014) 'Modeling enablers for sustainable logistics collaboration integrating Canadian and Polish perspectives,' *ACSIS*, 2, 1311–1319.

- ISO/ASTM 52900:2015 Additive manufacturing — General principles — Terminology

- Jabbour, ABLS., Jabbour, CJC., Foropon, C. and Godinho Filho, M. (2018) 'When titans meet – Can industry 4.0 revolutionize the environmentally sustainable manufacturing wave? The role of critical success factors,' *Technological Forecasting & Social Change*, 132, 18–25.

- Jasiulewicz-Kaczmarek, M. (2018), 'Identification of maintenance factors influencing the development of sustainable production processes–a pilot study,' IOP Conf. Series: Materials Science and Engineering 400 062014 DOI:10.1088/1757-899X/400/6/062014

- Jasiulewicz-Kaczmarek, M. (2019) Sustainable Maintenance Assessment Model of Enterprise Technical Infrastructure, Poznan University of Technology Publishers, Poznan.

- Juszczyński, M. and Kowalski, A. (2013) 'Achieving desired cycle times by modelling production systems,' *Lecture Notes in Computer Science*, 8104, 476–486.

- Kamble, S., Angappa, G. and Dhone, NC. (2019) 'Industry 4.0 and Lean Manufacturing Practices for Sustainable Organisational Performance in Indian Manufacturing Companies,' *International Journal of Production Research*, 1–19.

- Kang, HS., Lee, JY., Choi, SS., Kim, H. Park, JH., Son, JY, Kim, BH. and Noh, SD. (2016) 'Smart manufacturing: past research, present findings, and future directions,' *International Journal of Precision Engineering and Manufacturing-Green Technology*, 3(1), 111–128.

- Kannegiesser, M. and Günther, HO. (2014) 'Sustainable development of global supply chains—part 1: sustainability optimization framework,' *Flexible Services and Manufacturing Journal,* 26(1-2), 24–47.

- Kishawy, HA., Hegab, H. and Saad, E. (2018) 'Design for Sustainable Manufacturing: Approach, Implementation, and Assessment' *Sustainability,* 10 3604 doi:10.3390/su10103604

- Kusiak, A.(2019) 'Fundamentals of smart manufacturing: A multi-thread perspective,' *Annual Reviews in Control*, 47, 214–22

- Lee, J., Bagheri, B. and Kao, HA. (2014), 'Recent advances and trends of cyber-physical systems and big data analytics in industrial informatics' Proceedings of the international conference on industrial informatics, Porto Alegre, Brazil, 27–30 July 2014. New York: IEEE

- Lee YT., Kumaraguru, S., Jain, S., Robinson, S.,Helu, M., Hatim, QY., Rachuri, S., Dornfeld D., Saldana, CJ. and Kumara, S. (2017) 'A Classification Scheme for Smart Manufacturing Systems' Performance Metrics,' *Smart Sustain Manufacturing System* 1(1), 52–74. doi:10.1520/SSMS20160012

- Lowell Center for Sustainable Production 1998 Sustainable Production: A Working Definition, Informal Meeting of the Committee Members

- Lu, Y., Morris, KC. and Frechette, S. (2016) 'Current Standards Landscape for Smart Manufacturing Systems,' NIST: Gaitehrsburg MD USA, 8107

- Luthra, S., Mangla, SK., Xu, L. and Diabat, A. (2016) 'Using AHP to evaluate barriers in adopting sustainable consumption and production initiatives in a supply chain,' *International Journal of Production Economics,* 181, 342-349.

- Machado, CG., Winroth, MP. and Ribeiroda Silva, EHD. (2019) 'Sustainable manufacturing in Industry 4.0: an emerging research agenda,' *International Journal of Production Research* https://doi.org/10.1080/00207543.2019.1652777

- Matos, S. and Silvestre, BS. (2013) 'Managing stakeholder relations when developing sustainable business models: The case of the Brazilian energy sector,' *Journal of Cleaner Production*, 45, 61–73.

- Mittal, S., Khan, MA., Romero, D. and Wuest, T. (2019) 'Smart manufacturing: Characteristics, technologies and enabling factors,' *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture,* 233(5), 1342–1361.

- Moldavska, A. and Martinsen, K. (2018), 'Defining sustainable manufacturing using a concept of attractor as a metaphor,' *Procedia CIRP*, 67, 93- 97.

- Molina, A., Ponce, P., Ramírez, M. and Sánchez-Ante, G. (2014) 'Designing a S2-Enterprise (Smart x Sensing) reference model,' *Advances in Information and Communication Technology*, 434, 384-395.

- Müller, JM., Kiel, D. and Voigt, KI. (2018) 'What Drives the Implementation of Industry 4.0? The Role of Opportunities and Challenges in the Context of Sustainability,' *Sustainability* 10, 247
- National Science Foundation: Arlingation, NSF. Cyber-Physical Systems (CPS); VA, USA, 2010

- Parkash, D., Kundu, T. and Kaur, P. (2012) 'The RFID technology and its applications: a review,' *International Journal of Electronics, Communication & Instrumentation Engineering Research and Development (IJECIERD)*, 2(3), 109-120.

- Paszkowski, W. (2019) 'The assessment of acoustic effects of exploited road vehicles with the use of subjective features of sound,' *Eksploatacja i Niezawodność – Maintenance and Reliability,* 21(3), 522-529.

- Paszkowski, W. and Sobiech, M. (2019) 'The modeling of the acoustic condition of urban environment using noise annoyance assessment,' *Environmental Modeling &Assessment,* 24, 319-330.

- Qu, YJ., Ming, XG., Liu, ZW., Zhang, XY. and Hou, ZT. (2019) 'Smart manufacturing systems: state of the art and future trends,' *The International Journal of Advanced Manufacturing Technology,* https://doi.org/10.1007/s00170-019-03754-7

- Radziwon, A., Bilberg, A., Bogers, M. and Madsen, ES. (2014) 'The Smart Factory: Exploring Adaptive and Flexible Manufacturing Solutions,' *Procedia Engineering*, 69, 1184–1190.

- Rose, J., Lukic, V., Milton, T. and Cappuzzo, A. (2016) 'Sprinting to value I Industry 4.0. Perspectives from and implications for U.S. manufacturers,' [Retrieved December 20, 2019], https://www.slideshare.net /TheBostonConsultingGroup/sprinting-to-value-in-industry-40

- Rosen, MA. and Kishawy, HA. (2012) 'Sustainable manufacturing and design: Concepts, practices and needs,' *Sustainability,* 4, 2154-174.

- Rachuri, S., Lee, JH., Narayanan, A., Sarkar, P., Lyons, K., Sriram, R. and Kemmerer, S. (2010) 'Sustainable manufacturing: Metrics, standards, and infrastructure' NIST Workshop Report, NIST Interagency/Internal Report (NISTIR) – 7683.

- Rüßmann, M., Lorenz, M., Gerbert, P., Waldner, M., Justus, J., Engel, P. and Harnisch, M. (2015) 'Industry 4.0: The future of productivity and growth in manufacturing industries,' *Boston Consulting Group*

- Smart Manufacturing Leadership Coalition (2011) 'Implementing 21st century smart manufacturing report' [Retrieved November 10, 2019], https://www.controlglobal.com/assets/11WPpdf/110621_SMLC-smart-manufacturing.pdf

- Thoben, KD., Wiesner, S. and Wuest, T. (2017) 'Industrie 4.0" and Smart Manufacturing–A Review of Research Issues and Application Examples,' *International Journal* of Automotive *Technology*, 11(1), 4-16.

- Varela. L., Araújo, A., Ávila, P., Castro, H. and Putnik, G. (2019) 'Evaluation of the Relation between Lean Manufacturing, Industry 4.0, and Sustainability,' *Sustainability*, 11, 1439 doi:10.3390/su11051439

- Waszkowski, R. (2019). Low-code platform for automating business processes in manufacturing. IFAC-PapersOnLine, 52(10), 376–381. https://doi.org/10.1016/j.ifacol.2019.10.060

- Waszkowski, R. (2018). Multidimensional modeling and analysis of business processes. In Oanta, E and Naito, M and Carausu, C and Topala, P and Placzek, M and Schnakovszky, C and Paunoiu, V and Cohal, V and Nedelcu, D (Ed.), Modtech International Conference - Modern Technologies In Industrial Engineering VI (MODTECH 2018). https://doi.org/10.1088/1757-899X/400/6/062031

- Wallace, E. and Riddick, F. (2013) Panel on Enabling Smart Manufacturing, State College, USA.

- Wikipedia, the free encyclopedia [Retrieved December 20, 2019], http://en.wikipedia.org/wiki/Augmented reality,AugmentedReality

- Wright, P. (2014) 'Cyber-physical product manufacturing,' *Manufacturing Letters,* 2(2), 49-53.

- Xu, LD., Xu. EL. and Li, L. (2018) 'Industry 4.0: state of the art and future trends,' *International Journal of Production Research* 56(8), 2941-2962.

- Xu, X. (2012) 'From cloud computing to cloud manufacturing,' *Robotics* and *Computer-Integrated Manufacturing,* 28, 75–86.

Formation of Institutional Architectonics of The Regional Industrial Complex

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Abstract

It has been substantiated in the article that institutional architectonics at the level of the economic system is extremely dynamic and changes both evolutionarily and revolutionary. The formation of relevant institutions and institutes occurs in parallel with the development of the economic system. Institutional architectonics defines the structure of institutions, which is formed as a result of coordination of economic entities actions, rules, norms, established traditions and perceptions of economic processes and the existing set of institutions that cause certain impact on the economic environment. It has been proved that in the context of deepening integration processes, the Ukrainian economy is forced to introduce its own market institutions, based on the principles of the Y type matrix, but adapted to Ukrainian realities within a short period of time. Approach to the formation of the institutional architectonics of the regional industrial policy of Ukraine has been proposed, which is based on a set of measures of a regulatory, compensatory and motivational nature aimed at solving applied problems related to ensuring the effective development of the regional industrial complex. It has been determined that an important element of institutional architectonics is the formation of a model of interaction and relationships, as a system of stable functional relationships between the basic institutions of the regional industrial complex. The characteristics of the following models of interaction and relationships have been analyzed: pluralistic, neo-corporatist and patronage. It has been determined that at the moment in the industrial sector of Ukraine the features of the patronage (paternalistic) type of model of interaction and relationships are predominant. The necessity of the

transition to a neo-corporatist model of interaction and relationships has been substantiated, which is associated with the redistribution of powers between levels of government – central, regional and self-government.

Keywords: institutional architectonics, regional industrial policy, institutional matrix.

Introduction

The development of the economic system is based on the results of evolutionary or revolutionary changes in its three main elements: productive forces, economic relations and the management mechanism. An important role in the development of the economic system is played by the existing management mechanism, which is based on a set of institutions that perform managerial and regulatory functions in order to improve and coordinate economic processes.

It should be noted that the content of the concept "*institution*", from an economic point of view, defines a set of laws, norms, "rules of the game" and "rules of behavior" of economic entities that are formed under the influence of currently existing economic relations (technical and economic, organizational and economic, social and economic).

Brief Literature Review

In research study by Kostyrko and Tymofii'v (2014) *institutions* are the material carriers of the functions of institutes (organizations and institutions) that implement these functions in economic life.

In the book by Mel'nychuk (2010) Architectonics (from Greek. αρχιτεκτονικη – construction art, architecture) – is a harmonious combination of parts into one. In addition, this concept can be interpreted as the basic principle of construction, connection and interdependence of the elements of the whole. Institutional architectonics is a complex, multidimensional, multiaspect model and a very capacious economic category that has its own structure and is based on the principle of systematicity**.**

Institutional architectonics at the level of the economic system is extremely dynamic and changes both evolutionarily and revolutionary. The formation of relevant institutions and institutes occurs in parallel with the development of the economic system. Some of them evolutionarily developing, change their shape and structure, "adapt" to existing conditions, others disappear, because their content does not meet the requirements of society.

In research study by Grycenko (2005), institutional architectonics is defined as the structure of institutions, which is formed as a result of the coordination of actions of economic entities, rules, norms, established traditions and perceptions of economic processes and the existing set of institutions that cause a certain impact on the economic environment. Almost at every stage of development of the economic system, certain changes in institutional architectonics occur. The reaction of economic entities to environmental factors, globalization and integration processes, the need to harmonize values and rules of economic behavior, the challenges of the modern model of development of the national economy determine the features of the modern stage of institutional architectonics formation in Ukraine.

Some scholars emphasize that, despite the significant influence of internal and external factors on the process of institutional architectonics, there are certain basic institutions – deep, historically stable foundations of social practice that ensure the reproduction of social infrastructure in different types of society.
In a research study by S. Kirdina (2007), a Russian researcher, uses the notion of an "institutional matrix" – a stable, historically formed system of basic institutions that regulate the interconnected functioning of major social subsystems – economic, political, and ideological.

Bessonova, O. Je. (2007) has formulated the specific historical periods, the institutional matrix is a set of forms of basic and compensatory institutions, elements of which are presented in the form of legislative rules and regulations.

According to S. Kirdina (2007), there are two types of institutional matrix, conventionally called the X and Y-matrices, or "eastern" and "western". Each of these types of matrix is characterized by differences in their institutions:

- for Y (Western) type of matrix the following basic institutions are inherent: in the economic sphere – market institutions; in the political sphere – the institutions of the federation in the broad sense; in the ideological sphere, the dominance of individual, personal values (characteristic of most countries in Europe and the USA);
- for X (Eastern) type of matrix the following basic institutions are inherent: in the economic sphere – non-market economy institutions; in the political sphere – institutes of unitary-centralized state system; in the ideological sphere, the dominance of collective values (characteristic of China, Russia, certain countries of Asia and Latin America).

Problems of development of the Ukrainian economy and complexity of the transitional stage of its development is due to the need to move from one type of institutional matrix (X (Eastern) type to the second (Y (Western) type) and, accordingly, the transformation of institutions in all spheres of life – economic, political and ideological.

The purpose

The aim of the article is to analyze the formation of institutional architectonics regional industrial complex. It is necessary to prove that in the conditions of deepening integration processes the Ukrainian economy is forced to introduce its own market institutions based on the principles of the Y-type matrix, but adapted to the Ukrainian realities in a short period of time.

Results

The need for transition to Western type of institutional matrix is complicated by the tight timing of transformational change. For many years, the formation of the industrial sector of Ukraine, and especially in its most industrially oriented regions (Donetsk, Lugansk, Kharkiv), was under the influence of historically established economic relations and close cooperation of production with the Russian economy. Most industrial enterprises of Ukraine in their production cycle were associated with industrial enterprises of the former Soviet Union, and in the vast majority of economic processes were dominated by basic institutions of the X (Eastern) type. In the context of deepening integration processes, the Ukrainian economy is forced to introduce its own market institutions within a short period of time, based on the principles of the Y type matrix, but adapted to Ukrainian realities. That is why the study of the development experience of the regional industrial complex of countries with Western type of institutional matrix, especially those that in recent years have made the transition using this algorithm, is an important element in the formation of its own effective regional industrial policy.

Research by North D. (1990) is based on the hypothesis that the main factors of development – innovation, economic scale, education and attracting capital, etc. – are not the causes of growth. The development of the national economy is determined by the level of development and character of institutions, because changes occur in certain political, managerial and cultural conditions, which impose certain behavioral constraints and affect the efficiency of economic activity.
In the article "Institutions, Institutional Change and Economic Performance" (North D. Institutions, Institutional Change and Economic Performance, 1990), he argues in favor of reviewing institutions during the transition period. The emergence of institutes and related institutions is explored in another paper by D. North (North D. Understanding the Process of Economic Change, 2005). The author

points out that the development of relationships in the chain of beliefs → institutions → organizations → politics → results can lead to unprecedented economic well-being, and to endless catastrophes and human suffering.

Considering the "new" institutionalism R. Picciotto and E. Weisner (Picciotto & Wiesner. "Evaluation and development: theinstitutional dimension", 1998) identifie institutions and organizations as the basis of economic, social and political development. According to scientists, the important issue is not only the creation of the "right" institutions, but also the assessment of the "correspondence" between institutions and development problems, their "suitability" for solving these problems.

In general, the study of the compliance of institutional architectonics with the requirements and conditions of the development of the economic system, the search for ways to optimize it, is an important element of economic research. Especially its relevance is manifested in the conditions of decentralization of the economic development of the regions in Ukraine, when the question arises of the need to move from the format of centralized public administration to a more flexible form of government, taking into account the particularities of the development of the economic system of a particular region. To date, these issues are not sufficiently covered and require more in-depth research.

From the perspective of regional industrial policy, institutional architectonics is determined by the totality of institutes and institutions that regulate the activity of economic entities in the industrial sector of the region (Fig. 1).

The vast majority of basic institutions are the same for all territorial units at the level of the national economy. They are formed in the form of regulatory and administrative documents that determine the rules and options for the economic behavior of the main participants in economic relations in the industrial sector. In addition, there is a system of institutions of an indicative nature, aimed at forming a vector for the development of economic entities, clarifying the goals and directions of their activities. It is important to use a system of institutions of a motivational nature, the main purpose of which is to create economic, social and other advantages for economic entities that adhere to certain "rules" of economic behavior and prefer a certain development vector.

It is for the industrial sector that the active participation of the state, as an institution-creating entity, is important. In the vast majority of countries, the state of the industrial sector is a factor in the development of the economic system, the formation of income of both market participants and the state.

The purpose of the state is to create a stable model of interaction and relationships between the actors of the industrial sector and to substantiate the orientation and effectiveness of their individual and collective actions.

From the point of view of the industrial complex regulation in the region, the actions of the state should be directed to the formation of a complex of measures of regulatory, compensatory and motivational nature aimed at solving the problems of applied character, connected with ensuring the effective development of the industrial complex of the region.

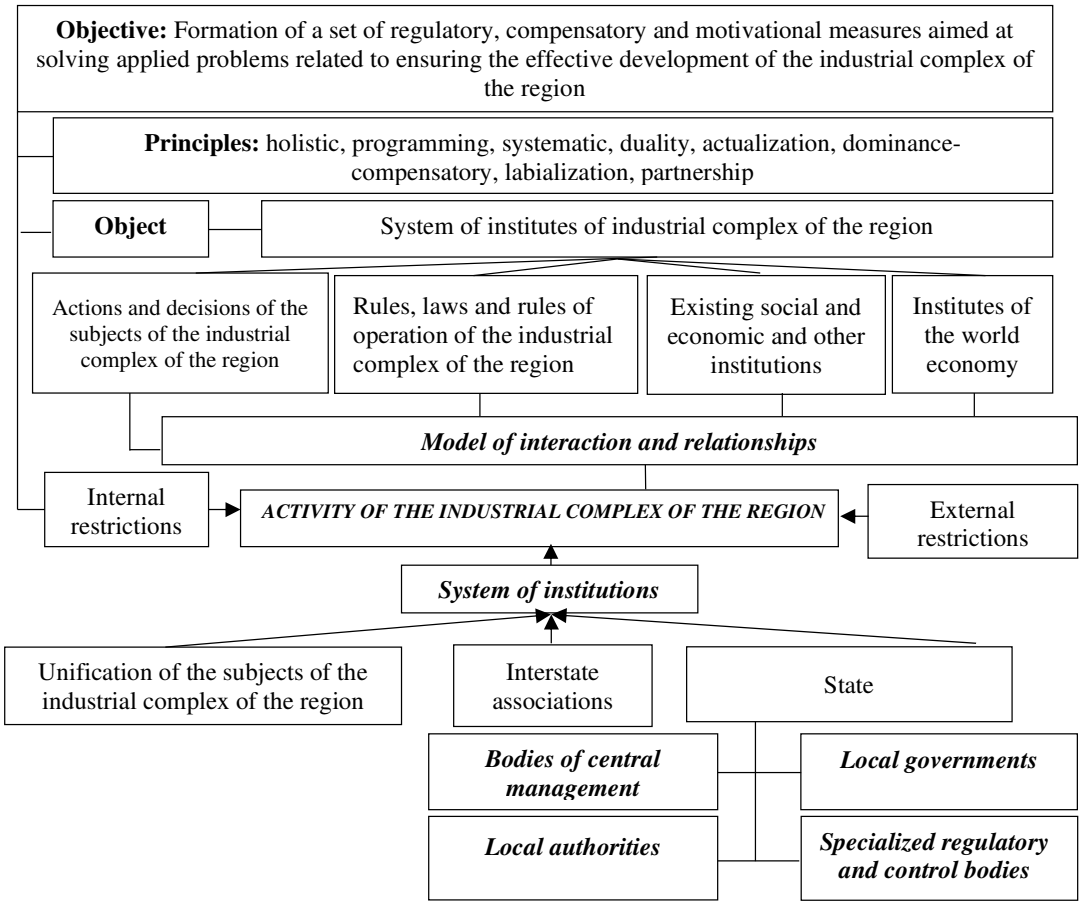

Fig. 1: Conceptual approach to the formation of institutional architectonics of regional industrial policy

An important element of institutional architectonics is the formation of a model of interaction and relationships, as a system of stable functional relationships between the basic institutions of the regional industrial complex. A rational model of interaction and relationships is determined and formed taking into account the type of institutional matrix, which is inherent in the national economic system and goal setting. It is the institution of goal-setting that determines the characteristics of the subject, a set of rules and procedures for determining priority goals and building mechanisms for their achievement.

In addition, the state should establish a set of restrictive institutions, whose actions are aimed at ensuring the balanced development of the industrial sector of the region, as a component of the national industrial complex, in the context of limited economic resources. In modern conditions, in determining the elements of regional industrial policy, it is important to determine the relationship between the subjects of the industrial complex and the state.

In general, at the theoretical level it is possible to distinguish the following models of interaction and relationships: pluralistic, neo-corporatist and patronage. In pure form, none of these models is used, but highlighting the characteristics of each is important for understanding the mechanism, goals and system of communication between business entities and government institutions within the national economy.

The characteristics of the main models of interaction and interrelationships between the basic institutions of the industrial complex of the region are shown in Table 1.

Table 1: Basic models of interaction and interrelations between the basic institutions

Model name	The main features	Advantages	Disadvantages	Groups of countries where applicable
PLURALISTIC MODEL	– high level of competition; – focus on personal success and profit; – the state acts as an arbitrator	– development of competition, ensuring equal access to the distribution of resources; – high level of motivation in development; – state policy of non-interference in economic processes, its orientation on solving social issues.	– development advantages for the most competitive and influential producers; – struggle for the possession of resources, their distribution and redistribution; – inertia of the state as a participant in economic relations; – disinterest in the implementation of active social policies and effective reforms.	Countries with the Anglo-American model of development (United States. United Kingdom. Canada, Australia, New Zealand)
NEO-CORPORATIST MODEL	– state support for the predominantly privatized industry; – focus on the development of the sphere of economic activity rather than a separate economic structure; – the state as a full participant and economic entity; – the opportunity to participate in shaping the basic elements of economic policy of all market participants, regardless of their competitiveness.	– the important role of the state in regulating economic processes; – social orientation of actions with the participation of the state; – expanding the interests of the subjects of the industrial complex by creating associations and unions that represent the main economic interests, receive the privileges and opportunities to participate in the development of standards and conditions for industrial production.	– the ability to restrict competition in order to achieve a certain result; – complexity of the management process and actions in case of urgent solution to the problems of development of the region industrial complex.	Scandinavian countries

PATERNAL (PATRONAGE) MODEL	– existence of hierarchy and inequality in the formation of relationships; – predominance of the regulatory function of the state, the focus of all actions of state institutions in support of balanced development of the region, to ensure the social orientation of business.	– a clear definition of the norms and parameters of the economic behavior of the state and economic entities, based on the reasonable advantages of all parties from the application of this model; – the focus of the institution of paternalism on improving the economic and social situation in the region.	– model of relationships in the plane of dependence-power; – restrictions on competition in the industrial sector; – the possibility of "protection" of business and the formation of "pro-state business"	Countries with X (Eastern) type of institutional matrix (Russia, Ukraine, China, some post-socialist countries)

In a research study by Kaufmann (2007) in accordance with the principles of constructing a *pluralistic model of interaction and relationships*, they should be based on "... permanent opposition of diverse interest groups". The functioning of society and the physiological survival of its members is impossible without ensuring adequate access to the results of material production. It is the industrial sector that acts as the basis for ensuring the growing needs of modern society and all other types of social production should be aimed at ensuring its dynamic development.

In a research study by Schmitter and Streeck (1999) ensuring the equilibrium development of the industrial sector, according to the pluralistic model, is possible only in a highly competitive market in which business "... units are organized into an unlimited number of independent, optional, competing with each other, hierarchically independent structures that are not specifically licensed, recognized and received subsidies and are not controlled by the state in any way".

The predominant position of the state in this model of relationships should be support for the competitive environment and focus on ensuring the interests of the system as a whole. In the event of disturbances in the equilibrium system, or the development of crisis processes, the activity of state regulatory institutions should be aimed at correcting the formed imbalances in the development of the industrial sector and returning the economy to an equilibrium state.

The state, as an element of the system of institutions of institutional architectonics of regional industrial policy, is considered as an external force, the main task of which is to develop, together with subjects of the industrial complex of the region, uniform rules for functioning and regulation, the initiator of resolving conflict situations and supporting national industrial producers in international markets.

Thus, among the main features of a pluralistic model of interaction and relationship are the following: competition is a driving force for the development of the industrial sector, within which there are numerous interest groups competing with each other; the basis of development is a focus on personal success and profit; the state acts as an arbitrator, participates in the development of rules of relations and interaction, and provides support in foreign markets.

Among the main disadvantages of this model of relationships can be identified:

– the predominance of the interests of the most competitive and influential sector entities, their focus on maximizing profits;
– competition is based on the principle of the struggle for the possession of resources, their distribution and redistribution, which leads to the practical elimination of weak and new competitors from the market;

– inertia of the state as a participant in economic relations, the prevalence of compensatory actions in its positions;
– lack of interest in implementing active social policy and implementing the most effective reforms.

The pluralistic model is based on Anglo-American traditions of business-state interaction. Thus, in the UK, the regulation of the industrial complex is carried out only at the regional level (in each enlarged region of the country (England, Scotland, Wales, Northern Ireland), its own departments of industry are established, which use specific industrial regulation instruments for the respective territories. The main thrust of industrial policy is to increase the competitiveness of their own producers through an active innovation and protectionist policy.

The mechanism of regional industrial policy in the US is similar: the main goal is to increase competitiveness and the application of protectionism measures to protect the national market and expansion into foreign markets of industrial goods; decentralization of state regulation functions, expansion of powers of local government.

Shmytter, F. (1992) insists *the neo-corporatist model of interaction and relationships* is based on the system of "... representation of interests, the components of which are organized at several special, compulsory, non-competitive, hierarchically ordered, functionally different levels, officially recognized and resolved (and in some cases created) by the state, endowed with a monopoly for representation in certain industries".

The main features of the model are as follows:

- the system of economic relations is based on state support for the predominantly privatized industry;
- a focus on the development of economic activity, not a separate economic structure, even the most competitive;
- the possibility of restricting competition in order to achieve a certain result;
- the state, as a full participant and economic entity, with the right to formulate requirements to business entities;
- possibility of defining social effect as the main economic result;
- the opportunity to participate in the formation of basic elements of economic policy of all market participants, regardless of their competitiveness.

The state's involvement is not limited to its recognition as an important economic agent and the development of "rules of the game" common to all participants. For this model of relations, it is important to recognize the social orientation of actions involving the state, its significant social obligations to society, and therefore the right to impose certain requirements on business. The state also plays an important role in regulating economic processes.

The model is characterized by the consolidation of the interests of the subjects of the industrial complex by creating associations and unions that represent the main economic interests, receive privileges and opportunities to participate in the development of standards and conditions for industrial production.

Formation of *paternalistic (patronage) models of interaction and interrelationships* is most often supported for the most economically and financially weak and investment unattractive regions.

If we examine the content load of the paternalistic model, it reflects the formation of specific relations between the state, as a subject of regulation and its individual regions, or spheres of activity (industries). The model is based on the concept of hierarchy, vertical orientation, dependency and guardianship. The regulatory and legal activity of the state and its main institutions is reflected in the patronizing attitude to the development of the region or its industrial complex. The purposeful and administrative distribution of resources, the use of an integrated system of directive and indicative

planning, the system of state order, the creation of specific investment and legal conditions for the functioning of the enterprises of the industrial complex of the region are the main elements of the paternalistic (patronage) model of interaction and relationships.

In a research study by Shushkova (2010) From the standpoint of institutional architectonics, paternalism can be defined as "… a social institution constructed by actors who need relationships of interdependence and who need care and guardianship".

It is possible to distinguish the following basic characteristics inherent in the paternalistic (patronage) model of interaction and relationships: the main characteristic is a model of relationships in the dependence-power plane; existence of hierarchy and inequality in the formation of relationships; a clear definition of the norms and parameters of economic behavior of the state and economic entities, based on the substantiated benefits of all parties from the application of this model; dominance of the regulatory function of the state, orientation of all actions of state institutions to support the balanced development of the region and its industrial complex, to ensure the social orientation of business; the paternalism's focus on improving the economic and social situation in the region.

In some cases (especially for post-Soviet countries), the patronage model acquires the signs of "protection" of the business of structures close to the authorities. This type of model consists in the application by the state and state institutions of administrative methods aimed at restricting competition in certain industries in which "pro-state business" is interested.

The possibility of forming economic relations between the state and its components according to the principles of libertarian paternalism extends in modern Western economic literature. The concept of libertarian paternalism was proposed by the economist of the University of Chicago Richard Teyler and professor of Harvard Law School Kas Sunstein and consists in the fact that state institutions have the ability to legally influence the behavior of economic entities without violating freedom of choice. The main goal of their activities is to "push" economic entities in the right direction, direct the efforts of state institutions to identify and substantiate the most optimal options for economic development. The authors of the theory emphasize: "We propose a form of paternalism, which is libertarian in spirit, which should be acceptable to those who firmly believe in freedom of choice on the basis of either autonomy or welfare" (Palermo, G. (2000)).

If we evaluate the current model of interaction and relationships in the industrial sector of Ukraine, the features of the patronage (paternalistic) type are prevailing. Perhaps in recent years there has been a tendency to gradually transform it to the principles of libertarian paternalism and the growing role of such an important market tool as competition. The reason for these trends may be the transfer of the characteristics of economic relations that existed between the state and industrial producers in the former Soviet Union and the significant dependence of Ukrainian industrial producers on Russian partners.

The importance of the latter statement is to preserve the X (eastern) type of institutional matrix within the Russian economy. The coincidence of the specifics of organizational, economic and technical and economic relations and the continuation of contractual relations at the level of subjects of the industrial complex of the two countries, the lack of need for their transformation and the weak access of Ukrainian producers to the world markets for industrial products led to the preservation of the principles of the patronage type of relationship.

In the conditions of deepening of the European integration processes preservation of patronage type of relations is possible only in relation to the development of the weakest, depressed regions. World experience involves the application of two main options for differentiation of approaches and patronage for the development of the industrial sector of the region – regional differentiation of tax rates (or their differentiation by types of industrial production within a particular region) and regional differentiation of the system of public expenditure related to public procurement and social transfers. The main purpose of applying differentiation in terms of stimulating the development of the

industrial sector is to increase the demand for investment resources and the results of industrial production within individual regions of the country.

On the one hand, it is a powerful mechanism for stimulating the symmetrical overall development of all regions of the country and solving the problem of economically backward territories. On the other hand, the economic effect of applying symmetric measures is different in different regions of the country. It all depends on the capabilities of the regional industrial production market, the development and structure of the labor market, the existence of appropriate infrastructure and the potential capabilities of individual territorial units. Therefore, differentiation must be deepened and must take into account the region's capabilities and the specificities of its social and economic development. To do this at the level of central government is extremely difficult and will result in inefficient allocation of financial resources of the state. A separate problem may be the realization of attempts to stimulate the economic activity of individual producers by applying fiscal policy measures. First, it violates the principles of the competitive environment and leads to a change in the system of the industrial complex of the country. Attempts are underway to change the very system of interregional and internal regional interaction. Territories and individual regions of the country, with the most favorable conditions for carrying out economic activity, become attractive for industrial producers, in turn, it leads to an overflow of capital and the emergence of interregional imbalances in the national economy. A separate economic and political problem may be the horizontal differentiation of tax rates. Certain regions or producers who have not received the appropriate preferences from the central government, express some dissatisfaction with the violation of competitive conditions, and in some cases, reduce the volume of their own industrial production.

Summing up, we can conclude that the use of the system of inter-budget relations and the system of state orders in the conditions of the formation of patronage relations between the state and industrial producers is a more flexible tool compared to fiscal methods of differentiation and should be used with the active participation of regional institutions that have the right and ability to implement their own economic policy.

The need to move to the principles of a neo-corporatist model of interaction and relationships is determined not only by the internal need to improve the competitive environment in the middle of the industrial sector, but also by shocks from external (foreign) industrial producers. The “roofing” of individual producers by the state, the opacity of the system of government orders and other features of the existing model of relationships lead to a decrease in the competitiveness of national industrial producers and reduce their stability in the competitive global market. The transition to a neo-corporatist model of interaction and relationships is associated with the redistribution of powers between levels of government – central, regional and self-government. This division is also possible under libertarian paternalism, when the state, represented by central government bodies, determines the use of individual instruments, including the financial and fiscal nature, and local government bodies determine the boundaries and mechanism for their application.

Under the neo-corporatist model of interaction and interrelationship, the object of regional industrial policy changes, from the activity of the subjects of the industrial complex itself to the elements of regional development that indirectly influence the development of the industrial complex of the region.

This model is characterized by a high proportion of privatized industrial enterprises and the participation of the state, as an active participant in economic activity, with the right to make demands on industrial producers regarding the structure of commodity supply and social orientation of business. The state is unable to influence directly the stages of economic activity of privatized enterprises of an industrial complex of a region; instead it has a wide range of economic regulatory instruments (taxes, indicative planning, programming and forecasting an industrial complex development, etc.).

The role of the state as one of the important subjects of regional industrial policy under the neo-corporatist model of interaction and interrelationship is determined by its regulatory influence in the

following main directions (Fig. 2): influence on the regional labor market and raw materials, influence on the regional capital market.

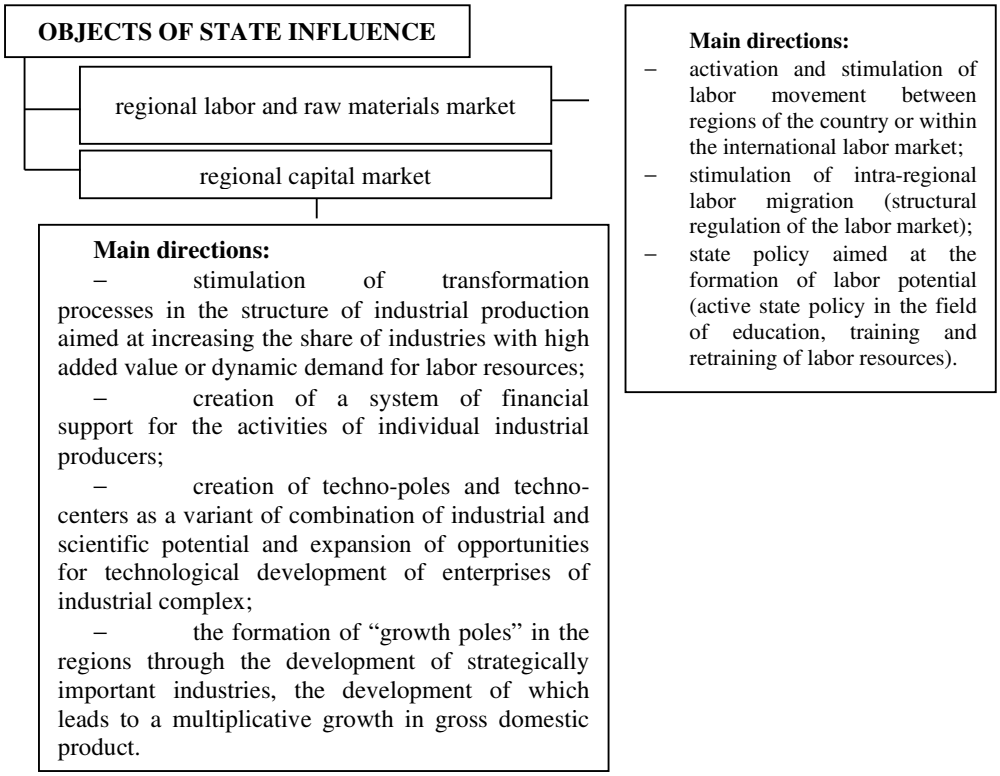

Fig. 2: Objects and directions of state influence in the context of regional industrial policy in neo-corporatist model of interaction and relations

Conclusions of this study

Among the main problems in the formation of the institutional architectonics of regional industrial policy in Ukraine there is the need to switch to the Western type of institutional matrix (a stable, historically developed system of basic institutions that regulate the interconnected functioning of the main social subsystems - economic, political and ideological). In the context of deepening integration processes, the Ukrainian economy is forced to introduce its own market institutions within a short period of time, based on the principles of the Y type matrix, but adapted to Ukrainian realities.

It is theoretically possible to distinguish the following models of interaction and relationships: pluralistic, neo-corporatist, and patronage. In its pure form, none of these models is used, however, the identification of the characteristic features of each of them is important for understanding the mechanism, goals and the system of relations between business entities and state institutions in the framework of the national economy. The role of the state as one of the important subjects of regional industrial policy in the conditions of a neo-corporatist model of interaction and relationships is determined by its regulatory influence in the following main areas: influence on the regional labor market and raw materials; impact on the regional capital market.

References

1. Kostyrko, I. G. and Tymofii'v, S. V. (2014), 'The perfection of the institutional infrastructure and its assessment: theoretical aspect', *The Economy of Agro-Industrial Complex*, 2, 81-86.

2. Mel'nychuk, O. S. (2010). 'Dictionary of foreign words'. [Online]. [Retrieved December 21, 2019], https://ukr-melnichuk.sesii.net.
3. Grycenko, A. (2005), 'Institutional architectonics: object, theory and methodology', Dement'eva V. V. (ed.), Post-Soviet institutionalism.
4. Kirdina, S. G. (2007), 'Economy Models within Institutional Matrices Theory Framework', *Economics of Contemporary Russia*, 2, 34-51.
5. Bessonova, O. Je. (2007), 'Phenomenon of the «Institutional Matrixes Theory»: Restoration of the out-of-date paradigm'. *Economics of Contemporary Russia*, 2, 23-33.
6. North, D. C. (1990), 'Institutions, Institutional Change and Economic Performance', Cambridge University Press, Cambridge.
7. North, D. (1990), 'Understanding the Process of Economic Change'. [Online]. [Retrieved December 21, 2019], https://zodml.org/sites/default/files/%5BDouglass_C._North%5D_Understanding_the_Process_of_E_0.pdf.
8. 'Evaluation and development: the institutional dimension', Robert Picciotto and Eduardo Wiesner (eds.), *World Bank series on evaluation and development*. [Online]. [Retrieved December 22, 2019], http://documents.worldbank.org/curated/en/650001468770389162/pdf/multi-page.pdf.
9. Jakubenko, V. D. (2003), 'Basic Institutions in the Transformation Economy', *KNEU, Kyiv*.
10. Grycenko, A. (2011), 'Methodological Foundations of Modernization of Ukraine', *Economy of Ukraine*, 2, 4-12.
11. Kaufmann, S. (2007), 'Interessenvertretung im Europäischen Parlament', *Praxisbuch: politische Interessenvermittlung: Instrumente – Kampagnen – Lobbying*, 234-238.
12. Schmitter, Ph. C. Streeck, W. (1999), 'The Organization of Business Interests: Studying the associative action of business in advanced industrial societies'. [Online]. [Retrieved December 22, 2019], http://www.mpi-fg-koeln.mpg.de/pu/mpifg_dp/dp99-1.pdf.
13. Shmytter, F. (1992). 'Neocorporativismo'. [Online]. [Retrieved December 23, 2019], http://read.virmk.ru/h/Shmitter_1.htm.
14. Shushkova, N. V. (2010), 'Sociology of Modern Paternalism', RusGenProekt, Vashyngton.
15. Thaler, R. H. and Sunstein, C. R. 'Nudge: Improving Decisions about Health, Wealth and Happiness'. [Online]. [Retrieved December 23, 2019], http://webcache.googleusercontent.com/search?q=cache:tE4xmgig_X8J:www.impactexecutives.com/books/nudge-improving-decisions-about-health-wealth-and-happiness/+&cd=15&hl=ru&ct=clnk&gl=ua.
16. Svendsen, L. (2016). 'Philosophy of freedom'. [Online]. [Retrieved December 23, 2019], https://www.litres.ru/lars-svendsen/filosofiya-svobody/chitat-onlayn/.
17. Palermo, G. (2000), 'Economic Power and the Eirm in New Institutional Economics: Two Conflicting Paradigms', *Journal of Economic Issues*, 34 (3), 573-601.
18. Petrosjanc, V. Z. and Shahtamanova, L. G. (2017). 'Methods and tools of regulation of the regional development', *Regional problems of the economy transformation*, 6, 18-27.
19. Ortina, G. V. (2016), 'Foreign experience of government strategies economics development'. [Online]. [Retrieved December 23, 2019], http://www.dy.nayka.com.ua/?op=1&z=1102/
20. Samuels, W. J. (1991). 'Institutional Economics'. *Companion to Contemporary Economic Thought*. London; New York.

Survey on Minimum Wage in Some Member States of The European Union

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Abstract

The minimum wage is one of the topics on the agenda of the European Union. Debates about the minimum wage between the EU Member States stir controversy and their different positions for the unified implementation of a labor policy. The invitation of the European Commission to discussions on the minimum wage for EU employees is an opportunity to make a comparative analysis between its different states. From the analysis of the data from present time, there are noticeable differences between the Member States of the Union regarding the gross and net monthly minimum wage, the way to determine it, the hourly rate, taxes and social contributions. In this paper I will also focus on analyzing a projection for the researched states regarding the increase of the minimum wage by 60% of the average salary of each country. Establishing clear objectives and criteria under EU coordination for determination the minimum wage that takes into account the economic and social situation of each country and the amount needed for decent minimum living is a necessity.

Keywords: Minimum Wage, Negotiations, EU Social Pillar, European Minimum Wage

Introduction

The purpose of this paper is to analyze the current situation of the minimum wage in some EU Member States, given the EU's intention to introduce a European unitary policy in this area.

In the analysis of the minimum wage at the level of the European Union, we focused on the following states: Belgium, Bulgaria, Germany, France, Hungary, Spain, Poland and Romania. The eight states were not chosen by chance. These are four economically developed states in western Europe with a tradition of wage negotiations and highly developed and applied social protection mechanisms. These states are: Belgium, France, Germany and Spain. The other four Member States were chosen from the former communist countries: Bulgaria, Hungary, Poland and Romania. These states have a high potential for economic growth, but also among the lowest salaries in the EU. The situation of these states is presented taking into account several indicators, such as: percentage of population working, activity rate, employment and unemployment rate, labor cost index, labor productivity, real GDP growth in Euro. All these data are presented to illustrate the rather large economic disparities, but also the different approach of labor relations within the EU member states.

This research analyzes how the minimum wage is set in each of the eight analyzed states. The evolution of the minimum wage in the last ten years in these Member States was followed, the taxes and applied taxes, the differences between nominal minimum hourly payment and the one expressed in purchasing power standard. The study notes the notable differences between these states in terms of economic growth, domestic product, social policies, minimum wage, social inequality and poverty, especially in the former communist states. A projection was made taking into account the proposal to increase the minimum wage as a result of 60% of the average salary of each Member State.

In this regard we presented the negotiations, discussions and proposals regarding the introduction of the European minimum wage. The ways in which Member States will be able to agree on the establishment of regulations, policies and instruments at EU level with regard to the European

minimum wage will be an important point in combating poverty and defending employees with minimum wages, but also for achieving a European cohesion supported from a social and economic point of view.

Short Literature Review

In recent years, due to the increased interest in the minimum wage among EU Member States and beyond, more studies have been carried out on this aspect. Schulten(2008, 2012) mentions that the idea of introducing a unitary minimum wage policy is a topic of discussion among Member States for a long time. Seelinger (2018) mentions the debates regarding the minimum wage but also the role played by the trade union organizations in countries such as Poland and Hungary. In a research study by Socolov and Marinas (2016) in Romania it is shown that the minimum wage can be an instrument of economic growth and the wage inequalities start from the labor market. The study conducted in Germany by Bossler and Greiner (2016) shows that the impact of introducing the minimum wage was at the time of "increase in average wages by about 4.8 percent and a decrease in the affected establishments' employment by about 1.9 percent". Fabo and Belli (2017) analyzes the minimum wage through the minimum living wage in the peripheral countries of the European Union. Schulten and Luebker (2018) point out that increases in the minimum wage in Eastern European states are only a small step, while in Western Europe, minimum wages have increased very little, and in France, growth has barely exceeded inflation. The minimum wage in Germany is measured using the Kaitz index. This leads to an important gap between France and Germany, the French minimum wage being higher in both relative and absolute terms.

Research Method and Methodology

The study is based on the research of domestic and international bibliographic studies, information collection, synthetic data processing and interpretation of results, as well as the formulation of conclusions. This is an image of the current minimum wage situation and is based on an observation and case study for the eight Member States (Belgium, Bulgaria, Germany, France, Hungary, Spain, Poland and Romania). The selected data were sorted statistically and processed. Data analysis presented a number of difficulties. Firstly, the prices in euro were taken into account, but not all the analyzed states have the euro. Resulting a difference in the national currency exchange rate for these countries. Another difference is the price level, the cost of the monthly basket. The nominal official data as well as those calculated were taken into account considering the purchasing power standard (PPS). The data published by Eurostat, the WSI Minimum Wage Database and Eurofound were taken into account in this study.

Results and Discussions

Considering the major economic changes of the last years, globalization, technologicalization, computerization of the society, population ageing, especially in the developed states, change of mentality and profile of the employees, the very large number of employees, the European Union pays special attention to the free movement of the employees and fair remuneration to enable a more consistent and sustainable economic development among the Member States. The economic environment is moving at a rather accelerated pace, which requires a more flexible workforce both in terms of working time, what they work and where they work. For the proper and long-term functioning of the Union's internal market, respect for the principles of free movement of workers, freedom of establishment and freedom to provide services to workers, the right to a fair wage must be unequivocal for all workers within the Union, no matter where they work. The minimum wage must allow all workers to face the daily expenses and allow a decent living.

In order to achieve this concept of decent living, in the Member States the labor policies are different. Some consider economic growth, increasing the number of workers, reducing unemployment. Other countries aim to achieve social equity through their policies. Some countries want both. All these tendencies are normal within a democracy as the European Union wants.

Specialized literature and legislation give different definitions to this notion. But, they all refer to the minimum amount an employee must receive in exchange for the work performed. (KPMG in Romania, 2017). The minimum wage is seen as a trade-off between employment and income equality (Fabo and Belli, 2017). The minimum wage should cover the daily expenses related to gas, electricity, food, clothing, heat, tools, and transportation. The national minimum legal wage can be set per hour, per week or monthly, and this is established by law, after consulting the social partners or by national cross-sectorial agreement. The minimum wage can be indexed to the consumer price index, by economic growth or established periodically by the legislative power was explained by the Eurostat statistics site.

At the European Union level, the question of harmonizing and supplementing the regulations regarding the payment of employees has always been raised. A sensitive point among the Member States of the European Union is represented by the discrepancies between the salaries paid in exchange for the work performed.

We might ask why it is necessary to know the minimum wage for each country or possibly for some branches of the national economy. One answer may be that without knowing the minimum wage or hourly wage payment, investments, developing a business plan, predictability of expenses would be difficult to achieve. In addition, the freedom to provide services throughout the European Union is one of the basic principles of the European single market. Last but not least, the introduction of a single wage at European level is also a concrete action to combat the deepening of social inequalities and poverty.

The choice of states listed was not accidental. Belgium, France, Germany and Spain are part of the developed states, in which the labor relations are well established, with reward mechanisms of the employees that give the expected effects. Belgium is the state that has the minimum wage established through collective bargaining at branch level, and France, Germany and Spain have the minimum wage set both at national level and through collective bargaining agreements. All these countries have a minimum wage of over 1000 euros / month. The four states listed are beginning to face a population ageing and have sought solutions to this effect. The standard of living and wages in these countries are significantly higher than the other four countries that are the subject of the study, which has attracted skilled and unskilled labor to cover the needs of deficient labor in certain sectors such as trade, agriculture, transport, services, industry.

As for the other four states, Bulgaria, Hungary, Poland and Romania, they come from the former communist countries. All these four countries have the statutory national minimum wage. Bulgaria, Romania and Hungary have minimum salaries up to 500 euros/month, Poland has just over 600 euros/month. And these countries are also facing a population ageing and an economic migration to the developed countries.

In table 1 we will present some indicators briefly in order to be able to form an overview of the state regarding the labor relations in the those countries. As for the percentage of the working population, the situation is somehow similar, the differences being relatively small. Among the eight countries analyzed, France is on the last place with 60.8% and Romania is on the first with 66.2%. And as for the unemployment rate, the situation is very different, with Germany having the lowest rate of 3.4% and ending with Spain having the highest 15.3%. We note that Belgium, France and Spain have higher unemployment rates than the developing countries which have between 3.7% and 5.2%.

Table 1: The statistic indicators for work in 2018

Country	Popula-tion working (%)	Activity rate (%)		Employment rate (%)	Employment growth (LFS)	Unemployment rate (%)	Labour cost index (wages and salaries, total)	Labour productivity (GDP/ person employed
		National	Non national					
Belgium	63.9	69.0	69.9	64.5	2.4	6.0	2.2	0.1
Bulgaria	64.3	71.5	55.9	67.7	-0.1	5.2	6.2	3.2
Germany	64.6	80.1	70.0	75.9	0.4	3.4	2.4	0.2
Spain	65.5	73.4	76.1	62.4	2.6	15.3	1.9	-0.1
France	60.8	72.4	66.4	65.4	0.9	9.1	1.7	0.7
Hungary	65.2	71.9	72.0	69.2	0.9	3.7	11.3	2.7
Poland	62.3	70.1	78.3	67.3	0.3	3.9	7.0	4.8
Romania	66.2	67.8	64.8	68.6	0.2	4.2	33.1	3.9

Source: Labour Market and Wage Developments in Europe, Annual Review 2019

In Figure 1 we performed an analysis of the growth of the gross domestic product over a period of 10 years from 2008 to 2018. Correlating the data from the two tables we can see the situation on the labor market of the 8 states under study. It follows that the former communist countries have potential for economic growth and development. The four developing countries, with the exception of the years of economic crisis, in the rest of the years have registered a real growth of the gross domestic product. For example Romania has an increase of 9.3 in 2008 and a 7.1 increase in 2017. Belgium, France and Germany have relative growth after 2009, the best growing in Germany is in 2010 with 4.2%, in the following years having a constant growth of about 2% per year.

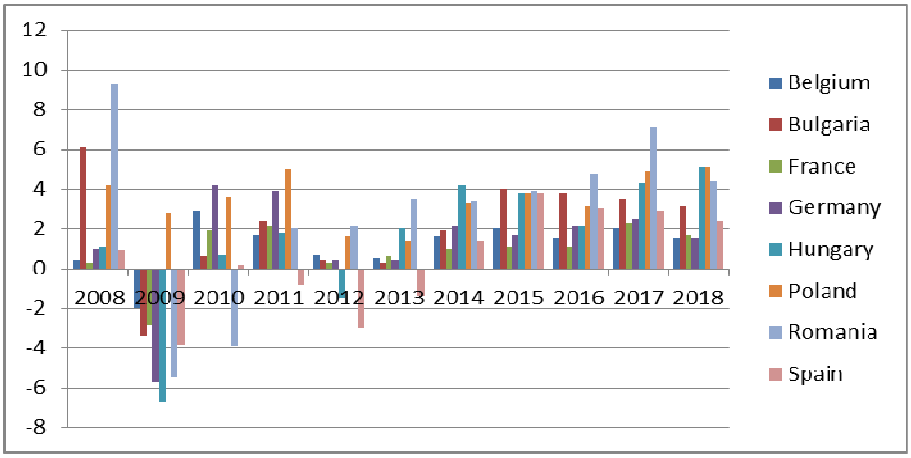


Fig. 1: Real GDP growt in Euro (%)

Source: data processed by the author after Eurostat

The law regulates the minimum wage. In Eastern Europe the minimum wage is discussed within a tripartite body at national level. If these negotiations fail, it is established unilaterally by the government and acquires a legal character. (Schulten et al. 2015). The modalities for establishing the minimum wage within the European Union are set differently (KPMG in Romania, 2019): in 15 Member States, the minimum wage is fixed at national level but also through collective bargaining; 6 (Romania, Bulgaria, Estonia, Poland, Hungary, Portugal) states have set the national minimum wage;

8 states set the minimum wage through collective bargaining; 1 state (Cyprus) has set the minimum on economy only for certain occupations; Sweden has not set a minimum wage.

Eurofound data shows that in January 2020, 22 of the Member States of the European Union have a national minimum wage. We list Belgium, Bulgaria, Croatia, Czechia, Estonia, France, Germany, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia Spain and United Kingdom. At present, a number of 6 countries have not set a national minimum wage, such as Austria, Cyprus, Denmark, Italy, Finland, and Sweden.

In analyzing the minimum wage at EU level, we will stop at the following states: Belgium, Bulgaria, Germany, France, Hungary, Spain, Poland and Romania. As can be seen, some of these states have minimum wages set at national level (Bulgaria, Hungary, Poland and Romania), some states have set them within collective bargaining agreements (Italy), some states have minimum wages set at both national level as well as through collective bargaining contracts.

The study presents a research on raising the minimum wage for the analyzed countries, which resulted in the fact that in the group of developed countries the growth in the 10 years was quite small, it was between 10% in Germany, 14.92% in Belgium, 14, 50% in France and 49.93% in Spain. On the other hand, in other countries where the minimum wage was very low, there were quite large increases, which stood at 79.04% in Hungary, 90.34% in Poland, 153.65% in Bulgaria and 228.17 % in Romania. This shows the wage discrepancies between the different Member States within the European Union and largely explains the economic migration that takes place especially from Romania and Bulgaria to the developed countries. (figure 2)

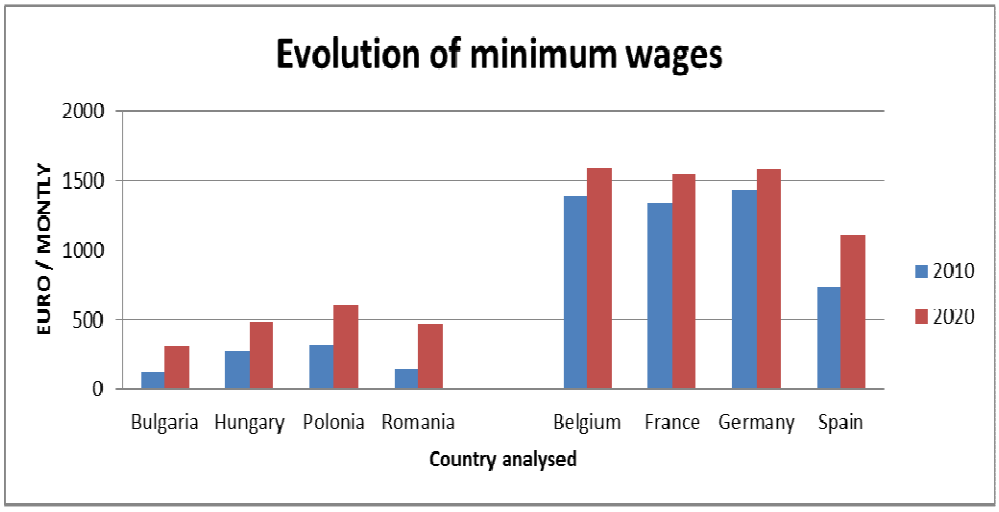


Fig. 2: Evolution of minimum wages

Source: data processed by the author after Eurostat

In what follows we will analyze the eight Member States to see how the minimum wage is set. In Belgium, the minimum wage is set both nationally and through collective bargaining. The minimum wage is agreed within a national collective contract for the private sector as a whole Part of the minimum wage is a fixed amount that depends on the working place, seniority in work and the branch where they work. Negotiations at branch level may cause the minimum to be different in the sector of activity, but not to be smaller than the one provided at national level. The amounts provided for those working outside Belgium, such as accommodation, meals, transport, health insurance, taxes paid for the stay in that country are not included in the minimum wage. The employees work on average 8 hours/day and 38 hours/week, but there may be exceptions. (KPMG in Romania, 2019)

In Bulgaria, the minimum wage is set at national level and depends on the working place, age and branch of activity. The minimum wage is set annually and includes the basic salary, rest leave. In the

case of detachment it does not include the costs for accommodation, transport and meal. The maximum number of hours worked is 8 hours/day, resulting in 40 hours/week. Minimum wage is 560 BGN in national currency in 2019. (KPMG in Romania, 2019)

In France, the minimum wage is set at national level and through collective bargaining for different sectors of the economy. This minimum may include a series of bonuses, but the expenses of accommodation, meal and transport cannot be taken into account. The employees work 35 hours a week, maximum 48 hours, but no more than 10 hours worked per day. The average weekly hours worked may not exceed 44 hours for 12 consecutive months. (KPMG in Romania, 2019)

In Germany the minimum wage is set nationally but also through collective bargaining and with labor agencies. The minimum wage has been introduced since January 2015 and the decisive benchmark for its establishment will be the development of average salaries established by collective agreements. (Schulten et al. 2015) Collective bargaining by branch of activity, even if they set a lower level, takes into account the nationally established level. The differentiation is made between the two zones: in the west the gross hourly rate was in 2019 of 9.96, Euro and in the east it was 9.66 Euro. The employees work 8 hours/day and maximum 48 hours/week six days weekly.

In Hungary the minimum wage is set at national level, usually at the beginning of each year. The maximum legal time is 48 hours/week and 12 hours/day. Minimum wage is 3.750 HRK in national currency in 2019.

Poland is one of the countries that has set a minimum national wage set annually. The minimum wage includes basic salary, seniority at work, vacation bonuses, bonuses, special payments. These refer to seconded employees who may receive travel allowance abroad, distribution allowance, daytime allowance. Extra hours, accommodation, transport and meals are not included in the minimum wage. The employees work 40 hours a week and a maximum of 8 hours/day. Minimum wage is 2.250 PLN in national currency in 2019. (KPMG in Romania, 2019)

Romania has set the minimum wage at national level, usually once a year. At present, there is the minimum differentiated: standard minimum wage (2,300 RON), minimum wage with university studies and 1 year work experience (2,350 RON) and for construction sector (3000 RON). The minimum wage includes base salary, overtime and bonuses. Not included: accommodation, travel awards abroad, special rewards. The employees work 8 hours/day and 40 hours/week.

Spain has the minimum wage set at national level and through collective bargaining. The national minimum wage is set once a year and the exact amount is established. The minimum wage depends on the negotiations that take place between the government, unions and management. It is included in the minimum wage, basic salary and overtime. Accommodation, transportation, daytime, and other additional bonuses are not included. It works 40 hours/week and 9 hours a day. The time worked may also depend on the collective bargaining. (KPMG in Romania, 2019)

The specialist views regarding the level of the minimum wage and its impact on the national economy are divided and still under debate.

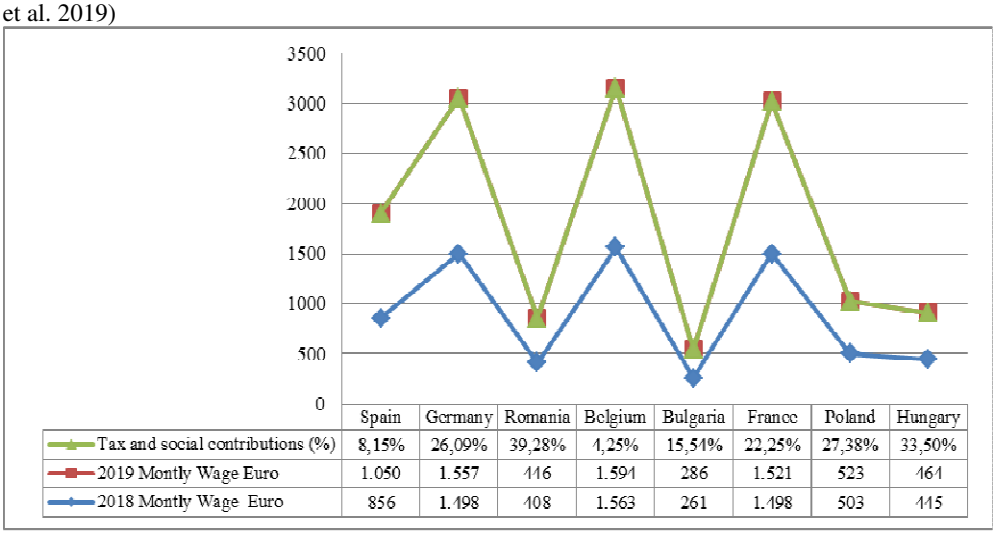
In Romania, the impact of raising the minimum wage is mostly felt by SMEs in some sectors where about 40% of the employees have the minimum wage. The increase in the minimum wage has led to a small increase in the average gross wage. However, this may be restrictive for lower-skilled or unskilled employees. A positive impact of raising the minimum wage was poverty reduction. (Socolov and Marinas, 2016).

In Germany, it is shown that there was no negative impact on the small wage sector, as expected, by introducing the national minimum wage. But by introducing it, the number of part-time employees has decreased (Bossler and Greiner, 2016). Other studies show that the introduction of a minimum wage has a positive effect on employees who earn low wages, but the effect is not as good on those who earn higher wages. (Bellman et al. 2017) In a recent study, Bruttel (2019) shows that imposing

the minimum wage in Germany has led to an increase in the hourly rate, especially for those earning less than 8.50 euros/hour. But this did not lead to a monthly wage increase. There are still no measurable effects at the macroeconomic level, nor is there an impact on poverty alleviation. Labor productivity did not undergo any change, but an increase in satiety compared to the increase in the minimum wage was noted.

From the studies published at European level, it was found that a minimum wage increase of 40% has a positive effect on all sectors of the economy, but the increase exceeding 51% has a negative effect on employment. The increase in the minimum wage can lead to an increase in the wage in general, preserving the wage differentiation for older employees and can reduce a number of inequalities between employees. (Fric, 2018). The European trade unions are cautiously favourable to the idea. „Trade unions from countries with weak collective bargaining can be expected to favour the idea of an institutionalized minimum wage, unions from countries with high coverage rates are ascribed a reluctance towards such bottom limits". (Seeliger, 2018)

Figure 3 presents the situation that refers to the nominal increase felt by the employees. There are quite large discrepancies in terms of salary increases. As expected the largest increases are observed in the states with the lowest minimum at EU level. Spain is an exception from the developed countries, the one that increased the most the minimum wage by 22.30%, and the increase felt is almost equal to the nominal increase. The biggest difference between the minimum wage regarding nominal change in euro terms and real change in national currency can be found in Romania from 9.36% at 5.9%. Next is Bulgaria from 9.81% at 7.39%, Germany from 3.96% at 2.19%., France from 1.52% at 0.10%. The following countries show a reverse trend from nominal change to real change: Poland from 4.05% at 6.39%, Hungary from 4.39% at 4.95%. France is the country with smallest growing next to Belgium. What can be seen in figure 3 is that the countries with the lowest minimum wages also have the highest taxes and contributions paid for work. The first place in this ranking of taxes and social contributions is occupied by Romania with 39.28% and the last place is occupied by Belgium with 4.25%.The average of the former communist countries is 28.82% in terms of social security contribution and taxes, and in the developed countries average is of 15.18%. (Aumayr-Pintar et al. 2019)



	Spain	Germany	Romania	Belgium	Bulgaria	France	Poland	Hungary
Tax and social contributions (%)	8,15%	26,09%	39,28%	4,25%	15,54%	22,25%	27,38%	33,50%
2019 Montly Wage Euro	1.050	1.557	446	1.594	286	1.521	523	461
2018 Montly Wage Euro	856	1.498	408	1.563	261	1.498	503	445

Fig 3: Monthly minimum wage 2018-2019 and taxes applied in 2019
Source: Aumayr-Pintar et al. 2019, Eurofound (2019), Minimum wages in 2019: Annual review

Taking into account that prices tend to rise, the qantity bought with money from wages is less. Inflation affects the whole world, and even more employees who earn the minimum in the economy. Of course, the differences between the Member States are smaller if we take into account the price level gaps and apply the purchasing power standard (PPS) in terms of final consumption expenditure. The application of this PPS indicator leads to the narrowing of the differences between states. There

is an increase of the minimum hourly rate/euro in 2019 compared to 2018: France +0.15, Belgium +0.19%, Germany +0.35, Spain +0.99, Poland +0.20, Hungary +0.12, Romania +0.18, Bulgaria +0.15. But if we compare the minimum hourly rate/euro taking into account also the PPS, then it is observed that the hourly rate is lower and that in reality the prices have risen together with the purchasing power of the employees. Difference is in France -0.21, in Belgium -0.22, in Germany -0.96, in Spain +0.86, in Poland -1.07, Hungary -0.32, Romania -1.01, Bulgaria 0.14. Dates were processed after WSI Minimum wages report 2018 and 2019 edition. (Lübker and Schulten, 2018, Schulten and Lübker, 2019).

There are discussions regarding the minimum wage and the wage that will ensure the minimum decent living. Studies have shown that Hungary, Bulgaria and Romania have low wages that do not cover decent living conditions. Poland and Spain are at the limit, only France, Germany and Belgium have a minimum wage that is above the minimum decent living conditions. (Fabo and Belli 2017).

Given that 241.5 million people are employed in the EU, they are living in a constantly changing world, moving to a neutral-climate economy, digitization and demographic change. The EU expresses its wish that each of its citizens have a salary that will ensure them a decent living no matter where they live. In January 2020, the European Union launched a first consultation with social partners, businesses and trade unions on fair minimum wages. This initiative is based on the implementation of the European Pillar of Social Rights adopted in 2017. The question that the EU is asking is whether the minimum wage is required at the Union level and whether Member States wish to negotiate with each other.

In connection with the European Pillar of Social Rights, the regulation of the European minimum wage was debated, to reduce poverty among those with low incomes.The increase of minimum wages, especially in low-wage countries, contributes to strengthening the social dimension of the European Union by giving confidence to European citizens for the purpose of this project. (Eurofound, 2018) Discussions on the notion of a European minimum wage have been around for several years and are considering an adequate level of minimum wages for the European Union. (Schulten et al., 2015, Schulten and Luebker, 2019)

Finance Minister Olaf Scholz spoke in November 2018 in favor of a European minimum wage initiative, saying that "thought there was merit in discussing the proposal that national minimum wages should be established at a level of at least 60 percent of the national median wage". The same proposal is also made by the European Trade Union Confederation, which argues that the minimum wage in the EU is at least 60% of the average wage in each country (ETUC, 2017).

The proposal that exists at the moment is to calculate the minimum wage as a result of 60% of the average salary of each country. For the countries chosen for the study we made a projection of the possible minimum wage according to the existing proposal so far. The data are those taken from Eurostat data. As EU representatives have said, they are open to proposals and negotiations. From the data processed it is clear that in all situations the minimum wage that would result would be higher. The approximate raise would be: for Belgium 11%, for France 6%, for Germany 13%, for Spain 6%, for Bulgaria 13%, for Hungary 12%, for Poland 11% and for Romania 12%. (Figure 4)

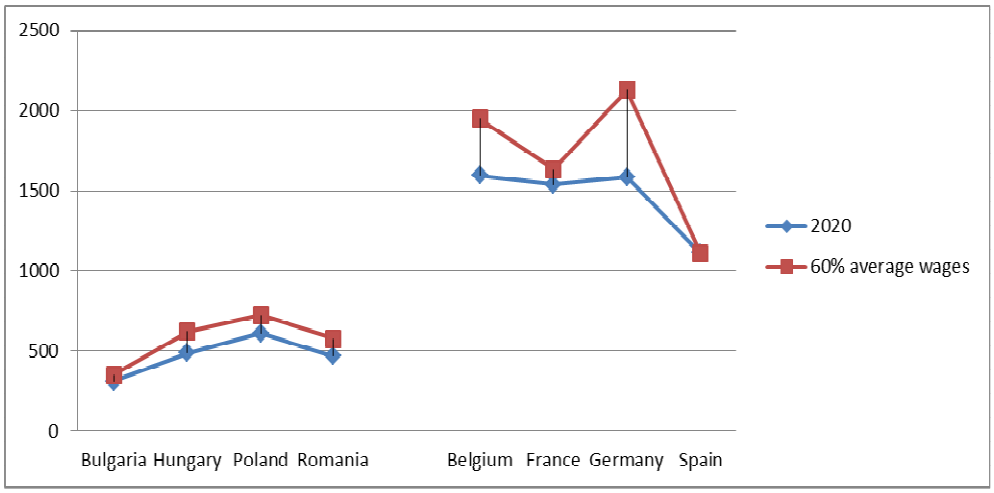


Fig. 4: Projection of the minimum wage according to the proposal of 60% of the average wage
Source: data processed by the author after Eurostat

Conclusions

In the years 2018-2019, the increase of the minimum wage was the main instrument in the countries of Eastern Europe for the wage increases. The fiscal changes by shifting the social contributions from the employer to the employee highlighted a major increase of 22.9% in 2018 compared to 2019. But the real increase of the salary was only 9.1%. In Poland and Hungary there was no wage increase, although the wages in these countries are small compared to those in western Europe. The gap between the minimum wages in the analyzed states remains very large. If viewed as a whole, the increase in the minimum wage had a minor impact on the distribution of added value. Significant increases in the minimum wage in some of the countries analyzed are misleading, with the calculation base being lower than in Western European countries. Based on the above, we can consider that wage convergence between east and west is a difficult objective to achieve. (Spatari and Guga, 2019)

A European minimum wage policy can play a dual role. From a social point of view it can lead to poverty and inequality reduction, and from an economic point of view it can stimulate growth and employment. (Schulten et al. 2015)

The response of companies for increasing minimum wages was raising prices, reporting low profits, trying to achieve better productivity by reorganizing the roles and responsibilities of employees, as well as training or qualifying employees in the workplace.

The discussions at European level should be correlated with those at national level. Important steps were taken by the states with low minimum wages, which increased the minimum wages by an important percentage, as the previous analysis showed. A number of the countries analyzed such as Spain, which registered an increase of almost 21% of the minimum wage, Germany which is one of the highest minimum wages is close to this proposal of 60% of the average wage. The increases in the minimum wage in the countries with the lowest level, such as Romania and Bulgaria, have been viewed with restraint by EU representatives. The tendencies of the companies in these countries were to employ many people with the minimum on the economy. At the same time, the differences between the salaries of older employees are very small. This can destroy the balance between employment and labor productivity.

The discussions should also look at taxes and social contributions related to salaries. Unfortunately, the states with the lowest minimum wage have the highest taxes. This has repercussions on the

number of employees. When the fiscal pressure is too high, firms tend to either hire as little as possible, or pay the minimum wage in the economy, or use illegal work. This is for example the situation of Romania where, despite the efforts of the different governments to clearly regulate the legal situation of the employees, to better collect the taxes and duties of the companies, to carry out more controls, there are still numerous situations in which the employees are paid with the minimum on the economy and quite a lot of people are employed on the black-market. The question arises whether the four Member States with the lowest minimum wages can economically support the increase of the minimum wages as long as the gross domestic product is not at the level of the developed countries and the taxes and social contributions related to the work are quite high.

The EU's initiative to open negotiations on this minimum wage is commendable. The very large differences between the Member States regarding the minimum wage can be mitigated by establishing common criteria, objectives and strategies at European level. The specificity of each country must be taken into account, but also the possibility of reaching the objectives and meeting the established criteria. The minimum wage must be set at a level close to the minimum leaving wage level.

The results of the study will be used for a new research in this field that will have as object if the proposal to increase the European minimum wage by 60% of the average salary ensures a decent living by reaching the minimum living wage threshold in the Member States.

References

- Aumayr-Pintar, C., Rasche, M. and Vacas-Soriano, C. (2019) Eurofound (2019), Minimum wages in 2019: Annual review, Industrial relation Minimum wages in 2019', Publications Office of the European Union, Luxembourg , [Online], [Retrieved January 20, 2020], https://www.eurofound.europa.eu/sites/default/files/ef_publication/field_ef_document/ef19028en.pdf

- Bellmann, L., Bossler, M., Dummert, S. and Ostmeier, E.,(2017), 'Mindestlohn: Längsschnittstudie für sächsische Betriebe', *IAB-Forschungsbericht*, 07/2017, [Online], [Retrieved January 22, 2020], http://doku.iab.de/forschungsbericht/2017/fb0717.pdf

- Bossler, M. and Greiner, H-D. (2016), 'Employment effects of the new German national minimum wage: Evidence from establishment-level micro data', *IAB Discussion paper No. 10*, Nurnberg, [Online], [Retrieved January 30, 2020], http://doku.iab.de/discussionpapers/2016/dp1016.pdf

- Bruttel, O., (2019), 'The effects of the new statutory minimum wage in Germany: a first assessment of the evidence', *Journal for Labour Market Research,* 53 (10), 1-13, [Online], [Retrieved February 2, 2020],https://link.springer.com/article/10.1186/s12651-019-0258-z

- ETUC (2017): 'For a common strategy on low and minimum wages', ETUC Resolution adopted by the Executive Committee in Malta on 15 -16 March 2017.

- Eurofound (2018), 'Progress on convergence in the socioeconomic area', Publications Office of the European Union, Luxembourg, [Online], [Retrieved January 31, 2020], https://www.eurofound.europa.eu/publications/policy-brief/2018/progress-on-convergence-in-the-socioeconomic-area

- European Comission, (2019) Labour Market and Wage Developments in Europe, Annual Review 2019', Luxembourg: Publications Office of the European Union, 138-167, [Online], [Retrieved February 1, 2020], https://ec.europa.eu/social/main.jsp?catId=89&furtherNews=yes&langId=ro&newsId=9485

- Fabo, B and Belli, S.S. (2017), ' (Un)beliveable wages? An analysis of minimum wage policies in Europe from a living wage perspective', *Journal of Labor Policy*, vol.6(1), 1-11, [Online], [Retrieved January 22, 2020], https://link.springer.com/content/pdf/10.1186/s40173-017-0083-3.pdf

- Fric, K (2018) 'Eurofound (2018), Statutory minimum wages 2018', Publications Office of the European Union, Luxembourg, [Online], [Retrieved January 20, 2020] https://www.eurofound.europa.eu/sites/default/files/ef_publication/field_ef_document/ef18005en.pdf

- KPMG in Romania, 2017, 'Minimum wage requirements whitin Europe in the context of positing of workers', KPMG in Romania, 2017, 7-9, [Online], [Retrieved February 2, 2020]

- KPMG in Romania, 2019, 'Minimum wage requirements whitin Europe in the context of positing of workers', KPMG in Romania, 2019, 12 -91, [Online], [Retrieved February 2, 2020] https://assets.kpmg/content/dam/kpmg/ro/pdf/2019/minimum-wage-survey-2019.pdf

- Lübker, T., and Schulten, T., (2018) 'WSI Minimum Wage Report 2018 - Price inflation suppresses real minimum wage growth', No.39e, March 2018, [Online], [Retrieved February 1, 2020], https://www.boeckler.de/pdf/p_wsi_report_39e_2018.pdf

- Seeliger, M. (2018), 'Why do (some) European trade unions reject minimum wage regulation?', *Culture, Practice & Europeanization*, 3 (1), 37–46, [Online], [Retrieved January 20, 2020], https://www.uni-flensburg.de/fileadmin/content/seminare/soziologie/dokumente/culture-practice-and-europeanization/vol.3-issue-1/seeliger.pdf

- Schulten T. (2008) 'Towards a European minimum wage policy? Fair wages and social Europe', *European Journal of Industrial Relations*, 14 (4), 421–439

- Schulten T. (2012) 'European minimum wage policy: A concept for wage-led growth and fair wages in Europe', *International Journal of Labour Research*, 4 (1), 85–104, [Online], [Retrieved February 1, 2020], https://pdfs.semanticscholar.org/287a/9da1982ae8d7790ac87f9c0bd82a20c0d9bf.pdf

- Schulten, T., Müller, T. and Eldring, L. (2015) 'Prospects and obstacles of a European minimum wage policy'. In Van Gyes, G, Schulten, T (eds) Wage bargaining under the new European Economic Governance, Brussels, p 327-359, [Online], [Retrieved February 1, 2020], https://Chapter+10+Prospects+and+obstacles+of+a+European+minimum+wage+policy+Schulten+Müller+and+Eldring.pdf

- Schulten, T., Lübker, M. (2019) 'WSI Minimum Wage Report 2019 Time for substantial minimum wage rises and a European minimum wage policy', nr. 46e, march 2019, Düsseldorf: WSI, [Online] , [Retrieved February 1 , 2020] , https://www.boeckler.de/pdf/p_wsi_report_46e_2019.pdf

- Spatari, M., Guga, S., (2019),) 'Situația salariaților din România.Studiu annual 2018-2019', Ediția a VII-a, Sydex Romania, [Online], [Retrieved January 28, 2020], https://www.syndex.ro/sites/default/files/files/pdf/2019-06/Situa%C8%9Bia%20salaria%C8%9Bilor%20din%20Rom%C3%A2nia%20%282019%29_0.pdf

- Socol, C. and Marinas, M. (2016) 'Minimum wage as a public policy instrument – Pros and cons', Friedrich Ebert Stiftung, [Online], [Retrieved January 20, 2020], https://library.fes.de/pdf-files/bueros/bukarest/13270.pdf

- https://ec.europa.eu/eurostat/statistics explained/index.php?title=Minimum_wage_statistics/ro

- https://ec.europa.eu/romania/news/20200114_europa_sociala_puternica_ro

Banking Systems in the Emerging Economies of Asia: Case Study - ASEAN Banking Systems

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Abstract

The link between the financial sector and economic growth has been debated in the literature and problems in the banking sector are always reflected in the economy. In a world where economic growth is stagnating, Asia's emerging economies stand out. As a dynamic, banking systems in emerging countries have undergone spectacular changes in recent decades. Our paper presents the characteristics of the banking systems in Asian emerging market economies and explores the role of banks in the development of emerging economies, particularly that of ASEAN economies in order to provide a possible explanation for the significant growth rates experienced by these countries. We focus on digital technology and how customers in the ASEAN embrace digital and mobile banking, trends that will affect the industry's regional landscape.

Keywords: Emerging Economies, Banking System, ASEAN, Digital Banking

JEL classification: E02, F63, G21**,** G23, F34

Introduction

Without the banking system one cannot talk about development and economic growth; the link between the financial sector and economic growth has been heavily debated in the literature. Walter Bagehot (1873) said that during the Industrial Revolution banks supported innovation and financed expensive infrastructure works, for example the railroads. Joseph A. Schumpeter (1912) remarked that financial mediation stimulates technological progress by relocating funds to those entrepreneurs who are oriented towards new technologies and innovation. Raymond W. Goldsmith (1969) highlighted the importance of financing in economic development. His study followed the evolution of 35 countries between 1860 and 1963 and showed the link between the development of the financial system and economic growth.

On the other hand, problems in the banking system are mirrored in economy. Financial system crises impacted macroeconomical stability, the Asian crisis of the '90s being only one example. Costs are supported by everyone, and studies show they are not at all small. In Indonesia, the public debt grew by 67,6%, while costs of the government intervention policies amounted to 52,2% of the GDP. In Thailand, the public debt grew by 42,1% and costs of the intervention in the banking system amounted to 34,8% of the GDP (Laeven and Valencia, 2018, chart 2).

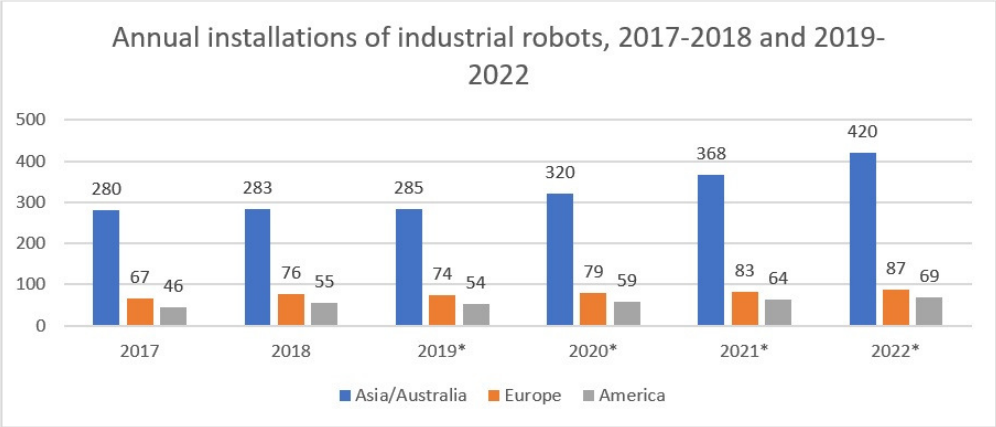
Technology, The Main Challenge of The Banking System in Asian Emerging Economies

When it comes to digitalization, Asia leads the digital revolution in spite of the region's heterogeneousness and of the differences in population incomes. Asian companies have been leaders in almost all aspects of digitalization, while some developed economies are significantly left behind. Automation through the means of industrial robots is one domain where Asia's supremacy is evident.

The density of robots is a comparative indicator that highlights the differences in the automation levels in manufacturing industry in different countries. According to the International Federation of Robotics (IFR), the value of yearly global sales reached 16.6 billion dollars in 2018. 422.000 units were delivered globally in 2018, plus 6% compared to the previous year. The IFR estimates that 2019 delivers will be

lower than the record level of 2018, but they are expected to grow by 12% per year between 2020 and 2022.

Asia is the biggest industrial robots market in the world (Fig.1). In the biggest three Asian markets result are mixed: the number of installations in China and South Korea decreased, while in Japan they increased considerably. Overall, Asia grew by 1%. Robot installations in the second biggest market, Europe, rose by 14% and have reached a sixth annual record in a row. In America, the growth rate was 20% higher than the previous year, which also constitutes a sixth consecutive high. The first five major markets for industrial robots make up for 74% of world installations in 2018: China, Japan, South Korea, USA and Germany. China remains the biggest industrial robots market, at 36% of total installations. In 2018, roughly 154.000 units were installed. This is 1% less than 2017, but more than the number of robots installed in Europe and America together. The value of installations reached 5.4 billion dollars – 21% higher than 2017.



**forecast*

Fig. 1: Annual installations of industrial robots, 2017-2018 and 2019-2022

Source: International Federation of Robotics, 2019

Emergent economies have major implication at world economy level; the banking systems in these countries are fragile. Dinamically, banking systems in emergent economies have gone through spectacular changes in the last decades. A lot of factors have caused these changes (Căpraru, 2014, p. 288): deregulations, banking internationalisation, the changing of political regimes and the fact that some countries went from socialist economy to market economy, the growing financial and banking competition at world level, international financial crises. The evolution of banking systems in the emergent economies came as a result of specific phenomena: the diminishing state ownership of the banking system following privatizations; the growing pervasion of foreign capital into the banking systems; mergers and acquisitions; the increasing degree of banking concentration; banking deregulation and liberalization; the development of the banking sector; increasing banking competition; increasing financial innovation; financial crises and bank restructuring.

The importance of emergent economies increased in recent years, along with the presence of these countries' banks in the world banking sector. Although banks in emergent economies are a relatively small part of the world's banking system, cross-border links between creditors și borrowers in emergent economies are substantial and growing fast (Cerutti, Koch and Pradhan, 2018). In terms of residence, in mid-2018 banks in emergent economies made up almost 8% of the total cross-border loans, compared to 1,5% in mid-2008. When loans are broken down according to banks' nationalities (the jurisdiction in which bank's headquarter is based), emergent economies banks meant more than 12% of world's cross-border loans in mid-2018, compared to 3% in mid-2008, according to the Bank for International Settlements. At the end of June 2018, almost 40% (1,442 billion dollars) of the cross-border loans granted by emergent economies banks were going to the same emergent economies.

In recent years, it was Asia that changed the game and brought innovation in banking services, but now Asian banks have to reinvent themselves in order to face the challenge of digitalization.

ASEAN is a region where is hard to generalize, as it brings together 643 million people from 10 nations whose diversity goes from Laos, an agricultural, mountainous country, to Singapore, a city-state with one of the highest life standards in the world. But studies show the banking system in that region is homogenous (Banna, et al. 2019). In that region banks are the main sponsors of the economy and own more than 80% of the region's financial assets. Also, governments promote the consolidation of the region's banking system by mergers and acquisitions in order to stimulate the stability of the banking sector. Last but not least, countries liberalized their entry barriers for regional banks to promote regional banking integration by adopting ASEAN agreements like the Banking Integration Framework - ABIF (from March 2015), the ASEAN-China Free Trade Area – FTA – agreement (from January 2010), and the ASEAN Plus Three cooperation agreement (from December 1997), that includes China, Japan and South Korea.

The explosive economic growth made the South-Eastern Asian banking industry grow rapidly, fueled by an expanding population that can afford banking services, regional integration and the adoption of the new financial services that fintechs provide. At the same time, the demographics give this region an extraordinary growth potential in the finance and banking sector.

ASEAN group is host to more than 630 million people, half of them below 30 years old. According to UN-Habitat estimations, roughly 47% of the urban population of the region produce 80% of ASEAN's GDP, but disparities can also be seen in the use of financial services. While in Indonesia, Malaysia, the Philippines, Singapore and Thailand – the so-called ASEAN 5 – the banking industry is developed, in the BCMLV group – Brunei, Cambodia, Myanmar, Laos and Vietnam – the banking sector is not at the same level of development.

Singapore has the highest degree of banking penetration, as 98% of the adult population have a bank account, followed by Malaysia and Thailand with 85% and respectively 82%. At the other end of the ranking, the countries with the lowest banking penetration level are Myanmar and Cambodia, with 26% and respectively 22%, according to World Bank data (table 1).

Table 1: Banking penetration in the ASEAN, adults who have a banking account

Singapore	98%
Malaysia	85%
Thailand	82%
Indonesia	49%
The Philippines	34%
Vietnam	31%
Laos	29%
Myanmar	26%
Cambodia	22%

Source: World Bank, The Global Findex Database 2017

The use of smartphones changed the consumer behaviour and increased the usage of digital channels banking. A study by McKinsey on the financial services consumer behaviour in Asia showed that banking penetration in the Asian emergent economies increased three times in 2018 compared to 2014, to 52% (McKinsey, 2018). The percentage of digitally active customers (who use digital banking and bought online at least once in the last six months) doubled in 2018 compared to 2014, to 25% of the population in Asian emergent economies (China, India, Indonesia, Malaysia, Myanmar, The Philippines, Thailand, Vietnam) and grew 1,2 times in developed economies (Australia, Hong Kong, Japan, New Zealand, Singapore, South Korea, Taiwan). Digital banking growth has lead to the decreased importance of the classical brick and mortar branch offices. Only about 21% of monthly

transactions are still being made in offices, as client prefer the digital platforms for simple, routine transactions, like balance check, peer-to-peer transactions or bills payment.

But the greatest challenge for ASEAN banks is fintechs competition, because fintechs are more flexible, unconfined by regulations that banks have to obey and they also offer simple, intuitive and easy to use financial services.

Investment in fintechs in ASEAN soared spectacularly in recent years (table 2). In 2017, for example, they increased by 45%, to 366 million dollars, from 252 million dollars in the previous year, given that internet penetration rate in ASEAN had reached 58%, 391 million mobile users, and a social media penetration rate of 55% (EY, 2018).

Table 2: Evolution of fintechs in the ASEAN

	Number of fintechs	**Investment in 2017/ Investment evolution vs 2016**	**Sectors in which they are active**	**Most active investors**
Singapore	490	141 million dollars, +68%	Asset management, wealth management, loans, mobile payment	Startupbootcamp, GMO Venture Partners, Wavemake Partners
Indonesia	262	26 million dollars, 3,7 times growth	Asset management, wealth management, mobile payment	East Ventures, Kejora, 500 start-ups
Malaysia	196	75 million dollars, 15 times growth	Payment, consum loans	500 start-ups, Cradle, Mavca
Thailand	128	12 million dollars, -40%	Payment	500 start-ups, Golden Gate Ventures
The Philippines	115	78 million dollars, 13 times growth	Payment	500 start-ups, Kickstart Ventures, Spiral Ventures.
Vietnam	77	3 million dollars	Payment	IDG Ventures Vietnam

Source: Tracxn, accessed on December 9, 2017

Banks in the region already work with fintechs or establish innovation hubs in order to be able to provide financial services that can compete against those provided by tech companies. Singapore is also the regions' country with the greatest number of innovation hubs, 52, followed by Vietnam with 24, Indonesia with 20, Malaysia with 10 and Thailand and the Philippines with 5 each (EY, 2018).

Conclusions

The increase in the number of digital channels users led to the emergence of fully digital banks, launched either by tech companies or the classical banks themselves. The company that owned the Kakao Talk messaging app, very popular in the South Korea, launched the Kakaobank digital bank in July 2017, building on the 40 million users of the app. In the first five days the new bank reached 1 million users, in three months it had 3.6 million dollars in deposits, and the value of granted loans reached several million dollars – the fastest growth of a bank. But this isn't the only example. In 2016,

BTPN launched Jenius, the first digital bank in Indonesia, and Singapore's DBS Bank launched digibank in India, that also expanded into Indonesia the next year.

The evolution of technology comes not only with challenges, but also opportunities. Mobile phones and the internet led to the creation of new types of financial services, that are simple, do not require sophisticated devices and increase the financial inclusion level.

Fintechs play an ever growing role in the improvement of financial inclusion. They should be a key element in any national financial inclusion strategy. This kind of strategy should target vulnerable groups, like the population in rural areas, low income households, the elderly and geographically isolated communities. Asia's experience in financial inclusion highlights the advantages of a holistic approach, that contains macroeconomic, financial, banking, and regulation policies and also structural reforms. It also underscores the importance of financial education and the fact that public policy makers should encourage public-private partnerships when striving for the financial inclusion.

References

- Bagehot, W. (1873), Lombard Street, A Description of the Money Market, 1962 ed. Irwin, Homewood, III,
- Banna,H., Shah, SKB., Noman, AHM., Ahmad, R., and Masud, MM. (2019) "Determinants of Sino-ASEAN Banking Efficiency: How Do Countries Differ?," *Economies, MDPI, Open Access Journal*, vol. 7(1), pages 1-23, February.
- Barquin, S. Vinayak, HV and Duhita Shrikhande, D., "Asia's digital banking race: Giving customers what they want", McKinsey.com [Online], [Retrieved January 18, 2020], https://www.mckinsey.com/~/media/McKinsey/Industries/Financial%20Services/Our%20Insights/Reaching%20Asias%20digital%20banking%20customers/Asias-digital-banking-race-WEB-FINAL.ashx
- Căpraru, B. (2014), Activitatea bancară. Sisteme, operațiuni și practici, CH Beck, București.
- Cerutti, E., Koch, C., and Pradhan, SK., „The Growing Footprint of EME Banks in the International Banking System", *BIS Quarterly Review*, December 2018.
- Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S. and Hess, JR., (2018) „The Global Findex Database 2017 : Measuring Financial Inclusion and the Fintech Revolution (English)", Washington, D.C. : World Bank Group. [Online], [Retrieved Decembre 12, 2019] http://documents.worldbank.org/curated/en/332881525873182837/The-Global-Findex-Database-2017-Measuring-Financial-Inclusion-and-the-Fintech-Revolution
- Goldsmith, RW. (1969), Financial Structure and Development, Yale University Press, New Haven.
- Laeven, L. and Fabián Valencia, F. (2018), „Systemic Banking Crises Database", *IMF Working Papers* WP/18/206.
- Schumpeter, J. (1912), The Theory of Economic Development, translated by Redvers Opie, Harvard University Press (1934) Cambridge.
- EY, (2018) „ASEAN FinTech Census 2018" [Online], [Retrieved July 22, 2019], https://www.ey.com/Publication/vwLUAssets/EY-asean-fintech-census-2018/$FILE/EY-asean-fintech-census-2018.pdf
- IFR World Robotics Presentation - 18 Sept 2019 [Online], [Retrieved December January 15, 2020] https://ifr.org/downloads/press2018/IFR%20World%20Robotics%20Presentation%20-%2018%20Sept%202019.pdf
- UN-Habitat, „The State of Asian Cities 2010/11", Fukuoka: UN-Habitat, 2010.

Work Dimensions And Job Satisfaction – What Makes Us Happy at Work?

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Abstract

The article presents research on the perception of work dimensions, which, according to the Peter Warr's vitamin model of well-being in work, should be significantly related to job satisfaction. The presented research was carried out in cooperation with TAW Polska, on a group of 239 diversified in terms of positions, seniority and education employees of a Polish company from the automotive industry. The vitamin model assumes 12 dimensions of work characteristics related to the perceived well-being of employees. The first group consists of factors which both lack and excess carry a lower level of well-being, and even prevent it from being felt. The second group consists of factors that are desired by both the employee and the organization at the highest level, and the perceived high level promotes the well-being of employees. The analysis of the results obtained partly confirms the relationship between the perception of work characteristics and well-being, in addition, the analyzes showed significant differences between groups of employees in the perception of work. Although they work in the same organization, but the different content of their work results in a different evaluations of work dimensions and well-being.

Keywords: Job Satisfaction, Dimensions Of Work, Human Resource Management, Vitamin Model Of Work Well-Being

Introduction

Well-being and quality of life concepts

The concept of well-being in social sciences, including psychology, management, and even economic sciences has noted in recent years an extraordinary increase in researchers' attention and importance in various types of analysis. Probably a specific "career" of this concept is associated with the growing popularity of a positive approach in social sciences (e.g. the development of positive psychology or focus on healthy organizations and institutions in management, education, health protection and other areas of social and economic life). Another reason is the change in the paradigm in economics and politics, which is responsible for shifting attention from economic criteria as indicators of the developmental level of societies to criteria related to the general condition of individuals and communities, and even their sense of satisfaction, happiness or well-being (World Happiness Report 2019; Harford 2019; Joshanloo 2018; Vittersoe 2016; UN General Assembly Resolution 2012).

The definition of personal mental well-being, created by WHO and based on a holistic health model, refers to the subjective sense of happiness and health felt by people. In the shortest diagnosis of well-being, it can be stated that well-being occurs when, people define themselves as “feeling cheerful and in good spirit, calm and relaxed, active and vigorous, waking up with feeling fresh and rested and having daily life filled with things that interest them” (Topp, Østergaard, Søndergaard and Bech 2015, p. 168). Of course, mental or psychological wellbeing is not the only one, because physical, spiritual, social and others also stand out in the literature.

In psychology, especially in its positive trend, several important models and approaches to wellbeing have been created since the 1980s, including subjective well being – SWL. It contains three distinct but often related components of wellbeing: frequent positive affect, infrequent negative affect, and cognitive evaluations such as life satisfaction (Diener, 1984; Diener, Suh, Lucas and Smith 1999).

Another important model is proposed by Carol Ryff (1989, 2008), consisting of six dimensions: Self - acceptance, Personal growth, Purpose in life, Environmental mastery, Autonomy, Positive relations with others. The multi-dimensional approach of Martin Seligman, one of the founders of the positive trend in psychology, called PERM, and containing the following dimensions is also important: Positive Emotions, Engagement, Relationships, Meaning and purpose, and Accomplishments. (Seligman, 2011)

The concept of well-being described above is closely related to the concept of quality of life, which has a similarly wide scope and is used in a wide range of research - from clinical psychology to the application in economics, health or educational policy (Diener and Tay 2015; Dodge, Daly, Huyton and Sanders 2012; Deci and Ryan 2008). As part of research, this trend analyzes the objective circumstances of people's lives and how they perceive these circumstances and their lives. It examines various issues, including employment, income, education, housing, family, health and work-life balance. Subjects of observation are also subjective issues, such as the level of personal satisfaction, level of life satisfaction and perception of the quality of society.

E.g. the results of the 2016 European Quality of Life Survey (2016) show significant progress in three key areas of the review: quality of life, quality of society and quality of public services - although these developments have not been reported in all countries or for all social groups.

Similar conclusions come from global research at the UN or OECD. All these research projects contain analyzes, rankings and conclusions regarding national happiness based on the assessments of the respondents' own lives and also report correlations with various life factors. For example, in March 2019, Finland was twice in the ranking of the happiest country in the world (World Hapiness Report 2019) turn, OECD studies, point to Norway as the country where life is best (assuming equal importance for all analyzed factors) (OECD Better Life Index 2017). In general, on the basis of numerous studies, Scandinavian countries are considered to be the most favorable to the well-being of their citizens.

Well-being at work and job satisfaction

Well-being and quality of life have a strong reference to people's professional activity, and work-related aspects are key in many general well-being models. E.g. Well-being Index Mayo Clinic assumes several key dimensions that create general well-being at work - meaning in work, likelihood of burnout, severe fatigue, work-life integration. In turn, in the above-mentioned Index Better Life published by the OECD, the areas: jobs, income and work-life balance are analyzed. In turn, job satisfaction as one of the direct indicators of well-being at work is a commonly diagnosed and analyzed variable - both in the field of work psychology and management, as well as in the practice of human resource management of numerous organizations. It has been the subject of interest for many years, but recent changes in labor markets and the functioning of many organizations further intensify interest in this area of research and applications (Locke 1969; Wanous and Lawler 1972; Yoone and Thye 2002; Schaufeli, Salanova, Gonzalez-Romá, and Bakker 2002; Luthans, Avolio, Avey and Norman 2007; Chung-Yan 2010; Bajcar, Borkowska, Czerw, Gasiorowska 2011).

This article assumes that job satisfaction is a state of positive assessments of various aspects of this activity (professional work) by employees. In common use, the term is understood as "feeling of pleasure and achievement which you experience in your job when you know that your work is worth doing" (Cambridge Dictionary https://dictionary.cambridge.org/en/dictionary/english/job - satisfaction). At the same time, it is also desired by managers and employers because of the consequences it has for employee engagement, responsibility, loyalty and creativity of employees, or attachment to organizations that reduce employee turnover, avoidance of work, and even counterproductive behavior in the workplace (Ford, Cerasoli, Higgins and Decesare 2011; Irving and Montes 2009).

The search for the causes and consequences of well-being at work is, by its very nature, an interdisciplinary area on the border of social sciences, mainly psychology and labor pedagogy, and management sciences, particularly human resource management. In such an interdisciplinary style, this

problem is dealt with by Peter Warr (1990b, 1994, 2009). In his model, the author presents basic assumptions regarding both subjective and organizational determinants of employee well-being. Organizational and situational determinants of well-being are the dimensions of work related to the specificity of the profession or type of work, but also with the organization. In the latest studies, the author describes 12 work dimensions included in the so-called vitamin model (Warr and Clapperton 2010; Warr 2009; Mäkikangas, Feldt and Kinnunen 2007; ; Jeurissen and Nykliček 2001; De Jonge and Schaufelli 1998). Of these, six should not exceed the average optimal level (at a higher level they are already harmful), and six may (or even should) reach very high values. The name "vitamin model" comes from just comparing working dimensions to vitamins, some of which can be supplied to the body in any amount - these are water-soluble vitamins, and some in too high doses can lead to overdose - fat-soluble vitamins. (Model description and dimension definitions are provided in the section on testing methods and procedures).

Research Method and Tools

The aim of the study

The main research goal presented in this work is the relationship between work dimensions in the vitamin model and job satisfaction. In addition, the analysis took into account important features that differentiate employees, such as seniority or position in the organization.

We have therefore hypothesized:

H1: the higher (or more optimal) the work dimensions, the higher the employees' job satisfaction ratings.

H2: work dimensions differ significantly in employee groups with different seniority and position in the organization.

Participants

The research was carried out on a group of employees diversified as to positions, seniority and education of a Polish company from the automotive industry. The research included 86.5% of the organization's employees (251 out of 290 people). Of those, 161 people worked in the production department and 42 worked in the administration department, and 35 in managers position (the rest were missing data).

The number of collected questionnaires is 251, but due to too many missing data, 239 questionnaires filled with the pen and paper method were adopted for analysis. There were 40 women, 195 men, and no data in 4 cases. The ages of the respondents ranged from 19 to 63 years (M = 34.5; SD = 10.23; 6 missing data). The years worked in this organization varied from one to 11 years (M = 3.06; SD = 2.10; 7 missing data). Most of the participants had secondary and vocational education (67.1%). The rest had higher education (28.9%) or primary education (4%).

Diagnostic Tools

The work dimensions were measured using the *Vitamin TAW Questionnaire* (Borkowska and Czerw 2015). The questionnaire consists of 12 scales which form two groups. The optimal level of the six dimensions included in Group A should oscillated around zero. Both high and low levels of dimensions can cause various types of discomfort to employees and reduce their well-being at work. Part A includes a 7-point scale, from -3 to +3, with 0 in the middle as the optimal point. The participant's task was to respond to statements concerning various aspects of his/her work and select a point along the scale. Thus, for example, the employee was asked to complete the following statement: "*I believe that social*

interaction at my workplace ..." Possible answers fell between the following two extremes: from -3 ("*actually does not exist*") to +3 ("*takes up too much of my time*").

Group B is made up of six work dimensions. In this group, the optimal level is the highest level. The presented theoretical assumptions imply different diagnostic methods for the two described vitamin groups (work dimensions). Therefore, when constructing the questionnaire – from the very beginning – different methodologies were adopted for its two parts: for the response scales, as well as for formulation of the instruction and the individual scale items. Part B includes work dimensions, levels of which should be as high as possible. They are determined using a 7-point agreement scale (from 1 – "*I fully disagree*" to 7 – "*I fully agree*") with the items formulated as affirmative sentences describing various aspects of participants' work, e.g. "*I know what my future career development prospects are in my company.*"

Dimensions in group A

Personal control (α=0.78) - scope and freedom of decisions made by an employee concerning their work, the manner and time of its performance and selection of co-workers, as well as the level of personal influence of the employee on the results of their tasks.

Demanding supervision (α=0.79) - ongoing employee supervision by superiors, evaluation of their tasks based on negative feedback and error tracking.

Work diversity (α=0.84) - level of diversification (repetitiveness vs variety) of tasks, methods and places of their execution, flexibility of thinking and employee behaviour.

Workload (α=0.77) - feeling tired due to work overload, task difficulty and carried responsibility for task execution.

Social contacts intensity (α=0.83) - frequency and quality of the employee's interpersonal contact with others in the context of their work, e.g. co-workers, supervisors, clients.

Development and evaluation (α=0.93) - the importance that employees believe an organisation attaches to their own development, using their potential as well as the organisation's involvement in career path planning.

Dimensions in group B

Supportive supervision (α=0.86) - employees' relationships with their superiors based on diverse feedback from results and work methods, the readiness and willingness of supervisors to provide support and assistance and their knowledge of employees' strengths and weaknesses.

Sense of security in organisation (α=0.79) - efforts of the organisation to ensure the physical safety of its members and the environment, and provide the employees with a sense of dignity and, as well, respect of the organisation for their own rights.

Financial compensation (α=0.82) - level of satisfaction with financial remuneration as well as transparency and fairness of remuneration policy in the organisation.

Significant social position (α=0.75) - purpose and usefulness of work for others and the organisation, importance and prestige of the professional role, a sense of being noticed by others in the organisation.
Organisational ethics (α=0.78) - involvement of the organisation in respecting standards and ethical principles related to risk avoidance, striving for fair and just practices in the organisation.

Career prospects (α=0.80) - the clarity of the organisation's career planning policies and knowledge of the conditions of promotion and pay as well as the personal influence of employees on shaping their own careers.

The questionnaire was tested in two different organisations in the same year. Reliability and validity indicators of the tool were found to be satisfactory (Borkowska and Czerw, 2015).

Employee satisfaction was measured using the Satisfaction with Job Scale (Bajcar et al. 2011). This scale includes nine items related to satisfaction components such as: co-workers, superiors, working hours, type of tasks, etc. (α=0,78). Respondents determine their level of satisfaction with particular categories on a scale from -5 to +5. The negative values refer to the level of dissatisfaction and the positive values to the level of satisfaction. The scale also includes the value 0 for a neutral level. The questionnaire was used in a number of studies where the level of job satisfaction was determined (Czerw 2017; Czerw and Borkowska 2010). The scale showed a satisfactory level of reliability and validity.

Statistical Method

Standard one-way ANOVA and Pearson correlation coefficient were used in the analyzes due to the normal distribution of variables.

Research Results

In the first step of the analysis, due to the assumed curvilinear nature of the variables in the vitamins A group (the closer to the zero point, i.e. the center of the scale, the better), for each of the work dimensions, all respondents were divided into two groups significantly different in terms of assessments of work dimension. Next, analysis of variance was carried out and differences in the declared job satisfaction in both groups were checked. The results are presented in the table below.

Table1: Relationship of job satisfaction with the level of work dimensions (Group A) (*N*=239)
Analysis of variance

	Personal control	Demanding supervision	Work diversity	Workload	Social contact intensity	Development and evaluation
Satisfaction-general	F=23,27 p≤0,001**	F=16,42 p≤0,001**	F=14,89 p≤0,001**	F=2,96 p=0,05*	F=12,29 p≤0,001**	F=12,29 p≤0,001**
Colleagues	F=4,19 p=0,16	F=1,51 p=0,223	F=0,110 p=0,896	F=0,697 p=0,499	F=6,24 p≤0,005*	F=23,99 p≤0,05*
Direct superiors	F=17,48 p≤0,001**	F=6,59 p=0,002*	F=5,46 p≤0,005*	F=2,92 p=0,05*	F=17,49 p≤0,001**	F=14,73 p≤0,001**
Type of tasks performed at work	F=14,07 p≤0,001**	F=8,16 p≤0,001**	F=12,29 p≤0,001**	F=1,38 p=0,252	F=3,34 p≤0,05*	F=20,17 p≤0,001**
Work conditions	F=9,03 p≤0,001**	F=11,21 p≤0,001**	F=11,53 p≤0,001**	F=2,71 P=0,068	F=1,23 p=0,293	F=22,84 p≤0,001**
Professional development	F=16,64 p≤0,001**	F=27,19 p≤0,001**	F=19,89 p≤0,001**	F=1,11 p=0,335	F=0,749 p=0,474	F=73,93 p≤0,001**
Salary	F=14,52 p≤0,001**	F=5,29 p≤0,005*	F=14,76 p≤0,001**	F=0,999 p=0,369	F=1,57 p=0,209	F=32,69 p≤0,001**
Work time	F=0,26 p=0,771	F=1,23 p=0,179	F=1,34 p=0,262	F=6,17 p≤0,005*	F=1,06 p=0,347	F=4,75 p≤0,01*
Stability of employment	F=10,94 p≤0,001**	F=1,55 p=0,213	F=1,34 p=0,333	F=3,08 p=0,05*	F=2,65 P=0,07	F=11,04 p≤0,001**
The company as a whole	F=11,58 p≤0,001**	F=10,62 p≤0,001**	F=8,19 p≤0,001**	F=4,59 p≤0,01*	F=0,298 p=0,743	F=20,13 p≤0,001**

** p≤0,05, ** p≤0,001*

As shown in Table 1, in 5 of 6 dimensions are significantly connected with general job satisfaction. Only *Workload* causes much ore slight differences in satisfactions evaluation. Interestingly, the evaluations of satisfaction of colleagues, working time and stability of employment are least related to the dimensions of work in group A. The results, however, generally confirm the relationship between work dimensions in group A and job satisfaction.

The next step was to carry out an analysis of the correlation of work dimensions from group B with aspects of job satisfaction. It was possible because it was assumed that the higher the results on all scales the respondent achieved, the better, i.e. greater well-being at work. The results are presented in the table below.

Table2: Relationship of job satisfaction with the level of work dimensions (Group B) (*N*=239) Pearson's correlation coefficient

	Supportive supervision	Sense of security in organisation	Financial compensation	Significant social position	Organisational ethics	Career prospects
Satisfaction-general	,584**	,531**	,615**	,455**	,408**	,567**
Colleagues	,262**	,194**	,130**	,191*	,236**	,172**
Direct superiors	,628**	,221**	,399**	,381**	,363**	,357**
Type of tasks performed at work	,406**	,278**	,365**	,438**	,204**	,357**
Work conditions	,367**	,474**	,378**	,250**	,324**	,370**
Professional development	,502**	,434**	,522**	,369**	,230**	,638**
Salary	,395**	,314**	,780**	,378**	,314**	,458**
Work time	0,061	,376**	,130*	-0,002	0,026	,175**
Stability of employment	,345**	,310**	,312**	,287**	,332**	,270**
The company as a whole	,397**	,443**	,427**	,341**	,362**	,410**

** p≤0,05, ** p≤0,001*

Similarly to the A group of vitamins, also in this set of work dimensions, the results show a relatively strong and significant correlation between job satisfaction and vitamins. It is worth noting the strong relationship between vitamins and overall satisfaction and satisfaction with professional development. Work dimensions seem to be correlated the least with satisfaction from working time and colleagues.

As part of the diagnosis, correlation and variance analyzes to indicate differences in the evaluations of work dimensions and job satisfaction depending on several demographic features, i.e. gender, age, but also general seniority and seniority in the company were carried out. Results of the analyzes have shown that men and women evaluate their dimensions of work and job satisfaction in very similar way. In addition, analyzes of correlation with age and seniority showed only two weak relationships between the age of employees and the assessment of work dimensions. The older the employees, the better (higher) they evaluate the importance of their position in the organization and the importance of their work for the company. Moreover, the longer the period of work in the organization, the worse they assess the organization's ethics.

Therefore, it should be emphasized, that these relationships are not very strong and it can be generally stated that demographic variables are generally not significant for the well-being and assessment of organization and work.

This an unintuitive result, indicates the strength of the influence of the characteristics of work and organization, as well ways of managing and organizing work in building employee well-being, rather than their individual characteristics.

However, significantly different in evaluations of the work dimensions were shown in the analyzes taking into account the department in which the respondents work and their position in the company (managerial versus non-managerial). The next four figures show these differences in evaluations.

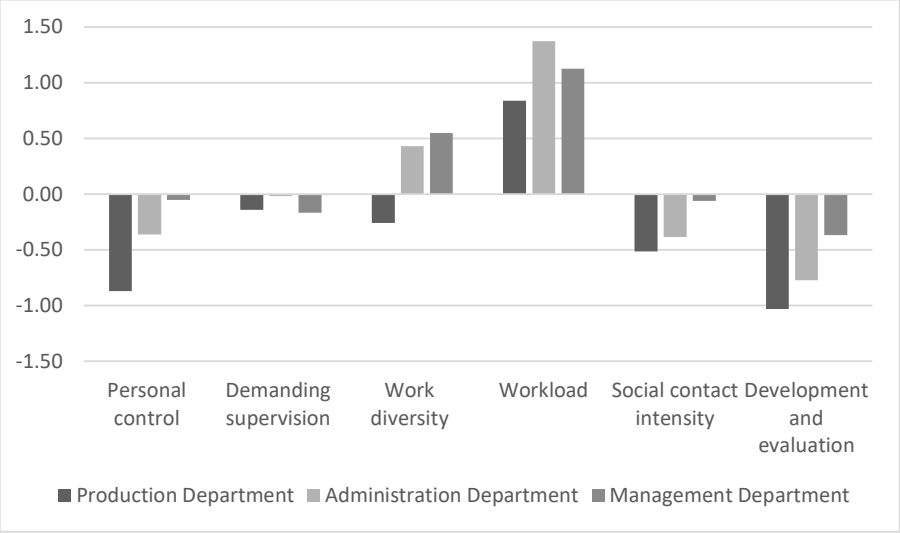

Fig.1: Evaluations of work dimensions (Group A) by employees of various departments

Analyzes of work dimensions from group A show significant differences in the evaluations of these dimensions between departments. They do not appear only on the *Demanding Supervision* dimension, by the way the best rated (the ratings closest to the optimum at the point "0"). The largest differences were recorded in the dimensions of *Personal Control, Work Diversity*, and *Development and Evaluation*. The employees employed in the Production Department declared the most negative (furthest from optimum) evaluations.

It is worth emphasizing that all three groups of employees (from three different departments) rated *Workload* the worst. This is consistent with general data showing a significant work load, e.g. in the number of hours worked, in Poland against other European countries.https://ec.europa.eu/eurostat/statistics-explained/

Summarizing these results, it should be notice that in different places, employees organize work in different ways and in different conditions, so they also perceive these dimensions in a completely different way.

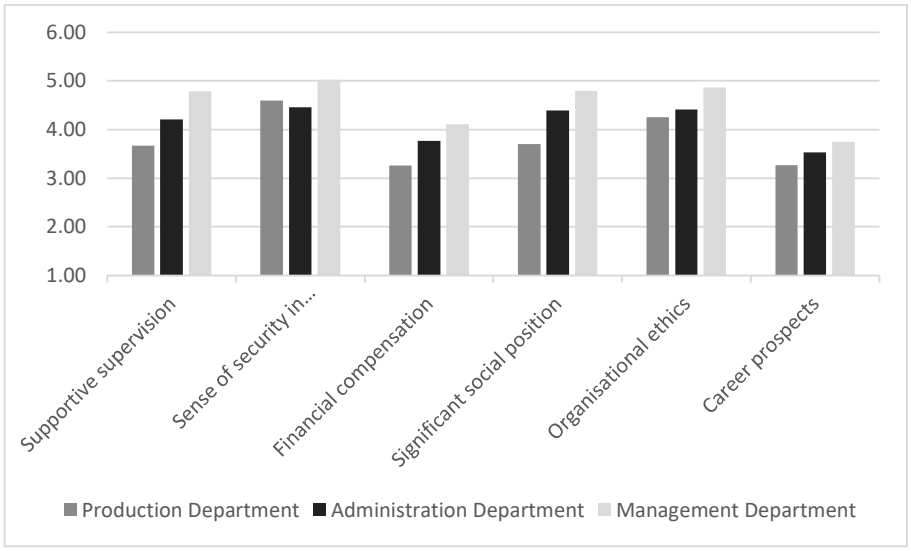

Fig.2: Evaluations of work dimensions (Group A) by employees of various departments

Similarly to the A group of Vitamins, the analyzes of B group showed significant differences between the departments of the researched organization.

The greatest differences concerns: Significant social position, Supportive supervision and Financial compensation. On all of these dimensions, the Management Department rated these dimensions the best, and the Production Department the worst. It is important to emphasize the constant pattern of differences in evaluations: the highest grades for all dimensions of work come from the Management Department and the lowest from the Production Department.

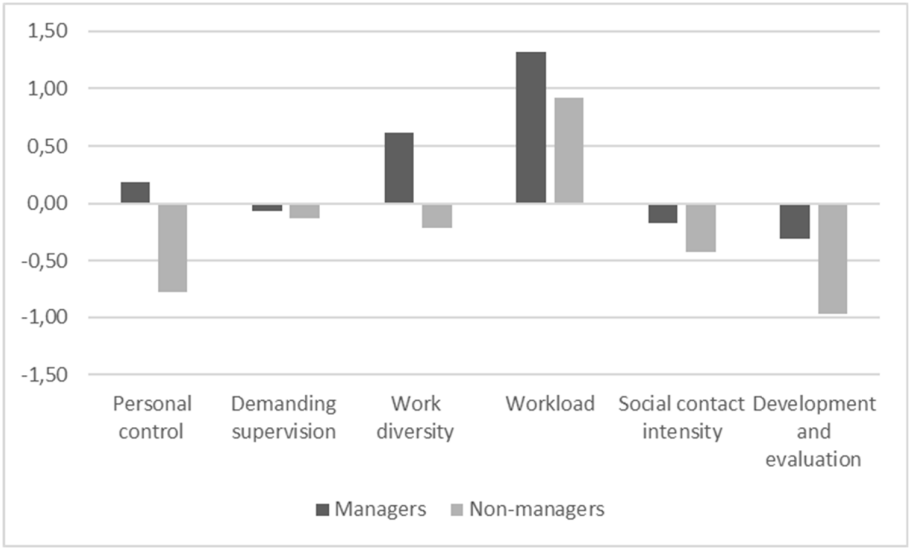

Fig.3: Evaluations of work dimensions (Group A) by managers and non-managers employees

The differences due to the position in organisation in this Vitamin group are very clear. People in managerial positions declare an excessive of *Work Diversity* and *Workload* (but in the second dimension the differences are not as clear compared to other employees).

On the other hand, non managerial employees rate the level of *Personal Control* and *Development* clearly lower

- they consider them too low.

Best (evaluations closest to the optimum at the "0" point) and in a consistent manner are rated dimensions: *Demanding Supervision and Social contacts intensity*.

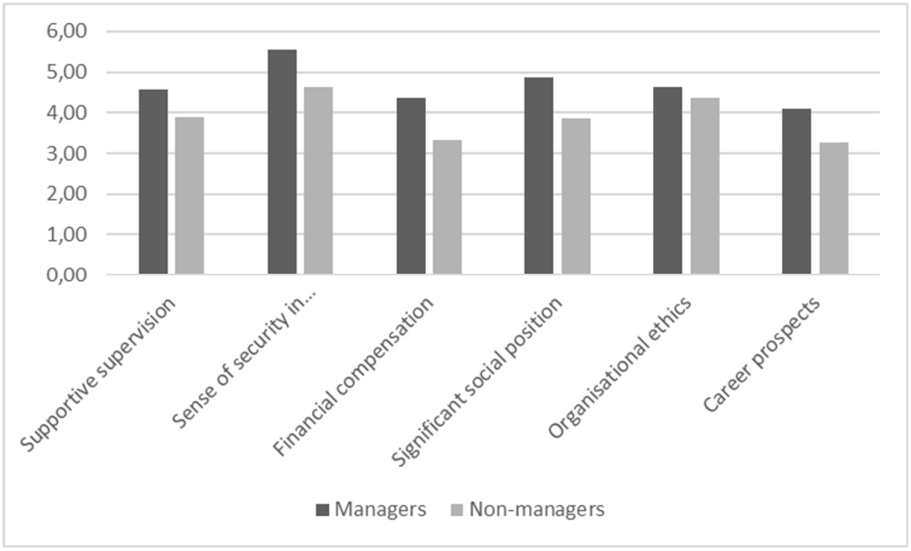

Fig.4: Evaluations of work dimensions (Group B) by managers and non-managers employees

The only dimension whose evaluation does not differ significantly in the group of managers and other employees is the *Organisational ethics*. Other assessments are varied, with the largest differences appearing in *Financial compensation* and *Significant social position.*

In general, a group of people employed in managerial positions evaluates better all dimensions of work in this Vitamin group.

Conclusions

Summing up the results presented above, it should be emphasised that the overall picture indicates that the organisation does not have a very high level of overall "positivity" (in terms support high level of employees well-being). It can therefore be assumed that, according to the workers, this is not a specially supportive or development-stimulating workplace: there are some areas that can be much better managed by leaders providing a higher level of employee well-being or job satisfaction. However, it is worth noting that, in the group of work dimensions which has an optimal point (Group A), three are evaluated quite well. These include *Demanding Supervision*, *Work diversity* and *Social contacts intensity*.

In group B of work dimensions, the *Career prospects* and *Financial compensation* were rated the worst. However, it is somewhat surprising that the best rated were *Sense of security in organization* and *Organisational ethics*. This result seems to be a kind of hope and positive expectation of employees put in the employer and workplace.

The analyzes in a clear and consistent manner confirmed the assumed relationship between the evaluations of work dimensions and the level of job satisfaction. It is relatively strong and significant. However, it should be emphasized that the five dimensions are particularly strongly associated with satisfaction. These are: *Personal control, Demanding supervision, Supportive supervision, Financial compensation* and *Career prospects.* This means that employers, organizations and individual managers are able to significantly increase the satisfaction of their employees thanks to active and thoughtful management of work conditions and features. Of course, not all aspects of work can be changed quickly and easily, but those that relate to control, supervision or employee autonomy are worth thinking and changing within the broadly understood organizational and management culture or types of leadership.

On the other hand, comparative analyzes show that employees of various departments and positions in one company work in completely different conditions and assess the dimensions of their work and the (same) employer in a significantly different way. This is undoubtedly a challenge for many managers as it requires a much more diverse and even individualized approach to motivating and engaging employees of various departments and positions. Another challenge seems to be building a coherent and common identity of employees of one company, since they perceive it in such a diverse way.

Currently, the need to ensure the well-being of employees, seems obvious. Many results of the research, however, suggest also equally importance of this mental state of employees for the functioning of the entire organization. Meatanalysis of various research carried out in this context (Ford et al. 2011) shows that the well-being of employees affects on more effective use of working time, increase in quality of work, improving interpersonal relationships at work, less frequent and better resolved conflicts , loyalty to the employer, civic attitude towards the organization, increased organization's innovation, customer satisfaction, less employee turnover, less work absences, safer work.

Since the well-being of employees brings so many benefits to the organization, actions aimed at raising and nurturing the well-being of its employees should become the norm. It seems that the results and conclusions given above can help achieve this goal in many different organisations.

Limitations

The basic limitation of the presented research is the character of the company in which it was conducted, i.e. the automotive production plant. In this type of company, employees have a very different scope and content of work, depending on the department in which they are employed and their role in the organisation (i.e. managerial or not managerial). As well, the work characteristics evaluation profile given by employees is probably quite specific to the industry itself and type and culture of organisation (i.e. Polish enterprises). Comparative analyses of organisations across different industries and types of activities would therefore be highly recommended.

References

- Bajcar, B., Borkowska, A., Czerw, A., & Gąsiorowska, A. (2011). Satysfakcja z pracy w zawodach z misją społeczną: psychologiczne uwarunkowania [Job satisfaction in occupations with a social mission: Psychological causes]. Gdańsk, Poland: Gdańskie Wydawnictwo Psychologiczne.
- Borkowska, A., & Czerw, A. (2015). Empiryczna weryfikacja witaminowego modelu dobrostanu w pracy [Empirical verification of the Vitamin Model of well-being at work]. Humanizacja Pracy [Work Humanization],1, 183-199.
- Chung-Yan, G. A. (2010). The nonlinear effects of job complexity and autonomy on job satisfaction, turnover, and psychological well-being. Journal of Occupational Health Psychology, 15, 237–251.
- Czerw, A. (2017). Diagnosing well-being in work context – Eudemonic Well-Being in the Workplace Questionnaire. Current Psychology, https://link.springer.com/article/10.1007/s12144-017-9614-8
- Czerw, A., & Borkowska, A. (2010). Praca zawodowa jako obszar realizowania misji społecznej. [Work as an area of social mission] Psychologia społeczna [Social Psychology], 5(4), 303–315.

- De Jonge, J., & Schaufelli, W. (1998). Job characteristics and employee well-being: A test of Warr's Vitamin Model in health care workers using structural equation modeling. Journal of Organizational Behavior, 19(4), 387–407.
- Deci, E. L., & Ryan, R. M. (2008). Hedonia, eudaimonia, and well-being: An introduction. Journal of Happiness Studies, 9, 1-11. https://doi.org/10.1007/s10902-006-9018-1
- Diener, E. (1984). Subjective well-being. Psychological Bulletin, 95(3), 542–575.
- Diener, E., & Tay, L. (2015). Subjective well-being and human welfare around the world as reflected in the Gallup World Poll. *International Journal of Psychology*, 50, 135– 149. https://doi.org/10.1002/ijop.12136
- Diener, E., Suh, M., Lucas, E., & Smith, H. (1999). Subjective well-being: Three decades of progress. Psychological Bulletin, 125(2), 276–302.
- Dodge, R., Daly, A., Huyton, J., & Sanders, L. (2012). The challenge of defining wellbeing. International Journal of Wellbeing, 2, 222–235.
- European Quality of Life Survey (2016) [Online], [Retrieved January 20, 2020], https://www.eurofound.europa.eu/eqls2016
- Ford, M., Cerasoli, Ch., Higgins, J., & Decesare, A. (2011). Relationships between psychological, and behavioral health and work performance: A review and meta-analysis. Work and Stress, 25(3), 185–204.
- Harford, T. *Why happiness is easy to venerate, hard to generate*, Financial Times, 1 March 2019. [Online], [Retrieved January 20, 2020], https://www.ft.com/content/7f73002a-3a95-11e9-b856-5404d3811663
- Irving, P. G., & Montes, S. D. (2009). Met expectations: The effects of expected and delivered inducements on employee satisfaction. Journal of Occupational and Organizational Psychology, 82(2), 431–451.
- Jeurissen, T., & Nykliček, I. (2001). Testing the Vitamin Model of job stress in Dutch health care workers. Work and Stress, 15(3), 254-264.
- Joshanloo, M. (2018). Income satisfaction is less predictive of life satisfaction in individuals who believe their lives have meaning or purpose: A 94-nation study. *Personality and Individual Differences*, 129, 92– 94. https://doi.org/10.1016/j.paid.2018.03.018
- Locke, E. A. (1969). What is job satisfaction? Organizational Behavior and Human Performance, 4, 309–336. doi:10.1016/0030-5073(69)90013-0
- Luthans, F., Avolio, B. J., Avey, J. B., & Norman, S. M. (2007). Positive psychological capital: Measurement and relationship with performance and satisfaction. Personnel Psychology, 60, 541–572. doi:10.1111/j.1744-6570.2007.00083.
- Mäkikangas, A., Feldt, T., & Kinnunen, U. (2007). Warr's scale of job-related affective well-being: A longitudinal examination of its structure and relationships with work characteristics. Work and Stress 21(3), 197–210.
- McCarthy, J.M.,Trougakos, J.P., & Cheng, B.H. (2016). Are anxious workers less productive workers? It depends on the quality of social exchange. Journal of Applied Psychology 101(2), 279–291.
- Meyerding, G. H. (2015). Job characteristics and job satisfaction: A test of Warr's Vitamin Model in German horticulture. The Psychologist-Manager Journal, 18(2), 86–107.
- Rydstedt, L., Ferrie, J., & Head, J. (2006). Is there support for curvilinear relationships between psychosocial work characteristics and mental well-being? Cross-sectional and long-term data from the Whitehall II study. Work and Stress, 20(1), 6–20.
- Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. Journal of Personality and Social Psychology, 57, 1069– 1081. https://doi.org/10.1037/0022-3514.57.6.1069
- Ryff, C. D., & Singer, B. H. (2008). Know thyself and become what you are: A eudaimonic approach to psychological well-being. Journal of Happiness Studies, 9(1), 13– 39. https://doi.org/10.1007/s10902-006-9019-0
- Schaufeli, W. B., Salanova, M., Gonzalez-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A confirmative analytic approach. Journal of Happiness Studies, 3, 71–92. doi:10.1023/A:1015630930326
- Seligman, M. E. P. (2002). Authentic happiness. New York, NY: Free Press.

- Topp C.,W., Østergaard S., D, Søndergaard S, Bech P. The WHO-5 well-being index: a systematic review of the literature. Psychotherapy Psychosomatic. 2015;84:167–76. https://doi.org/10.1159/000376585
- UN General Assembly Resolution (2012) Happiness: towards a holistic approach to development. Draft Note. [Online], [Retrieved January 20, 2020], https://www.un.org/esa/socdev/ageing/documents/NOTEONHAPPINESSFINALCLEAN.pdf
- Van Der Doef, M., & Maes, S. (1999). The Job Demand-Control(-Support) Model and psychological well-being: A review of 20 years of empirical research. Work and Stress, 13(2), 87–14.
- Vittersø, J. (2016). The most important idea in the world: An introduction. In J. Vittersø (Ed.), Handbook of eudaimonic well-being (pp. 1– 24). Cham, Switzerland: Springer International Publishing. https://doi.org/10.1007/978-3-319-42445-3
- Wanous, J. P., & Lawler, E. E. (1972). Measurement and meaning of job satisfaction. *Journal of Applied Psychology, 56*(2), 95–105. https://doi.org/10.1037/h0032664Warr, P. (2009). Environmental "vitamins", personal judgements, work values, and happiness. In S. Cartwright, and C. L. Cooper (Eds.), The Oxford handbook oforganizational well-being (57–87). New York, Oxford, UK: Oxford University Press.
- Warr Peter. 1990b. Decision latitude, job demands, and employee well-being. Work and Stress, 4(4), 285-294.
- Warr Peter. 1994. A conceptual framework for the study of work and mental health. Work and Stress, 8(2), 84-97.
- Warr P., & Clapperton, G. (2010). The joy of work. East Sussex, UK: Routledge.
- World Happiness Report (2019) [Online], [Retrieved January 20, 2020], https://worldhappiness.report/ed/2019/

Organizational and Economic Aspects of Assessing the Level and Quality of Life of The Population of Regional Economic Entities

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Abstract

In the publication, the author substantiates the relevance of using the indicative organizational and economic approach to assessing the level and quality of life of the population of an administrative-territorial unit, develops tools for applying the indicative organizational and economic approach to assessing the level and quality of life of the population of an administrative-territorial unit, performs practical testing of individual indicators organizational and economic approach to assessing the level and quality life of the population of the administrative-territorial unit. As an object of practical testing of the tools of an indicative organizational and economic approach to assessing the level and quality of life of a population in a scientific study, statistical indicators of the socio-economic development of the Kursk region were used. The advantage of the method of assessing the level and quality of life of the population of the administrative-territorial unit presented by the author is the use of a formalized criteria-based organizational and economic apparatus in the process of research. Based on the results of the study, the author concludes that it is practical to use the presented indicative organizational and economic approach to assess the level and quality of life of the population in order to remove uncertainty when making program-oriented management decisions.

Keywords: Level and quality of life, regional development, management decisions, indicators of quality of life, organizational and economic approach

Introduction

The study of issues of assessing the level and quality of life of the population has the most significant interest. The high relevance of assessing the quality of life of the population is due to the presence of interest in this issue at the macroeconomic, political, and at the public level. In this regard, a large number of methods and tools for assessing the standard of living of the population have been developed in the scientific literature. Most of the presented methods can be divided into two categories: quantitative and qualitative. In our view, the use of quantitative methods to assess the level and quality of life of the population contributes to obtaining a more formalized result and increases its importance as an information base for making management decisions. In this aspect, it can be noted that the relevance of assessing the quality of life of the population is also caused by the need to form a reliable information base for the development and implementation of programmatic and targeted measures to increase this criterion, including at the regional and municipal levels of government. The effectiveness of the implementation of programme-targeted measures to increase the quality of life of the population of a territorial unit also needs the formation of a reliable and formalized assessment apparatus, which would make it possible, on the basis of a reliable statistical base, to form reasonable conclusions on the dynamics of the development of this indicator. We

propose to use an indicative organizational and economic approach to assess the standard and quality of life of the population of the administrative and territorial unit to solve this issue.

The purpose of this study is to develop and test an indicative organizational and economic approach to assessing the level and quality of life of the population of an administrative-territorial unit.

This purpose is achieved through the following tasks:

- to substantiate the relevance of the use of an indicative organizational and economic approach to assess the level and quality of life of the population of the administrative and territorial unit;
- development of tools for an indicative organizational and economic approach to assessing the level and quality of life of the population of the administrative and territorial unit;
- the practical testing of individual tools for an indicative organizational and economic approach to assessing the level and quality of life of the population of an administrative-territorial unit.

The working hypothesis of this study is that the development and adaptation of an indicative organizational and economic approach to assessing the level and quality of life of the population of an administrative-territorial unit will contribute to improving the reliability of the information base for making quality management decisions, including at the regional and municipal levels of management, which will significantly increase the effectiveness of the development and implementation of various target programs.

The main result of this study is the development of a verified indicative organizational and economic approach to assessing the level and quality of life of the population of the administrative-territorial unit, based on the synthesis of the materials of the statistical representative sample. Monographic, statistical, comparative, economic-analytical, representative methods of research are used to solve the problems in the work and achieve its main goal. The development of an effective tool for assessing the standard and quality of life of the population implies, first of all, the concretization of the conceptual apparatus in this field of research. The assessment of the standard of living and the quality of life of the population is given considerable attention in the scientific literature, which once again indicates the relevance of this issue.

Review Methodology

A number of scientific researchers in their publications define the standard of living of the population as a set of factors that contribute to the meeting the necessary needs. The formation of these factors is achieved in the process of creating the necessary criteria for the socio-economic development of the territory and the life of the population.

Based on the above, we can conclude that the standard of living of the population can be determined through the lens of current income and property benefits accumulated by residents of an administrative-territorial unit. An important factor in the development of the standard of living of the population is the range of social services provided to the population by the State free of charge.

L.M. Idigova considers it appropriate to use a standardized approach to reveal the essence of the concept of "standard of living of the population". Taking into account the author 's scientific position, it can be concluded that the level of living of the population can be considered as a standard that should be achieved by the actual conditions of residence of citizens in a particular territory. This author unambiguously treats the standard of living of the population as an economic category subject to certain social standards. A certain group of scientific researchers considers it appropriate to separate such categories as the level and quality of life of the population. Based on the scientific position of L.N. Kravchenko, we can conclude that the standard of living is a quantitative category, and the quality of life is a qualitative category. In addition, the sign of subjectivity is an important factor in separating the concepts of "level" and "quality" of life of the population. In our opinion, the category of" standard " of living of the population has an objective character and can have a certain

quantitative parametric assessment. The category "quality" of life of the population is subjective and in a certain sense can not be characterized by a certain set of quantitative criteria.

Based on the presented comparative categorical analysis and taking into account the goals and objectives of this work, the main object of the study will be the category of living standards of the population. Thus, under the standard of living of the population within the concept of this study will be defined as a system of socio-economic factors of life, contributing to the satisfaction of its material, moral, spiritual, and physiological needs.

The study of the standard of living of the population includes the achievement of a wide range of goals. First of all, among the main targets for assessing the standard of living of the population, the following can be identified:

- the study of the dynamics of the development of the population's standard of living in the formation of General macroeconomic indicators of socio-economic policy;
- the creating a reliable information base for selecting vectors for implementing the program-targeted approach to increasing the level of socio-economic development of a certain administrative-territorial unit;
- the formation of a quantitative criterion for evaluating the effectiveness of certain measures in the area of increasing the level of socio-economic development of a certain territory.

Based on research materials, we can note that the standard of living of the population is an integral indicator. To assess the standard of living of the population, we recommend using a specific set of indicators. Indicators for assessing the standard of living of the population can be dynamic or static. In our opinion, the most relevant is the use of dynamic indicators to assess the standard of living of the population, due to these indicators allow you to track the dynamics of the standard of living for a certain time interval.

The formation of a dynamic integral indicator for assessing the standard of living of the population

The formation of a dynamic integral indicator for assessing the standard of living of the population is based on the calculation of chain indicators of growth of individual indicators for the selected time period. Calculating the value of the dynamic integral indicator for assessing the standard of living of the population requires an analysis of the evolution of the following static indicators:

- Per capita income of the population:

$$PCM_a = \frac{MI_t}{P_a} \quad (1)$$

PCM_a - the average per capita monetary income of the population;

MI_t - the total amount of monetary income of the population of the studied territory;

P_a - the average annual population of the studied territory.

- the share of the population with incomes above the subsistence level:

$$S_{pisl} = \frac{P_{isl}}{P_a} \quad (2)$$

S_{pisl} - the share of the population with incomes above the subsistence level;

P_{isl} - the average annual population with incomes above the subsistence level;

P_a - the average annual population of the study area.

- the total area of residential premises per resident:

$$A_{pr} = \frac{A_t}{P_a} \quad (3)$$

A_{pr} - the total area of residential premises per resident;

A_t - the total area of residential premises for resident to live in this territory;

P_a - the average annual population of the study area.

- the volume of paid services per capita:

$$VS_c = \frac{VS_t}{P_a} \quad (4)$$

VS_c - the volume of paid services per capita;

VS_t - the total volume of paid service to the population in this territory;

P_a - the average annual population of the study area.

Based on the presented four indicators, a dynamic integral indicator for assessing the standard of living of the population is determined. The calculation of the value of the dynamic integral indicator for assessing the standard of living of the population is made using the following formula:

$$DII_{slp} = Kc_{PCM_a} * Kc_{S_{psl}} * Kc_{A_{pr}} * Kc_{VS_c} \quad (5)$$

DII_{slp} - dynamic integral indicator for assessing the standard of living of the population;

Kc_{PCM_a} - the chain coefficient of growth of average per capita income of the population;

$Kc_{S_{psl}}$ - the chain coefficient of growth of share of the population with incomes above the subsistence level;

$Kc_{A_{pr}}$ - the chain coefficient of growth of total area of residential premises per resident;

Kc_{VS_c} - the chain coefficient of growth of volume of paid services per capita.

Statistical indicators of the social and economic development of the Kursk region were used as an object of practical testing of the tools of the indicative organizational and economic approach to assessing the level and quality of life of the population. The advantage of the methodology presented by the author for assessing the level and quality of life of the population is the use of a formalized criteria-based organizational and economic apparatus in the process of conducting research. The initial data for determining the dynamic integral indicator for assessing the standard of living of the population of the Kursk region are presented in table 1.

Table 1: Values of indicators for determining the dynamic integral indicator for assessing the standard of living of the population of the Kursk region

Indicator	2013	2014	2015	2016	2017	2018	The growth rates 2018 to 2013
The average per capita monetary income of the population, rub.	22908,7	23188,1	25801,4	25821,4	26424,6	27218,2	118,81
The chain growth rate, %	-	101,22	111,27	100,08	102,34	103,00	-
The share of the population with incomes above the subsistence level	91,2	91,3	89,8	89,7	89,8	90,1	98,79
The chain growth rate, %	-	100,11	98,36	99,89	100,11	100,33	-
The total area of residential premises per resident, m^2	27,9	28,3	28,7	29,3	30	30,4	108,96
The chain growth rate, %	-	101,43	101,41	102,09	102,39	101,33	-
The volume of paid services per capita, rub.	97,5	99,3	103,6	107,8	110,7	113,2	116,10
The chain growth rate, %	-	101,85	104,33	104,05	102,69	102,26	-

Using formula 4 and based on the initial data in table 1, the value of the dynamic integral indicator for assessing the standard of living of the population of the Kursk region is determined. The results of this calculation are presented in figure 1.

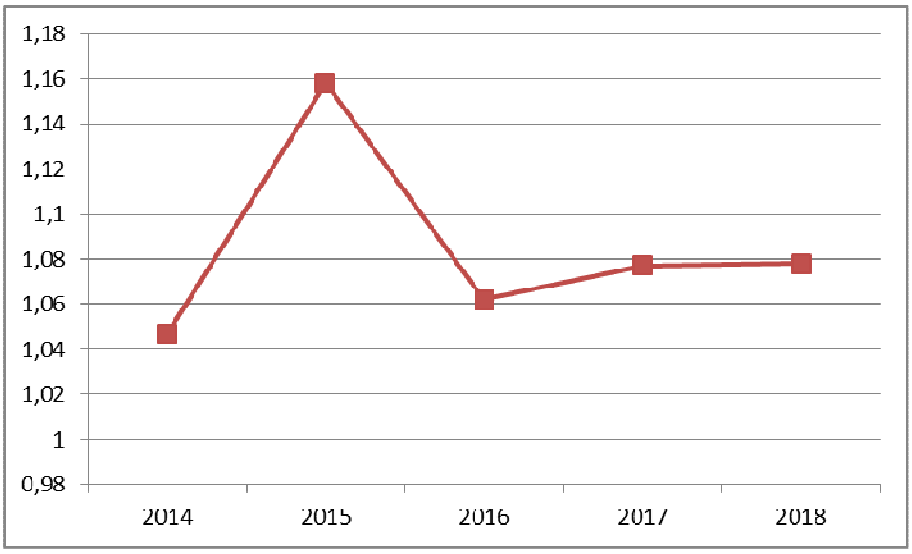

Fig. 1: Dynamics of the dynamic integral indicator for assessing the standard of living of the population of the Kursk region

Conclusion

So, based on the results of the conducted research the following conclusions can be drawn. The value of the dynamic integral indicator for assessing the standard of living of the population of the Kursk region varies unevenly within the studied period of time. The highest value of this indicator was in 2015, and the minimum value of the indicator was in 2014. The assessment of the evolutionary of the dynamic integral indicator for assessing the standard of living of the population of the Kursk region indicates positive changes in the socio-economic development of the region and the correctness of management decisions in this area. The reason for this conclusion is the fact that, starting from 2016 to 2018, the value of the dynamic integral indicator for assessing the standard of living of the population of the Kursk region is constantly increasing relative to the level of this indicator in 2014. The negative point is a significant drop in the value of the indicator in 2016 relative to 2015. The advantage of the performed calculations is the fact that they are based on both a verified mathematical apparatus and a reliable statistical information base. In addition, we can not fail to note the evolutionary nature of the dynamic integral indicator for assessing the standard of living of the population of the Kursk region, which allows to see exactly the temporary development of this phenomenon, which is the main thing for a qualitative assessment of not only the current state, but also the formation of promising management decisions. As a result, we can conclude that it is practical to use an indicative organizational and economic approach to assess the level and quality of life of the population in order to reduce uncertainty in making program-targeted management decisions.

References

1. Zueva E.G., Kapishnikova D.A., Schukina E.S. (2018) The level and quality of life of the population. In the collection: High Technologies. Science and education: current issues, achievements and innovations. Collection of articles of the International scientific-practical conference: at 2 hours. P. 43-45
2. Idigova L.M., Israilova M.S.A (2018) The level and quality of life of the population of Russia: concept, indicators, standards. FGU Science. №1 (11). - P. 70-74
3. Kravchenko L.N., Kirilova V.S. (2017) The level and quality of life of the population of the Belgorod region. Belgorod Economic Bulletin. № 3 (87). - P. 131-138

4. Meshkova K.N., Krasnopyorova M.V., Melnikova T.V. (2018) The level and quality of life of the population of the Russian Federation. In the collection: Modern Economics: a collection of articles of the XVI International Scientific and Practical Conference: at 2 hours. P. 55-58
5. Chernysheva E.A., Denisova I.S. (2017)The impact of international sanctions on the quality and standard of living of the population of Russia. Central Scientific Bulletin. T.2.№ 22S (39S). P. 67-68
6. Kovalenko K.E., Bakhvalov S.Yu., Zeky A.O., Vikulina V.V., Tinkov S.A., Tkacheva T.V. (2019) Key indicators of innovation activity of Russia (from 2011 to 2017). T. 22. № 3. P. 368.
7. Yusupova M.A. (2018)The level and quality of life of the population: regional aspect. In the collection: Economics and Management: Key Problems and Development Prospects Materials of the VII International Scientific and Practical Conference. under the general ed. E.V. Korolyuk. P. 220-224
8. Rosa, A. T. R., Pustokhina, I. V., Lydia, E. L., Shankar, K., & Huda, M. (2019). Concept of electronic document management system (EDMS) as an efficient tool for storing document. Journal of Critical Reviews, 6 (5), pp. 85-90. doi:10.22159/jcr.06.05.14

The Substitution of Labor with Capital from Smith to Schumpeter. Is the Service Sector the Last Chance of Employment? An analysis on the employment in service sector in the EU.

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Abstract

Over the decades, there is an increasing emphasis on the role that technologies play in the production process. The shift of the labor force from agriculture to industry, then from industry to services due to the automation of the first two sectors had a major impact on the development of a country. In the future, the evidence shows that we will face a new sector change. From the classics to the contemporaries, each has expressed his opinion in one way or another on this nodal problem that the economy of each country is facing, from the poorly developed ones to those where, although unemployment is not one of the matter with which is facing, but its lack of labor force to support the production of the respective nation.

Keywords: Employment, Service Sector, Substitution of Labor, Automation

Introduction

The fear of unemployment due to technological changes has been and remains present, debated and analyzed. The Schumpeterian paradigm started from modern industrial organizations and placed companies and entrepreneurs at the center of the growth process. The "creative destruction" explains that in some countries the increases generated by innovation are associated with a higher turnover rate, but also with a decrease in the nation's employment.

Most economists consider employment not only an economic condition, but also a human right. Burgess and Mitchell (1998) claim that the right to work is a fundamental, natural right. Wray (2009) argues that work can be a fundamental premise for social justice in any society, when the income from work is an important determinant for access to resources. Sawyer (2003) claim that obtaining jobs through state intervention creates inflation, motivating that lower unemployment means higher inflation.

Frey and Osborne (2017) consider that half of the labor force face a high risk of automation in the coming decades. Although the economic literature suggests that it is possible these recently evaluations of the risks is an ver-estimation of the potential for automation (Arntz, et al., 2016), until now, only a few studies are referring to the consequences on labor market because of modern automation technologies.

According to existing studies, automation technologies are replacing work in routine tasks. These are tasks that can be performed through algorithms and computer control. Increased processing power leads to a decision to replace individuals with machines in routine tasks (Acemoglu & Restrepo, 2017). Dorn et al (2013) and Cortes and Salvatori (2015) consider local US labor market that specialize in routine tasks didn't registered a decrease in jobs, while Gregory et al (2016) clearly highlight a net positive impact on the demand for work in European regions.

A more recent component of the literature focuses on the effects of robots on the labor market. Graetz and Michaels (2015) regarding industrial robots say that it doesn't have a negative effect on employment in developing countries. A result is somewhat different from a recent presentation for the US, in that the regions which use more robots have had a negative effect on employment (Acemoglu & Restrepo, 2017).

Lee and Kim (2009) believe that an economy can have different paths to economic growth depending on the initial structure of human capital and the nature of technological uncertainties, so despite the widespread new technologies, less developed countries have failed to gain ground. They believe that the right public policies especially in education and technology can make a country's economy adapt to uncertain technological changes. However, the implementation of innovation policies requires a thorough understanding of the characteristics of innovation. This involves understanding the processes of technological change, opportunities for development and use of new technologies and services, as well as the role of specialized expertise and changes in social structures (Hauknes, 1996). Some researchers believe that developing countries, through institutions and policies, should adopt technologies, even if this would lead to market rigidity and a less competitive environment (Acemoglu, et al., 2006).

The Davos Forum of 2016 debated the issue of the "fourth revolution", the digital revolution, which has radically changed the current economic evolution and the labor force disposition. The digitization of activities also makes it much more difficult to get a job. This, being accessible to the developed countries and to the multinational companies, leads to the reduction of the labor force and the narrowing of the demand for it. Automation in the service sector can lead to structural unemployment, just as previous innovations in productivity growth. Those with progressive views might argue for taxation to delay the spread of technologies, and others might think that increased business investments will lead to innovation that, in turn, will create new jobs in an economy that does not yet exist (Marsh, 2017).

This paper aims to make an inventory of the strong contributions of the literature in the field of employment and service sector, to highlight the dynamics of the idea of employment, both under the ratio of content and mechanism as such, along the route of the classics, neoclassic and contemporaries. Substitution of labor with capital in the primary and secondary sector leads to the following question: could this phenomenon also occur in the tertiary sector?

The substitution of labor with capital. The Classical Approach

Adam Smith divides the capital into a part reserved for immediate consumption, in fixed capital and working capital. In turn, fixed capital is divided into four other categories. One is represented by machines "which facilitate and abridge labour" (Smith, 2007, p. 217). The tendency of machines is "to increase the productive powers of labour, or to enable the same number of labourers to perform a much greater quantity of work" (Smith, 2007, p. 222). For this classic, these tools are regarded as an aid in society and that do not in any way cause negative consequences for the workforce.

David Ricardo considers that the use of machines in any way, regardless of the production sector, brings a general benefit with some negative consequences caused by the transfer of capital and work from one job to another. For him, the machines reduce the price of the goods at their cost of production so that the consumer, or the employee, will be able to procure an additional amount of goods and services with the same income. The emergence of the machines will not reduce their salary because the entrepreneur "would have the power of demanding and employing the same quantity of labour as before, although he might be under the necessity of employing it in the production of a new, or at any rate of a different commodity" (Ricardo, 2001, p. 283). Ricardo is in the first phase firmly convinced that replacing the workforce with cars will not result in their dismissal or, if it does, for this workforce there will still be demand for work, if not for that good then for another. But to be able to produce another kind of good, do we need a new set of skills? What about the cost associated with preparing another type of goods / merchandise?

Frédéric Bastiat (1996), in his book, 'Economic Sophisms', observes a similarity between imports and the appearance of machinery. Both are detrimental to the national workforce. Machinery and labor are excluded, but noting that in developed countries inventions and labor coexist, it can be said that the two are not excluded. Those who are opponents of the machinery see the short-term effects, the transient ones, and not the long-term ones, general ones. A machine has the immediate effect of replacing the labor force. But its effect does not stop here. The product, being obtained with less effort, can be sold at a lower price, and the savings obtained from the price difference can be directed to the purchase of other goods and services, which stimulates the employment at a general level, to the same extent of the force. of work released from the sector in which the new technologies were introduced. Thus, the volume of the workforce remains the same, and the needs can be better met.

The substitution of labor at Schumpeter

Starting with the concept of employment, we have in the first place the employee, one of the main actors of the economic life. They are different, both intellectually, spiritually, and bodily. Some are prepared to work, while others are not; that's why "...threats are addressed to incompetence. But though incompetent men and the obsolete methods are in fact eliminated, sometimes very promptly, sometimes with a lag, failure also threatens or actually overtakes many an able man, thus whipping up *everybody*, again much more efficaciously than a more equal and more «just» system of penalties would" (Schumpeter, 2003, p. 74). Therefore, each is placed by the "invisible hand" where it has high efficiency. Through the division of labor, they increase productivity. Smith tells us that there are three circumstances that increase the quantity of work through the division of labor: a) increasing the skill of each worker; b) time is saved due to the fact that one does not move from one job to another; c) the invention of machines that make a single man capable of producing the work of many others with its help (Smith, 2007, pp. 10-12). The third circumstance was considerably dealt with by Schumpeter, the substitution of labor with capital. The "creative destruction" of Schumpeter is related to this process. By technical progress we assure, he tells us, the survival of capitalism because "A first test of economic performance is the total output, the total of all the commodities and services produced in a unit of time - a year or a quarter of a year or a month" (Schumpeter, 2003, p. 63). Thus, what Schumpeter tells us and validates today is that the disappearance of an industry leaves room for new one, more efficient, but less benevolent with workers.

The neoclassical theory explained, at best, how the dynamics of wage and capital have an effect on employment. Thus, we face two situations. First, if wages increase, initially, employers want to adopt technologies to reduce their costs. These decisions have repercussions on the labor force, by diminishing it and substituting it with capital. Secondly, the change of the price of capital, more precisely, its decrease, determines the reduction of the costs of production and a tendency of increase of the production, which will lead to the increase of the demand of work and, implicitly, of the employment. But this is not the only effect of lowering the price of capital. We can also have a negative substitution effect because the demand for labor carriers, in response to the cheaper technologies, will be oriented towards them. The production will thus be obtained with lower costs, but also with a lower volume of work, and the unemployment rate will increase. It is growing exponentially especially during the period of industrial revolutions. They culminated in a period of rising unemployment and then recorded periods of decline until a subsequent revolution. In the long term, unemployment does not have a growth trend. It grows during periods of economic instability "from causes inherent in the capitalist mechanism itself" (Schumpeter, 2003, p. 70). The high unemployment specific to those periods of the industrial revolution is predominant especially during that period of adaptation. Schumpeter asserted that "... the real tragedy is not unemployment per se, but unemployment plus the impossibility of providing adequately for the unemployed without impairing the conditions of further economic development: for obviously the suffering and degradation - the destruction of human values - which we associate with unemployment, though not the waste of productive resources, would be largely eliminated and unemployment would lose practically all its terror if the private life of the unemployed were not seriously affected by their unemployment " (Schumpeter, 2003, p. 70)

Schumpeter clearly tells us that the entrepreneur plays a crucial role in the market. It is linked to both economic growth and employment. What should prevail in a society that seeks to create wealth is

production. To reach this first point, entrepreneurs, ie the private sector, are needed. It can only be developed on the free market, unrestrained or stifled by government intervention. The essential, crucial role, for a nation to prosper is played by the entrepreneur, who is the creator of these commodities and services, which supports economic growth. But he cannot do this alone; it needs production factors, the man occupying the first and most important place. Therefore, in order for him to create real jobs, supported by the world of goods and services, the state is required to help it. Not through political subsidies or favors, but by ensuring an efficient institutional framework, which will allow him to develop as it employs its workforce.

Although in the developed countries there is an increase in the capital- labor substitution, in the developing countries, I believe, the unemployment due to the technologies and innovations is not yet a nodal problem; when there is no monopoly in the market. But it can be a problem when our leaders intervene on the free market. When, from the desire to enter the graces of the electorate, the minimum wages increase without discernment, without leaving alternatives to the entrepreneur, forced to resort to the machines that replace the man.

Service sector. The last chance of employment?

Known for his Curve, Kuznets describes the steps that need to be taken in order for any country plan to be realistic. The dynamics he describes shows us that he starts from the primary to the secondary, and then to the tertiary one. The problem of productivity in agriculture and industry must first be solved, and then get to the services sector, where over 80% of the active workforce is in developed countries. Indeed, as Maslow's famous pyramid shows us, the strongest need at the bottom of the pyramid is given by physiological needs, food being one of them. To be able to meet the others, productivity prospects in the primary sector need to be considered. "A country's economic growth can be defined as a long-term rise in capacity to supply increasingly diverse economic goods to its population, this growing capacity based on advancing technologies and the institutional and ideological adjustments that it demands" says Kuznets (1973, p. 247). Advanced technologies are the permissive sources of economic growth. Also, in order to be compatible with economic growth, they must be employed in a framework compatible with increasing the stock of human knowledge.

In his Nobel conference, Kuznets summarized six features of modern economic growth that resulted from his analysis of the national product and its components, such as increased labor. The third of its six characteristics states that "the rate of structural transformation of the economy is high. Major aspects of structural change include the shift away from agriculture to nonagricultural pursuits and, recently, away from industry to services" (Kuznets, 1973, p. 248). The most frequent pattern observed over time is characterized by a decrease in the share of the labor force allocated to agriculture and by an increase in the share in services.

The economist mentioned considers that by analyzing the statistical data of the incomes of a generation you can see the level of development of a country; nor by studying two generations. In order to interpret the stage of development of a country, we must also take into account other economic and social factors, to which we do not always have access. Even if we had the statistical data of income fluctuations over a longer period of time, we could not say exactly, only by analyzing them, whether or not that country had experienced economic growth (Kuznets, 1995); a growth that does not want to be artificial. But we can see, however, in what direction that country is heading and perhaps, what measures need to be implemented to achieve sustainable economic growth and a better life. As technology and economic performance grow to higher levels, incomes are less subject to transient disorders, not necessarily of the cyclical order that can be recognized and allowed by reference to the business cycle chronology, but of an irregular type. Kuznets observed, in the past years analyzed, that the economic wealth of the entrepreneurs was subjected to greater vicissitudes - poor crops for some farmers, other natural losses for some business units that do not belong to the agricultural sector - and from the total proportion of the individual entrepreneurs of whose incomes were subject to such calamities, some incomes would have been more affected by the transient disorders.

Kuznets tells us that there are at least two reasons why we have a discrepancy between a country's social groups in terms of income. The first would be that only a small portion of a country's population saves; as his US study shows, where at that time a small percentage of the population was responsible for two-thirds of the individual savings. The second reason is the industrial structure of income distribution. An undeniable reason for growth in developed countries was the shift from agriculture to a process called industrialization or urbanization. Or, in other words, there were two categories of income: urban and rural. The rural ones were smaller than the urban ones, and the percentage inequality regarding the distribution for the rural population was somehow narrower than for the urban population. Thus, an increase in the urban population leads to an increase in inequality between the two categories. Also, the differences between per capita incomes between rural and urban population deepen in the process of economic growth, but they increase as per capita productivity in urban increases faster than in agriculture (Kuznets, 1995). If during the period analyzed, this was accurate, today, a small percentage of the rural population earns their living from agriculture; agriculture with sap and moss. The automation of the primary sector has increased productivity without requiring more labor and time, and those who still use the rudimentary methods of harvesting their fruit from the land do it only for the use of their own households. Indeed, the migration of the last decades of individuals from rural to urban has led to an increased productivity of individuals in cities; especially in the tertiary sector. Also, Kuznets assumes that in the rural sector, most use their skills, abilities and concentration only in agriculture when, in fact, many of them have many other tasks.

Inequality and the slow economic growth may also be exacerbated by legislative and political interference, such as taxes and duties, induced inflation, rent control or artificially low interest rates maintained by the government to protect the market and its bonds, Kuznets says.

A large part of the high revenues accounted for by Kuznets come from the services field, especially those obtained from entrepreneurial activities. The discrepancy between the incomes obtained in different sectors is given by the level of training required to be able to practice in that field. The service sector needs additional training. A substantial part of the rising per capita income trend is due to inter-industry change, a shift of workers from lower incomes to higher income industries.

Kuznes tells us that there are income inequalities between those who work in agriculture and those who work in nonagricultural sectors. These, over time, have grown even stronger as a large volume of the employed population has moved from the primary sector to the others, mainly because of this income difference. Also, in the case of the USA, the differences are explained by the fact that immigrants occupied the lower paid jobs in agriculture, and the native individuals moved to better paid jobs (Kuznets, 1973).

The economic growth of the states is accentuated in the industrialization / pre-industrialization phase, and then it decreases; so, for the developed states, this increase in income can no longer be observed, but for the developing ones, there may still be a chance for increased employment and full employment. Also, the analysis offered by Kuznets refers to the income that is obtained without excluding the taxes imposed by the state, so the tax burden in each country has a word say. Thus, if the tax burden is high, for both employees / consumers or entrepreneurs / producers, we can observe fluctuations in the degree of employment. A state with low taxes promotes entrepreneurship and thus reaches a high level of employment, and another with high taxes damages from the beginning the entrepreneurial activity, and therefore, unemployment increases, and the only "chance" in such states is represented by the public sector.

Employment in service sector in the European Union

Table 1: Employment in services (%of total employment) in EU- 28 countries

Country/Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Belgium	73,78	75,04	75,27	75,47	77,07	76,94	77,39	77,39	77,49	78,08	78,24	78,40
Bulgaria	56,10	57,67	60,21	61,77	62,24	63,15	62,88	63,25	63,46	63,09	63,27	63,44
Czech Republic	56,30	58,31	58,92	58,56	58,83	59,46	59,21	59,05	59,03	59,14	59,36	59,58
Denmark	74,36	77,12	77,97	77,71	77,70	77,99	78,26	78,21	78,82	78,99	79,18	79,37
Germany	68,87	69,52	70,04	70,12	70,25	70,78	70,52	70,92	71,31	71,32	71,60	71,86
Estonia	60,83	64,50	65,46	63,15	64,40	65,46	65,99	65,44	66,38	66,51	66,71	66,91
Ireland	71,43	74,56	76,16	76,82	77,25	77,01	77,26	76,57	76,11	76,12	76,51	76,75
Greece	66,64	67,17	68,02	69,96	70,45	70,75	71,45	72,16	72,38	72,51	72,69	72,88
Spain	68,13	71,29	72,83	74,14	75,11	75,95	76,31	75,97	76,17	75,59	75,81	76,02
France	74,01	74,40	74,84	74,92	75,32	75,62	76,62	76,88	76,83	76,89	77,08	77,28
Croatia	56,33	57,67	58,29	57,46	59,83	61,59	63,50	64,06	65,42	66,61	66,82	67,02
Italy	66,50	67,07	67,62	68,03	68,72	69,35	69,46	69,65	69,99	70,21	70,44	70,66
Cyprus	72,72	74,25	75,80	75,27	76,92	79,33	79,05	79,78	79,31	80,43	80,50	80,59
Latvia	62,64	66,91	68,31	68,20	68,15	68,02	68,65	68,42	68,19	69,82	70,05	70,26
Lithuania	61,42	64,17	66,61	66,96	66,12	66,05	66,11	65,86	66,89	67,08	67,29	67,50
Luxembourg	83,06	85,74	85,55	85,41	86,00	86,37	87,59	86,43	86,93	87,85	88,05	88,24
Hungary	63,46	64,23	64,75	64,28	65,14	65,33	64,82	64,77	64,52	63,44	63,67	63,89
Malta	72,65	73,52	73,15	74,31	76,67	76,86	77,72	78,58	78,88	79,17	79,44	79,69
Netherlands	78,57	79,20	79,29	80,05	80,06	81,39	81,48	81,25	81,25	81,21	81,44	81,63
Austria	68,51	69,71	69,88	69,04	69,25	69,52	69,41	69,71	70,09	71,15	71,43	71,67
Poland	54,14	55,60	56,64	56,42	57,01	57,46	57,97	57,93	57,97	58,11	58,37	58,61
Portugal	59,57	60,75	61,55	62,94	64,04	66,07	67,49	68,12	68,59	68,86	69,09	69,32

Romania	39,69	40,89	40,67	42,18	42,08	42,46	42,72	45,96	47,02	47,10	47,33	47,55
Slovenia	56,29	57,72	58,60	59,74	60,64	60,47	59,44	60,92	61,80	61,19	61,44	61,68
Slovak Republic	55,92	58,49	59,65	59,43	59,23	60,87	61,06	60,71	60,64	60,13	60,34	60,54
Finland	70,33	71,43	72,26	72,78	73,06	73,02	73,85	74,07	73,98	74,08	74,30	74,50
Sweden	76,55	77,66	78,00	78,08	78,30	78,81	79,42	79,68	79,91	80,00	80,21	80,39
United Kingdom	76,92	79,28	79,57	79,60	79,75	80,08	79,78	80,21	80,42	80,60	80,75	80,89

Source: Data World Bank

We can see that during the period analyzed, the services sector is gaining an increasing proportion compared to the other two sectors. Although from the beginning of the reference period we can see that employment in the services sector had a high percentage of the total labor force employed, in the following years it gained ground compared to agriculture and industry. The most significant growth in this branch can be seen in Croatia and Portugal, about 10%. This increase is due to the reduction of barriers and the modification of the legislation regarding the tertiary sector, but also because the tourism has increased. At the other extreme, where there is almost no increase we have Hungary. One of the reasons why the service sector declined since 2011 was the nationalization of private pension funds, which eliminated some financial services providers.

Last year, among the countries with the most developed tertiary sector we can see Luxembourg, United Kingdom and Cyprus, and at the opposite pole we have Romania, Poland and the Czech Republic.

One reason that explains the increasing share of services in developing countries is the fact that some countries, in order to reduce their production costs, especially those with labor force, do offshoring. There is a large gap between salaries, and one phenomenon that has been common lately is the offshoring of computer programming. Workers in developing countries are gradually acquiring the human capital needed to be competitive in this area, which requires a higher level of qualification and education. Although we cannot say that economic growth can be observed in these countries, we can see that employment is increasing.

Conclusions

The vision of economic thinking, when approaching the employment process, ranges from considering automation as a factor that facilitates the work of the individual to the element of labor force replacement. Smith, Ricardo and Bastiat believe that employment is not affected by the introduction of new technologies, but supports the nation's increased productivity and wealth, the use of machines for a general benefit, and the workforce left without work being used again.

Unlike them, for Schumpeter, although the machines replace the workforce, the market sends them where they are demanded and efficient, in the tertiary sector, which is not a cause for concern. The role of the employee in the employment process is given by the training and competence, each being placed by the "invisible hand" where he has the highest performance. He emphasizes, like its predecessors, the crucial role of the entrepreneur in the market. He is linked to both economic growth and employment. What should prevail in a society that seeks to create wealth is production. To reach this point it is necessary to have entrepreneurs, to encourage the private sector.

Kuznets complements the ideas of the ones listed above and "urges" us to note that employment in the tertiary sector is the result and not the starting point.

Regarding the services sector, we are still far from having a satisfactory picture of the size, role and nature of the innovative activities. We noticed that in the last years the tertiary sector has been gaining more and more employees. However, in the last two decades, most of the theoretical and empirical literature on technology and innovation has, in fact, focused on the production sector, which has traditionally been considered the main producer and user of technology. Regarding the relationship between technological changes and employment, the lack of data and systematic analyzes regarding the service sector is even more serious.

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References

- Acemoglu, D., Aghion, P. and Zilibotti, F. (2006), 'Distance to Frontier, Selection, and Economic Growth', *Journal of the European Economic Association*, 4(1), 37-74.
- Acemoglu, D. and Restrepo, P. (2017), 'Robots and jobs: Evidence from the US Labor Markets', *NBER Working Papers.* [Online], [Retrieved January 20, 2020], http://nber.org/papers/w23285.
- Aghion, P. and Akcigit, U. (2017), 'Innovation and Growth: The Schumpeterian Perspective', *Economics without Borders: Economic Research for European Policy Challenges*, Cambridge University Press, Cambridge, 29-72.
- Arntz, M., Gregory, T. and Zierahn, U. (2016), 'The Risk of Automation for Jobs in OECD Countries', *OECD iLibrary*. [Online] [Retrieved January 20, 2020], http://dx.doi.org/10.1787/1815199X.
- Bastiat, F. (1996), ' Economic Sophisms', Foundation for Economic Education, New York.
- Burgees, J. and Mitchell, W. (1998), 'Unemployment, Human Rights and A Full Employment Policy in Australia', *Australian Journal of Human Rights*, 4(2), 76-94.
- Cortes, G. M. and Andrea, S. (2015), 'Task Specialization within Establishments and the Decline of Routine Employment', *Federal Reserve Bank of Antlanta*. [Online], [Retrieved January, 2020], https://www.frbatlanta.org/~/media/Documents/research/seminars/2016/cortes-011916.pdf.
- Dorn, D. and Hanson, G. (2013), 'Untangling Trade and Technology: Evidence from Local Labor Markets', *NBER Working Papers*. [Online], [Retrieved January, 2020], https://www.nber.org/papers/w18938.
- Frey, B. C. and Osborne, M. A. (2017), 'The future of employment: How susceptible are jobs to computerisation', *Technological Forecasting and Social Change*,114, 254-280.
- Graetz, G. and Michaels, G. (2015), 'Robots at Work', *IZA Discussion Paper*. [Online], [Retrieved January, 2020], http://ftp.iza.org/dp8938.pdf.
- Gregory, T., Salomons, A. and Ulrich, Z. (2016), 'Racing With or Against the Machine? Evidence from Europe', *SSRN Electronic Journal*. [Online], [Retrieved January, 2020], https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2815469.
- Hauknes, J. (1996), 'Innovation in the Service Economy', Step Group, Oslo.
- Kuznets, S. (1973), 'Modern Economic Growth: Findings and Reflections', *The American Economic Review*, 63(3), 247-258.
- Kuznets, S. (1995), 'Economic Growth and Income Inequality', *The American Economic Review*, 45(1), 1-28.
- Lee, J.-W. and Kim, Y. J. (2009), 'Technological change, human capital structure and multiple growth paths', *ADB Economics Working Paper Series*. [Online], [Retrieved January, 2020], https://www.adb.org/publications/technological-change-human-capital-structure-and-multiple-growth-paths.
- Marsh, M. J. (2017), 'Automation: Will the Fourth Industrial Revolution Lead to the Downfall of Human Labour? ', Texas Christian University, Texas.
- Ricardo, D. (2001), 'On the Principles of Political Economy and Taxation', Batoche Books, Ontario.

- Sawyer, M. (2003), 'Employer of Last Resort: Could It Deliver Full Employment and Price Stability?', *Journal of Economic Issues*, 37(4), 881-907.
- Schumpeter, J. A. (2003), 'Capitalism, Socialism & Democracy', Routledge, London and New York.
- Smith, A. (2007), 'An Inquiry into the Nature and Causes of the Wealth of Nations', MetaLibri, Amsterdam.
- Wray, R. (2009), 'The Social and Economic Importance of Full Employment', *The Levy Economics Institute of Bard College*. [Online], [Retrieved January, 2020], http://www.levyinstitute.org/pubs/wp_560.pdf.

¿Cómo Están Gestionando El Talento Humano Las Pymes Colombianas? Una Revisión Bibliográfica De La Cuestión

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Resumen

La gestión del talento humano como un proceso fundamental para el desarrollo y consecución de resultados de las organizaciones, es un tema de auge reciente en nuestra sociedad cambiante y competitiva, en el que la contribución del factor humano cobra mayor valor. Los procesos y prácticas de administración de personal generan impacto en las pequeñas y medianas empresas (Pymes) que constituyen gran parte del mercado nacional e internacional. Debido a esta cuestión, se lleva a cabo una revisión teórica acerca de los procesos de gestión del talento humano en las Pymes colombianas de acuerdo con la literatura clásica, para lo cual se realizó una búsqueda de publicaciones científicas en español entre los años 2010-2019 en la base de datos Google Académico. Se evidencia como resultado, que los procesos que actualmente adquieren mayor relevancia para estudio de las Pymes son: gestión estratégica, sistemas de información y capacitación y desarrollo de recursos humanos. La revisión muestra informalidad y manejo deficiente de los procesos de gestión del talento humano.

Palabras clave: Gestión del Talento Humano; Pymes; Procesos, Prácticas.

Abstract

Human talent management as a fundamental process for the development and achievement of organizational results is a matter of recent boom in our changing and competitive society, in which the contribution of the human factor takes on greater value. The processes and practices of personnel management generate impact in the small and medium enterprises (SMEs) that constitute a large part of the national and international market. Due to this issue, a theoretical review is carried out about the processes of human resources management in Colombian SMEs according to classical literature, for which a search of scientific publications in Spanish between 2010 and 2019 was carried out in the Google Scholar database. It is evidenced as a result, that the processes that currently acquire greater relevance for the study of SMEs are strategic management, information systems and training and development of human resources. The review shows the improvised and poor management of the human talent management processes.

Keywords: Human Talent Management; SMEs; Processes, Practices**.**

Introducción

La gestión del talento humano según Eslava (2004) es un enfoque estratégico de dirección, que tiene por objetivo obtener el máximo valor para la organización a través de la continua disposición de los conocimientos, capacidades y habilidades necesarias para ser competitivo en el entorno actual y futuro, es decir, permite la selección del personal de alto rendimiento para la organización y busca garantizar niveles individuales y grupales de satisfacción laboral colocando todos los recursos necesarios a disposición del empleado para que así el empleador cuente con una fuerza de trabajo capaz de conseguir los resultados organizacionales propuestos.

Para Chiavenato (2009) el recurso humano es el activo fundamental para el desarrollo de las organizaciones, ya que solo a través del esfuerzo de las personas, se pueden llevar a la realidad las grandes ventajas de otros recursos como la tecnología, la información, las materias primas etc. siendo

ejemplo de esto las grandes compañías del mundo (Google, Windows, Facebook) que cuentan con ambientes laborales diseñados para promover el alto rendimiento y satisfacción de sus empleados, al ser conscientes de que el crecimiento, la innovación y la competitividad se alcanza permitiendo y garantizando la formación, desarrollo y bienestar de las personas. Como se afirma en distintos estudios *"la gestión del éxito de una organización depende de (…) la participación del talento humano, el servicio al cliente, la manera de gestionar los procesos para fidelizar los clientes, y la manera como se valora y reconoce lo que el personal realiza por la empresa"* (Gamboa y Jiménez, 2016, p. 141).

De acuerdo con la Ley Colombiana 590/2000 (modificada por la Ley 905/2004), se entiende por pequeña empresa aquella que cuenta con un número de trabajadores permanentes de 11 a 50 y/o activo total mayor a 501 y menores a 5.001 salarios mínimos legales vigentes, y por mediana empresa a aquellas que ostenten de 51 a 200 trabajadores y/o 5.001 a 15.000 salarios mínimos legales vigentes.

Las pequeñas y medianas empresas (pymes) son entidades orientadas al cliente, poseen un relevante papel en el entramado empresarial nacional pues generan la mayoría de puestos de trabajo en el país, más de un 83% del total y el más del 50% del PIB de los sectores industriales, comerciales y de servicios (Dini y Stumpo, 2018 y Saavedra y Hernández, 2008). Las Pymes son reconocidas también por diversas características propias, por ejemplo: su elevada flexibilidad laboral, su alta capacidad de adaptación a entornos cambiantes o su orientación al cliente por medio de una atención personalizada, lo cual les permite detectar y satisfacer necesidades muy específicas del mercado.

Sin embargo, las pequeñas y medianas empresas también presentan serias dificultades que impiden su adecuado desarrollo y en casos extremos conllevan a su desaparición del mercado, entre las problemáticas se resalta: el bajo nivel de innovación y emprendimiento, el escaso uso de las TIC (Cortés, Páez y Lozano, 2016), a pesar de la existencia de numerosas herramientas tecnológicas de gestión (Riascos y Aguilera, 2011), problemas para la comercialización de los productos, la limitada participación en el mercado de contratación pública y el financiamiento inadecuado (López-González y Robledo-Velásquez, 2014); dichas limitaciones por lo general no son subsanadas por el apoyo público y/o privado colombiano debido a la centralización de, apoyos que tienen que ver casi en exclusiva con aspectos financieros y tecnológicos y no en la potenciación de las habilidades humanas (García, Paz y Cantillo, 2019), obviándose en buena medida lo relacionado con la gestión del talento en este tipo de compañías.

Si bien, con el paso del tiempo el papel de los recursos humanos va adquiriendo mayor relevancia va de manera paulatina (Calderón, Navarro y Álvarez, 2010), es paradójico, evidenciar el escaso interés que tienen las autoridades políticas y económicas de Colombia por el capital humano de las pymes de su nación, pues se ha identificado una relación directa entre el nivel de formación de los trabajadores, la existencia de un departamento especializado en recursos humanos y las acciones conjuntas empresariales que involucran al trabajador (como la capacitación o la formación) con la innovación empresarial (Becerra y Álvarez, 2011), ya que como afirma Fábregas (2013), las inversiones tecnológicas que realizan las pymes no sirven de mucho si las compañías no promueven la cualificación continua y bienestar del talento humano.

Metodología

Se realizó una revisión bibliográfica en la base de datos Google Académico de artículos científicos recientes (posteriores al año 2010) en español relacionados con la gestión del talento humano en las pequeñas y medianas empresas colombianas en función a los diferentes procesos que la componen (Dolan, Valle, Jackson y Schuler, 2007; Chiavenato, 2009), encontrándose más de treinta artículos con estas características, algunos de los cuales exploraron sobre más de un proceso.

Para filtrar la búsqueda de artículos científicos se especificaron una serie de palabras claves asociadas intrínsecamente con la temática de la variable, los conceptos usados fueron "gestión", "talento humano", "pymes" y "Colombia", en el intervalo de tiempo correspondiente a los años 2010-2019. Posteriormente se clasificaron los textos identificados en función de los distintos procesos de gestión del talento humano a los que hacemos referencia, a destacar los procesos de planeación estratégica de

recursos humanos, análisis y descripción de cargos, reclutamiento y selección de personal, contratación y vinculación, inducción y orientación, capacitación y desarrollo, evaluación de desempeño, compensación, reconocimiento e incentivos, bienestar socio-laboral, seguridad y salud en el trabajo y gestión de sistemas de información de recursos humanos, obviando en nuestra búsqueda el resto de actuaciones.

Resultados

A continuación, se presenta un resumen de los resultados obtenidos a partir de la búsqueda de publicaciones científicas en relación a los procesos de gestión del talento humano de las Pymes en Colombia, en la tabla 1 se señalan la cantidad de fuentes identificadas por proceso, los autores con los años de publicación.

Tabla 1: Artículos científicos de gestión de talento en pymes colombianas, en función de los procesos determinados por Dolan et al. (2007) y Chiavenato (2009)

Procesos de gestión del talento humano	N° Fuentes	Autoría
Planeación estratégica de recursos humanos	10	Castaño (2011); Aguilera y Virgen (2013); Casas y Urrego (2013); Bermúdez y Gutiérrez (2012); Pacheco (2013); Solano, Riascos y Aguilera (2013); Pérez (2014); Mora, Vera y Melgarejo (2015); Valle y Niebles, (2017); Rincón y Chaparro (2018).
Análisis y descripción de cargos	1	Blanco y Vera (2019)
Reclutamiento y selección	2	Jaramillo (2011); Naranjo (2012)
Contratación y vinculación	2	De la Hoz, Morelos y Fontalvo (2012); Naranjo (2012);
Inducción y orientación	1	Jaramillo (2011)
Capacitación y desarrollo	6	Franco y Bedoya (2018); Castiblanco (2012); Medina, Delgado y Lavado (2012); Jara, Guerrero, Jiménez, Pinzón y Rubio (2014); Iglesias-Navas, Roseda y Castañeda (2017); Simancas, Silvera, Garcés y Hernández (2018)
Evaluación del desempeño	2	Jaramillo (2011); Del Toro, Salazar y Gómez (2011)
Compensación, reconocimiento e incentivos	3	Jaramillo (2011); Franco y Bedoya (2018); Aguilar (2014)
Bienestar socio-laboral	2	Jaramillo (2011); Mejía, Montoya y Vélez (2013);
Salud y seguridad en el trabajo	4	Jaramillo (2011); Gómez y Herrera (2012); Morelos y Fontalvo (2013); Garcia, Orozco y Torres (2014)
Sistemas de información de recursos humanos	6	Vega y Torres (2010); Riascos, Aguilera y Ávila (2014); Rodríguez (2011); García, Azuero y Salas (2013); Fajardo, Medina y Vargas (2018)

Fuente: Elaboración propia (2020)

Discusión y Conclusiones

A continuación, se señala de manera descriptiva los principales hallazgos obtenidos a partir de la revisión de la bibliografía sobre cómo están gestionando las pequeñas y medianas empresas su talento humano:

Planeación Estratégica De Recursos Humanos

Se logra identificar que una de las limitaciones de las pymes es carecer de una planeación estratégica adecuada que plantee las bases para guiar acciones de mejoramiento y competitividad, el establecimiento de objetivos, procedimiento y métodos para alcanzarlos, así como para la toma de decisiones frente a situaciones de crisis.

Un estudio realizado por Aguilera y Virgen (2013) cuyo objetivo fue aplicar un modelo de formulación de estrategias orientado a la generación de políticas de crecimiento empresarial en pymes, arrojó como resultado que a diferencia de las medianas empresas, las pequeñas tienen dificultades para establecer una misión estructurada correctamente direccionada hacia el crecimiento; también se encontró que aunque las pymes tienen claridad de sus características internas (fortalezas y debilidades para funcionar), no utilizan este conocimiento para definir las estrategias acordes con sus necesidades, además, no tienen claridad sobre el papel de la innovación y el uso de las tecnologías en la actividad de la empresa. Finalmente, se evidenció que no tienen claridad sobre las características del entorno que representan oportunidades y amenazas para su actividad productiva, por tanto, implementan estrategias diversas y poco aterrizadas a lo que requieren sus nichos de mercado.

En su estudio, Casas y Urrego (2013) evidenciaron la ausencia y necesidad de administrar la innovación en las pymes y proponen la gestión tecnológica como medio para vincular la planeación estratégica con la innovación. Al respecto, Bermúdez y Gutiérrez (2012) muestran que la innovación en materia de producción/servicios, procesos, gestión y mercados en un grupo de pymes de Boyacá presenta brechas importantes, encontrándose apenas en fase de despegue. Otro estudio permitió conocer que factores como el crecimiento y la toma de decisiones estratégicas tienen relación con la implementación de planes en materia de sistemas de información, es decir, que el desempeño de las pymes mejora cuando realizan inversiones en materia de tecnología producto de una adecuada planeación de los sistemas de información (Solano, Riascos y Aguilera, 2013). En otras palabras y de acuerdo a los hallazgos, la planificación estratégica se relaciona e influye de manera significativa en el funcionamiento de otros procesos de gestión organizacional y competitividad de las Mipymes (Mora, Vera y Melgarejo, 2015).

Pérez (2014), implementando un modelo de análisis estadístico (MMGO) describe las incidencias de elementos organizacionales (gestión de mercadeo, comunicación e información, gestión de producción, estructura y cultura organizacional, gestión humana, finanzas, asociatividad, comercio exterior, logística, innovación y conocimiento, responsabilidad social y análisis de entorno) sobre la planeación estratégica y esto a su vez sobre el éxito a largo plazo de las pymes, encontrándose que el direccionamiento estratégico es fundamental para el desarrollo empresarial de este tipo de empresas en el país y que depende en gran medida de componentes organizacionales como: la estructura y cultura organizacional, las finanzas, la gestión de mercadeo, la innovación y conocimiento. Estos hallazgos logran explicar las dificultades que presentan las pymes en relación a este proceso ya que como se ha señalado, las pymes presentan debilidades en tales componentes, especialmente en el tamaño reducido, la cultura informal en el manejo de sus diferentes procesos, el bajo nivel de innovación, el escaso interés por el nivel de formación de sus trabajadores, además presentan problemas para acceder a financiamiento y contratación (López-González y Robledo-Velásquez, 2014).

Si bien las pymes son conscientes de la importancia de este proceso, su utilización se hace de manera particular (Castaño, 2011), pues obedece a las decisiones de la gerencia y por lo regular se omite debido a la destinación de recursos a otros proceso de la empresa tal como lo sostiene Valle y Niebles (2017) al afirmar teniendo en cuenta los resultados de sus estudios, que los administradores y la gerencia le otorgan más importancia a aspectos funcionales de la empresa como lo son: la financiación, la imagen corporativa y la productividad, viendo al planteamiento estratégico como un enfoque demasiado complejo que no necesariamente garantiza el éxito de la misma. Se identificó además que la planificación no se hace de manera formal, ocasionando que las empresas sean orientadas de manera intuitiva, lo que puede generar una disminución en la capacidad de respuesta a los cambios y superación de las crisis que llevan a innumerables pérdidas y a una corta estancia en el mercado económico como suele ocurrirles a las pymes colombianas (Pacheco, 2013).

Rincón y Chaparro (2018) afirman por su parte que, entre más experiencia y crecimiento (tanto en activos como en colaboradores) tienen las Pymes, muestran mejores condiciones para formular estrategias. Asimismo, informan la urgencia de que las Pymes sean administradas bajo principios y técnicas administrativas, al igual que las grandes organizaciones, lo cual permita proporcionar a directivos y administradores conocimientos y herramientas básicas para que no prevalezca la escasez de recursos financieros y la falta de visión.

Dado que el propósito de la planeación estratégica es potencializar el desarrollo coherente y coordinado de acciones través de las cuales la empresa organiza y utiliza su estructura, procesos, aptitudes y demás recursos para aprovechar las oportunidades y reducir las repercusiones de las amenazas del entorno con el fin de cumplir sus objetivos, se puede señalar teniendo en cuenta los estudios recientes, que las pymes presentan serias dificultades en este proceso, principalmente porque como indica Dolan et al. (2007), las oportunidades en el mercado solo pueden ser aprovechadas por organizaciones cuyas estrategias se diseñen y soporten en su recurso humano, factor determinante para la competitividad, y como se ha podido evidenciar este factor no es prioridad para las Pymes que màs bien estàn preocupadas por resolver los problemas y necesidades del corto plazo, no logrando ver en las personas una inversiòn a mediano y largo plazo sino en un gasto màs para la empresa.

Análisis Y Descripción Del Cargo

Según Chiavenato (2009), este proceso consiste en un procedimiento de recogida de informaciòn acerca de los puestos de trabajo lo cual permitirà describir un determinado cargo, significa relacionar qué hace el ocupante, cómo lo hace, en qué condiciones lo hace y por qué lo hace, en otras palabras, la descripción del cargo relaciona de manera breve las tareas, deberes y responsabilidades del cargo. De acuerdo con los escasos resultados encontrados sobre este proceso, se puede señalar que no es lo suficientemente atendido por las pymes quienes al parecer no lo llevan a cabo de manera exhaustiva pues se ha encontrado que estas empresas pese a contar con algunos manuales de funciones, estos no detallan lo sufucientemente bien los aspectos referentes al cargo. De acuerdo con Blanco y Vera (2019) en las Pymes colombianas, no se està haciendo uso de los instrumentos necesiarios para recolectar información sobre los cargos, esto se ve reflejado en la ineficiencia de la descripción de las funciones frente al cargo, la organización y clasificación de los puestos (acorde a la estructura organizacional), lo cual impide valorizar los cargos de manera adecuada y adquirir un nivel jerárquico más allá de gerente y demás empleados.

Estos hallazgos resultan preocupantes toda vez que este proceso se relaciona directamente con la adecuada ejecuciòn de los demàs procesos de gestiòn del talento humano que se exploran en el presnete estudio.

Reclutamiento Y Selección

Respecto a estos procesos, los cuales obedecen al lanzamiento de convocatorias internas o externas con herramientas de comunicación que permita la publicación y propagación de la información para escoger al candidato más apto para la vacante ofertada, en los estudios de Jaramillo (2011) y Naranjo (2012) se encontró que la mayoría de estos procesos se dan de manera informal, siendo la principal fuente de reclutamiento la recomendación, lo que ocasiona que estos procesos sean imparciales y no tengan en cuenta las capacidades y competencias reales de los aspirantes, predominando nuevamente la intuición que da paso a acciones poco transparentes que no permiten la realización de un procedimiento justo, claro y confiable para seleccionar a los empleados.

Contratación Y Vinculación De Personal

En lo que respecta al proceso de contratación y vinculación del personal se encontró que dependiendo del producto y/ o servicio que se ofrezca, así como las temporadas altas y bajas en el mercado, las contrataciones pueden ser de carácter temporal (contratos por prestación de servicio) generando así inestabilidad laboral (De la Hoz et al., 2012), lo que a su vez desencadena baja motivación, poco sentido

de pertenencia, alta rotación y baja competitividad de las pymes. De acuerdo con Naranjo (2012), el sistema de contratación también depende del grado de familiaridad, amistad y la recomendación.

Inducción Y Orientación

En relación con el proceso de inducción, las pymes colombianas prefieren que sean terceras organizaciones las que se encarguen de estas actividades y en caso de no contar con recursos para esto, el proceso es delegado al administrador de nómina o quien posea contacto directo con los empleados y se basa principalmente en ofrecer al colaborador unas instrucciones generales verbales sobre los procedimientos de trabajo establecidos (Jaramillo 2011). Se encontró además inexistencia e informalidad de este proceso lo cual dificulta la adecuada adaptación o desempeño de los trabajadores.

Capacitación Y Desarrollo

Con respecto a este proceso, Franco y Bedoya (2018) indican que las Pymes por lo general compiten donde se presenta sobreproducción, es por eso que, la organización tendrá que buscar una estrategia que la diferencie y le facilite permanecer en el mercado, solo hay una posibilidad: talento humano capacitado, formado y motivado. Sin embargo, la realidad es otra, las competencias que tiene un trabajador de Pyme son esencialmente operativas (del hacer), no requiere demasiada formación académica y le exigen poca experiencia laboral, lo que conlleva a una baja productividad del personal y por ende a altas rotaciones.

Los empleadores solo capacitan al personal en procesos específicos vinculados directamente a la organización y que raramente se aplican por fuera de ésta, por lo que si el empleado requiere de una capacitación formal debe ser solventada por su propia fuente, siendo el aporte de la empresa a esto un horario flexible para que pueda asistir a sus clases (Castiblanco, 2012). Sin embargo, la capacitación es un proceso clave para la innovación y desarrollo de la pymes ya que se debe contar con recursos y conocimientos bien estructurados que permitan la facilitación de los procesos, aumento de capacidad productiva y la actualización constante debido a las dinámicas económicas ya sean regionales y/o internacionales (Simancas, Silvera, Garcés, y Hernández, 2018), y no solo que mejore sus conocimientos en cuanto a las actividades propias de su cargo sino también una formación integral y desarrollo personal de los empleados (Iglesias-Navas, Roseda y Castañeda, 2017).

A pesar de las carencias en este proceso de las empresas pequeñas y medianas de Colombia, Jara et al (2014) encuentra en Bogotá que, el crecimiento saludable de las Pymes, permite fortalecer las capacidades de sus colaboradores y mantenerlos creativos y comprometidos. Teniendo en cuenta entonces, la importancia de este proceso para mejorar la competitividad de las empresas, se identificó un estudio en el que se propuso desarrollar los fundamentos de un sistema de gestión humana por competencia basado en la estrategia organizacional de una Pyme en Cali, a partir de la cual se pudo establecer que los elementos a considerar para pasar de un modelos tradicional a uno por competencias son la capacitación y desarrollo, selección y evaluación, específicamente las actividades de planes de sucesión, concurso interno de selección y el uso de la entrevista de incidentes críticos para la evaluación de competencias (Medina, Delgado y Lavado, 2012).

Evaluación De Desempeño

En la revisión de la literatura se encontró que este proceso consiste principalmente en la observación del supervisor a las competencias del empleado y la manera en cómo se desenvuelve en su cargo (tiempo, resultados, cumplimiento de indicadores), debido a que es una observación, los resultados están sujetos a sesgos, el proceso no es formal ni estándar y aunque su finalidad es la mejora de la producción, la calidad del producto y el rendimiento del personal en un cargo, también es visto como un proceso que influye en toma de decisiones relacionadas con las bonificaciones o la renovación del contrato (Jaramillo, 2011). Otros estudios en las pymes por su parte, han centrado su interés en conocer los factores que pudieran influir en el rendimiento de los trabajadores, al respecto Del Toro, Salazar y Gómez (2011) encontraron que el clima organizacional y la satisfacción laboral se relacionan y predicen el desempeño.

Compensación, Reconocimiento E Incentivo

Las Pymes se caracterizan por ser empresas que cumplen con los aspectos fundamentales de la ley (contratación, salario mínimo prestaciones, vinculación a la seguridad social, etc.) sin embargo, al no estar este proceso reglamentado en el marco legal vigente, no se otorgan muchos beneficios adicionales de manera voluntaria a los trabajadores (Jaramillo, 2011). Las pymes tambièn se caracterizan por presentar estructuras productoras y organizacionales pequeñas, lo cual imposibilita la movilidad de los trabajadores, no promueven el ascenso como incentivo (Franco y Bedoya, 2018). De acuerdo con Aguilar (2014), debido a que las Pymes no pueden compararse con las grandes empresas en cuanto a compensación y beneficios, para retener y fidelizar el talento humano deben basarse en establecer un buen clima laboral y estrategias especiales de promoción dentro de la organización.

Bienestar Social Laboral

Según la literatura revisada, los programas de bienestar social laboral de estas compañías se caracterizan por prestar poca atención a las actividades que puedan promover el bienestar general (personal, familiar, social) de los empleados (Mejía, Montoya y Vélez, 2013), centrándose principalmente en la remuneración salarial como único incentivo para generar satisfacción laboral y bienestar, lo cual en muchas ocasiones genera más gastos para la organización y no representa beneficios reales a nivel de bienestar para los trabajadores, ya que se ignora las necesidades a nivel cultural, social, familiar, personal, etc. de los trabajadores y son los programas de bienestar relacionados con estos aspectos los que contribuirán a mejorar las condiciones físicas y la calidad de vida de estos, sus familias y la sociedad (Jaramillo, 2011).

Salud Y Seguridad En El Trabajo

Con respecto al proceso de salud y seguridad en el trabajo se encontró que la mayoría de autores resaltan el hecho de que gran parte de las Pymes no cuentan con un sistema de salud y seguridad bien implementado (Jaramillo, 2011) lo que se traduce en altos índices de accidentalidad, problemas legales e insatisfacción laboral. Se encuentra ademàs, que aunque la empresa cuente con los recursos necesarios para la implementación del sistema, se siguen presentando accidentes o incidentes de trabajo en las empresas debido a la falta de compromiso por parte de los empleados con el uso de los elementos de protección personal (otra causa es el desgaste de las herramientas y equipos de trabajo), es decir, son los colaboradores quienes no muestran conciencia sobre su propia seguridad y no siguen los lineamientos de seguridad para ejercer sus labores (Gómez y Herrera,2012; Morelos y Fontalvo, 2013). La promoción de la seguridad yla salud en el trabajo y la prevención de los riesgos laborales son las principales y más importantes tareas que tienen las organizaciones, pues de ellas depende el mejoramiento de la calidad de vida de los trabajadores (García, Orozco y Torres, 2014).

Pese a que el Colombia este proceso està estrictamente regulado por la ley, llama la atenciòn que las pymes no lo estèn implementando correctamente, una de la causas sin dudas es el desconocimiento de las implicaciones que puede tener la materializaciòn de un riesgo laboral, que va desde sanciones econòmicas cuantiosas hasta el cierre definitivo de los establecimientos, sin mencionar los daños al individuo y la familia. Otra razòn es que no se cuenta con personal especializado o cualificado que lideres las acciones propias de este proceso.Ahora bien, como en los otros procesos, implementar un sistema de seguridad y salud en el trabajo, supone para los empleados de las pymes gastos y no inversiones, es decir, aun no se logra articular los procesos e indicadores procudtivos con los de seguirdad pese a su estrecha relaciòn.

Sistemas De Información De Recursos Humanos

Este proceso aparece como uno de los más estudiados a nivel de Pymes, también es de interés reciente debido al creciente desarrollo tecnológico que facilita los procesos tanto a nivel externo como a nivel interno de la organización (García, Azuero y Salas, 2013), sin embargo, se encontró que estas empresas no cuentan con el desarrollo tecnológico necesario y no utilizan de manera adecuada los sistemas de

información a disposición, manifestándose en la dificultad de intercambio de mensajes, actualización de noticias y desconocimiento sobre el uso adecuado de las TIC´s, se evidencia además, subutilizaciòn de paquetes de software que apoyan los procesos de gestión del talento humano (Vega y Torres, 2010; Riascos, Aguilera y Àvila, 2014).

Las Pymes no consideran la tecnología como punto principal de crecimiento y desarrollo (Fajardo, Medina y Vargas, 2018), aun cuando necesitan utilizar las TIC como apoyo empresarial, pues ellas permiten controlar los diferentes sistemas de la organización y evaluar de manera permanente la planificación de los mismos, facilitan la implementación de políticas y normas de seguridad a nivel tecnológico, aseguran la integridad y la confiabilidad de los sistemas de información de las organizaciones (Rodríguez, 2011)

En conclusiòn, los procesos de gestiòn de talento humano que actualmente adquieren mayor relevancia de estudio para los investigadores y las pymes son: la gestión estratégica, los sistemas de información y la capacitación y desarrollo del recurso humano, evidenciándose de esta manera el reconocimiento de estos procesos como elementos estratégicos para apostarle al fortalecimiento y competitividad de las Pymes en un mercado globalizado, marcado cada vez más por acelerados avances tecnológicos e informáticos en los que el capital intelectual y las competencias del recurso humano son claves para el manejo eficiente y maximización de otros recursos y procesos de las organizaciones, en otras palabras, solo a través del esfuerzo humano puede llevarse a la realidad las grandes ventajas de otros recursos materiales como: la tecnología, la información, las materias primas y el dinero etc. (Robbins y Judge, 2009).

Asì tambièn, se pudo observar que procesos igualmente claves para la consecución de los resultados organizacionales tales como: el análisis y descripción de cargo, inducción y orientación, evaluación del desempeño y compensación, reconocimiento e incentivo, no están siendo objeto de mucho estudio en los últimos años en Colombia. Lo anterior muestra la necesidad de seguir indagando sobre las prácticas de las Pymes en materia de gestión de recursos y las razones que las justifican, con el fin de identificar limitaciones y oportunidades para el mejoramiento, dado la importancia que estas empresas tienen para la economía y generación de empleo en el país.

Teniendo en cuenta la premisa imperante que reconoce a las personas como el activo más importante de una organización, llama la atención de que estos procesos no se esten llevando a cabo de la manera adecuada por las pymes, los resultados muestran claramente una subutilización o manejo deficiente del recurso humano, procesos poco estructurados, màs que procesos sistematicos e interdependientes, las pymes realizan actividades o pràcticas tradicionales de administraciòn de personal, la mayoria reguladas por la ley, sin el reconocimiento del impacto que estas tienen en los resultados finales de las empresas. Estas debilidades o limitaciones de las pymes se pueden explicar por el hecho de que aunque muchas reconocen el valor de los procesos de manejo de personal, al momento de su implementaciòn presentan dificultades para disponer de los recursos (de tiempo, tecnicos, tecnologicos, econòmicos y humanos) que estos exigen. Las pymes estàn inclinadas a satisfacer las demandas inmediatas de sus clientes a traves de procesos operativos y de produciòn, no estàn orientados hacia la atracciòn, fidelizaciòn, desarrollo, motivaciòn y bienestar de las personas que las conforman, ya sea porque no pueden o porque no saben como hacerlo sin poner en riesgo la rentabilidad de la empresa, obviando que el riesgo es mayor si continuan omitiendo o llevando a cabo de forma regular los procesos. Lo anterior resalta la importancia de tomar medidas urgentes de intervención que atiendan a las características y necesidades particulares de las Pymes, medidas centradas principalmente en la sensibilizaciòn y empoderamiento de los lideres o alta direcciòn de las empresas, en la creaciòn y disposiciòn de entidades o centros pùblicos y privados de asesorìa y consultorìa especializada en modelos pràcticos y efectivos para el manejo del talento humano en las pequeñas y medinas empresas.

Referencias

- Aguilar, JC. (2014). Retos y rol estratégico en la gestión del talento Humano: Caso en empresas de Cali, Colombia. *MERCADOS y Negocios.* [En línea] [Consultado el 21 de febrero de 2020] http://www.revistascientificas.udg.mx/index.php/MYN/article/view/5260/4908

- Aguilera, A. y Virgen, V. (2013). Aplicación de un modelo de formulación de estrategias para evidenciar la orientación al crecimiento empresarial en pymes. Cali, Colombia. *Entramado*, 9(2), 82-97. [En línea] [Consultado el 6 de abril de 2019] https://revistas.unilibre.edu.co/index.php/entramado/article/view/3465

- Becerra, F. y Álvarez, C. (2011). El talento humano y la innovación empresarial en el contexto de las redes empresariales: El clúster de prendas de vestir en Caldas- Colombia. *Estudios Gerenciales,* 27(119), 209-232. [En línea], [Consultado el 20 de Septiembre de 2019], https://www.redalyc.org/pdf/212/21220043010.pdf.

- Bermúdez, J. I., y Gutiérrez, Ó. (2012). Las prácticas de innovación en las pymes boyacenses. Apuntes Del Cenes, 31(54), 161-192. [En línea], [Consultado el 18 de Julio de 2019], https://revistas.uptc.edu.co/index.php/cenes/article/download/18/19/.

- Blanco-Ariza, A. B., & Vera-Barbosa, A. (2019). Modelo para la gestión del talento humano en las pymes del sector servicios de Barranquilla, Colombia. Innovar, 29(74), 25-44, https://doi.org/10.15446/innovar.v29n74.82059
- Calderón, G., Naranjo, JC. y Álvarez, CM. (2010). Gestión humana en la empresa colombiana: sus características, retos y aportes. Una aproximación a un sistema integral. *Cuadernos de Administración Bogotá (Colombia),* 23(41), 13-36. [En línea], [Consultado el 20 de Mayo de 2019], https://doi.org/10.11144/Javeriana.cao23-41.ghec

- Casas, R. y Urrego, N. (2013). Selección de modelo de gestión tecnológica para pymes colombianas. *Revista Científica*, 1(17), 125 - 130.[En línea], [Consultado el 17 de Octubre de 2019], https://doi.org/10.14483/23448350.4572

- Castaño, A. (2011). Planeación estratégica en la Pyme de Bogotá. Orientación al futuro y evasión de la incertidumbre. *Contaduría y administración*, (235),147-173.[En línea],[Consultado el 20 de Agosto de 2019], http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0186-10422011000300008&lng=es&tlng=pt.

- Castiblanco, S. (2012). Capital humano y el modelo empresarial de las Pymes: una percepción de los empresarios importadores y exportadores de Bogotá. *Suma de Negocios,* 3(2), 87-96. [En línea], [Consultado el 13 de Agosto de 2019], https://ssrn.com/abstract=3024134

- Chiavenato, I. (2009). *Gestión del Talento Humano*. Ciudad de México: Mc Graw Hill.
- Cortés, J., Páez, J. y Lozano, J. (2016). La aplicación de las TIC en los sistemas de gestión de las PyME del sector portuario. *Revista Redes de Ingeniería*, 7(1), 24-40.[En línea], [En línea], [Consultado el 29 de Mayo de 2019], https://revistas.udistrital.edu.co/index.php/REDES/article/view/8491/11545

- De la Hoz, E., Morelos, J., y Fontalvo, T. (2012). Gestión logística de las pequeñas y medianas empresas (pymes) de confecciones en el departamento del atlántico. *Desarrollo Gerencial,* 4(2). [En línea], [Consultado el 02 de Septiembre de 2019], http://revistas.unisimon.edu.co/index.php/desarrollogerencial/article/view/2403

- Del Toro, J., Salazar M. y Gómez, J. (2011). Clima organizacional, satisfacción laboral y su relación con el desempeño laboral en trabajadores de una PYME de servicios de ingeniería. *Clío América*, 5(10), 204-227.[En línea], [Consultado el 10 de Mayo de 2019], https://doi.org/10.21676/23897848.419

- Dini, M. y Stumpo, G. (coords.). (2018). "Mipymes en América Latina: un frágil desempeño y nuevos desafíos para las políticas de fomento", *Comisión Económica para América Latina y el Caribe* (CEPAL). .[En línea], [Consultado el 23 de Mayo de 2019], https://repositorio.cepal.org/bitstream/handle/11362/44148/1/S1800707_es.pdf

- Dolan, S., Valle, R., Jackson, S. y Schuler, R. (2007). *La Gestión de los Recursos Humanos: cómo atraer, retener y desarrollar con éxito el capital humano en tiempos de transformación*. Madrid: Mc Graw Hill.

- Eslava, E. (2004), Gestión del Talento Humano en las organizaciones. *Recursos humanos blog*. [En línea],[Consultado el 25 de Septiembre de 2019], https://bit.ly/2tukrdY

- Fábregas, C.J. (2013). Identificación de factores no monetarios asociados a las pymes del sector confecciones que afectan su ingreso a mercados internacionales. *Desarrollo Gerencial*, 5(2).[En línea], [Consultado el 12 de Agosto de 2019],http://revistas.unisimon.edu.co/index.php/desarrollogerencial/article/view/492

- Fajardo, M., Medina, Y., y Vargas, G. (2018). Las TIC como estrategia en la mejora y desarrollo de las pymes del Municipio de Florencia Caquetá para su mayor competitividad. Memoria del XI Congreso de la Red Internacional de Investigadores en Competitividad, ISBN 978-607-96203-0-6. Noviembre 2017: 402-423

- Franco-López, J. y Bedoya-Zapata, J. (2018). Análisis del talento humano aplicados en organizaciones pymes. Revista CEA, 4(7), 85-101. https://doi.org/10.22430/24223182.761

- Gamboa, R. y Jiménez, L. (2016). Gestión del éxito organizacional como estrategia de valor para minimizar la reluctancia en pymes. *Desarrollo Gerencial*, 8(1), 123-142.[En línea],[Consultado el 12 de Septiembre de 2019],http://revistas.unisimon.edu.co/index.php/desarrollogerencial/article/view/427

- García, G., Orozco, O., y Torres, R. (2014). Diagnóstico sobre las actividades en Seguridad y Salud en el trabajo de las Pymes metalmecánicas de Cartagena. *Libre Empresa*, 11(1), 47-55.[En línea], [Consultado el 4 de Julio de 2019],https://doi.org/10.18041/1657-2815/libreempresa.2014v11n1.3012

- García, J., Paz, A. y Cantillo, N. (2019). Estrategias y habilidades para la competitividad: caso de pymes del sector construcción en Barranquilla. *Aglala,* 10(1), 312-339.[En línea],[Consultado el 12 de Noviembre de 2019],http://revistas.curnvirtual.edu.co/index.php/aglala/article/view/1349

- García, M., Azuero, A., y Salas, L. (2013). Responsabilidad social empresarial hacia los empleados: el caso de una PYME colombiana. *Faedpyme international review*, 2 (3), 18-27, http://hdl.handle.net/10317/4320

- Gómez, J., y Herrera, T. (2012). Análisis causa-efecto de los accidentes laborales en pymes del sector metalmecánico en Cartagena. *Revista Entornos*, (25), 213-225. [En línea],[Consultado el 16 de Agosto de 2019], https://dialnet.unirioja.es/servlet/articulo?codigo=6937019

- Iglesias-Navas, M., Roseda , K. y Castañeda , J.(2017). La gestión del talento humano y su relación con la innovación en las pymes de la industria de alimentos en Barranquilla-Colombia. *Revista espacios,* 39 (6), 3. [En línea],[Consultado el 06 de Septiembre de 2019], http://hdl.handle.net/20.500.12442/1771

- Jara, M., Guerrero, J., Jiménez, J., Pinzón, E. y Rubio, J. (2014). Factores de competitividad de las pymes del sector de restaurantes en Bogotá, localidad la candelaria. *Revista Intersección* ,1, 15-23. [En línea],[Consultado el 16 de Agosto de 2019], https://revistas.elpoli.edu.co/index.php/int/article/view/225

- Jaramillo, O. (2011). La dimensión interna de la responsabilidad social en las micro, pequeñas y medianas empresas del programa Expopyme de la Universidad del Norte. *Pensamiento y Gestión,* 31, 167-195.[En línea],[Consultado el 20 de Abril de 2019], https://www.redalyc.org/pdf/646/64620759009.pdf

- López-González, C. y Robledo-Velásquez, J. (2014). Una aproximación a la gestión de capacidades de innovación en la pyme colombiana. *Gestión y Sociedad,* 7(2), 11-30[En línea], [Consultado el 19 de Septiembre de 2019], https://www.researchgate.net/profile/Cristina_Lopez27/publication/272747616_An_Approach_to_the_Management_of_Innovativeness_in_Colombian_SMEs/links/54f4610c0cf24eb8794e1b0a/An-Approach-to-the-Management-of-Innovativeness-in-Colombian-SMEs.pdf

- Medina, A., Delgado, A. y Lavado (2012). Fundamentos de un sistema de gestión humana por competencias para soportar la estrategia organizacional en una pyme del sector de la industria de las artes gráficas en Cali (Colombia). *Estudios Gerenciales,* 28(122), 121-138. [En línea], [Consultado el 20 de Junio de 2019], https://www.sciencedirect.com/science/article/pii/S0123592312701973

- Mejía, A., Montoya, A. y Vélez, N. (2013). Estrategia integral de capacitación orientada hacia la innovación tecnológica y el mejoramiento productivo en pymes. Cali-Colombia. *Latin American and Caribbean Journal of Engineering Education*, 4(2).[En línea],[Consultado el 15 de Junio de 2019], http://www.laccei.org/LACCEI2010-Peru/published/IE126_Mejia.pdf

- Mora, E., Vera, M. y Melgarejo Z. (2015). Planificación estratégica y niveles de competitividad de las Mipymes del sector comercio en Bogotá. *Estudios Gerenciales*, 31(134), 79-87.[En línea], [Consultado el 13 de Noviembre de 2019], https://www.sciencedirect.com/science/article/pii/S0123592314001600

- Morelos, J, y Fontalvo, T (2013). Caracterización y análisis del riesgo laboral en la pequeña y mediana industria metalmecánica en Cartagena-Colombia. *Revista Soluciones de Postgrado*, 5(10), 17-44.[En línea], [Consultado el 20 de Noviembre de 2019], https://revistas.eia.edu.co/index.php/SDP/article/view/370

- Naranjo, R. (2012). El proceso de selección y contratación del personal en las medianas empresas de la ciudad de Barranquilla (Colombia). *Pensamiento y Gestión,* 32, 83-114.[En línea],[Consultado el 13 de Agosto de 2019],http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S1657-62762012000100005

- Pacheco, C. (2013). Estrategias empresariales más utilizadas por las pymes en Sincelejo. *Revista Económicas CUC*, 34 (1), 183-202.[En línea], [Consultado el 20 de Septiembre de 2019],http://revistascientificas.cuc.edu.co/index.php/economicascuc/article/view/583

- Pérez, R. (2014). La planeación estratégica en las pymes colombianas: un aporte para empresas contratistas de la FAC. *Ciencia y Poder Aéreo,* 9 (1). 55-65.[En línea],[Consultado el 16 de Agosto de 2019], https://dialnet.unirioja.es/servlet/articulo?codigo=5682910

- Riascos, S., Aguilera, A. y Ávila, G. (2014). Seguridad de los sistemas de información en las Pymes de Santiago de Cali (Colombia). *Libre Empresa*, 11(1), 107-118. [En línea], [Consultado el 08 de Septiembre de 2019],https://dialnet.unirioja.es/servlet/articulo?codigo=6586847

- Riascos, S. y Aguilera, A. (2011). Herramientas TIC como apoyo a la gestión del talento humano. *Cuadernos de Administración (Universidad del Valle)*, 27(46), 141-154.[En línea], [Consultado el 13 de Junio de 2019],http://www.scielo.org.co/pdf/cuadm/v27n46/v27n46a11.pdf?__hstc=17859942.1bb630f9cde2cb5f07430159d50a3c91.1533772800103.1533772800104.1533772800105.1&__hssc=17859942.1.1533772800106&__hsfp=1773666937

- Rincón, I. y Chaparro, J. (2018). Caracterización de estrategias corporativas en las pymes en la ciudad de Montería. *Procceding CLADEA 2017* [En línea], [Consultado el 15 de Abril de 2019], http://grupoinolsa.com/ojs3/index.php/procceding_cladea2017/article/view/256

- Robbins y Judge. (2009). Comportamiento Organizacional. Décimo tercera edición. PEARSON

- EDUCACIÓN, México, 2009. Economía, ISBN: 978-607-442-098-2. Área: Administración.

- Rodríguez, G. (2011). Factores de aplicación de endomarketing en las pymes agroindustriales de la Sabana de Bogotá (Recurso Electrónico).[En línea], [Consultado el 14 de Septiembre de 2019], https://repository.ean.edu.co/bitstream/handle/10882/2705/Endomarketing%20Agroindustrial.pdf?sequence=1&isAllowed=y

- Saavedra, M. y Hernández, Y. (2008). Caracterización e importancia de las MIPYMES en Latinoamérica: Un estudio comparativo. *Actualidad Contable Faces, 11*(17), 122-134.[En línea],[Consultado el 03 de Septiembre de 2019], https://www.redalyc.org/pdf/257/25711784011.pdf

- Simancas, R.; Silvera, A.; Garcés, L. y Hernández, H. (2018). Administración de recursos humanos: factor estratégico de productividad empresarial en pymes de Barranquilla. *Revista Venezolana de Gerencia*, 23 (82) .[En línea],[Consultado el 20 de Mayo de 2019], http://www.redalyc.org/articulo.oa?id=29056115008

- Solano, O. Riascos, S. y Aguilera, A. (2013). Determinantes de los Planes Estratégicos de los Sistemas de Información en las Pymes colombianas: caso Santiago de Cali (Colombia). *Revista Entramado,* 9(1), 26-36. 11.[En línea], [Consultado el 13 de Mayo de 2019],https://www.redalyc.org/pdf/2654/265428385003.pdf

- Valle, A. y Niebles, W. (2017). Planificación estratégica como instrumento de la sostenibilidad ambiental en Pymes de Barranquilla (Colombia). *Revista Espacios, 38 (58) , 6.*[En línea], [Consultado el 20 de Agosto de 2019], http://hdl.handle.net/11323/4601

- Vega, L. y Torres, G. (2010). Capacidad tecnológica de las PYMES exportadoras de confecciones en Barranquilla. *Dimensión empresarial*, 8(2), 38-46.[En línea], [Consultado el 18 de Agosto de 2019],https://dialnet.unirioja.es/servlet/articulo?codigo=3990464

The Impact of The Tax Burden on The Economic Growth of BRICS Countries

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Abstract

The modern concept of building a multipolar world provides for the formation of associations of countries that collectively create a synergistic effect due to their development prospects. One of such significant forums is the BRICS, which includes Russia. Due to existing opinions about the vagueness of development and even the existence of this association in the future, connected with a slowdown in economic growth and the volume of mutual trade and investment relations, the issue of alternative factors that can affect the GDP of states becomes relevant. The article considers issues related to the problem of macroeconomic growth, based on the relationship with indicators of the tax burden, such as the volume of tax revenues, the amount of customs and other import duties. As a result of the study, using the correlation and regression analysis, the factors that have the greatest influence on the growth rate of GDP of each of the BRICS countries were identified. The strong differentiation in the historical, economic, and political terms of the countries explains the lack of a single trend in the interconnection of indicators, as well as in multiple and paired regression models of dependence. The structure of tax revenues formation of the consolidated budgets of countries was detailed due to the need to assess the key parameters of tax policy and its orientation towards a particular sector of the economy. The analysis made it possible to determine the importance of improving the tax system of the BRICS countries to accelerate the pace of business activity at the macro level.

Keywords: BRICS, Economic Growth, Tax Burden, Tax Policy, Regression Analysis.

Introduction

The modern world economy is a complex multi-level system, the elements of which-national economies-are linked by international economic relations. An important fact is that the world economy is very hierarchical, where there is a ‘core', the center representing economically developed countries, and the periphery represented by developing countries and countries with economies in transition. This hierarchy and differentiation provides the basis for the emergence of various types of groupings of countries similar in terms of development to solve common urgent problems in the context of the accelerating process of financial globalization. One of these key coalitions, in which Russia plays an important role, is the BRICs interstate transregional association.

Conceptually, the BRIC format was announced in 2001 by Jim O'Neill, an employee of the international investment bank Goldman Sachs. This project was regarded, first of all, as an effective platform for the application of foreign capital. For all their differences in countries located on completely different continents, BRIC members, according to Jim O'Neill, have a key characteristic that can attribute them to a single forum - the presence of a fast-growing economy with a voluminous emerging market, which is so important for potential investors. In addition to high GDP growth rates

(6-10%), among other indicators, there were high export rates from these countries, a growing share in world trade and global FDI.

However, the question remains: what allows countries to maintain their economic growth, in addition to the above-mentioned indicators of international relations? What is the impulse and driving force inside the state's economy itself? Of course, the socio-economic development of a country cannot be separated from its tax policy, which forms the budget and is the basis for the government to fulfill its core functions. (Akhmadeev, 2018; Turishcheva, 2019) In this regard, the relevance of the study is to analyze the role and relationship of the tax burden with the growth rate of the BRICS member countries.

Literature Review

Koomin Kim (2018) explores the relationship between tax burden and American states revenue. Based on the general theory of state tax policy, using a regression analysis, the main factors that affect the reliability of income and the tax burden were identified. In her spatial equilibrium model, Rebecca Lessem (2019), considers the impact of tax cuts and job availability on the territorial distribution of high productivity households that create the region's economic welfare. Role of present development practices for tax, financial and statistical reporting in the Russian Federation reveal in article Petrov, Kiseleva, Kevorkova, Melnikova, Yshanov (2019). The author of the study (Van Kolpin, 2019) on apolitical SALT-free Tax Equilibria demonstrates the reasons for increasing the aggregate equilibrium tax burden and concludes that reducing the tax burden leads to the decrease of economic efficiency. According to Mark Hallerberg and Carlos Scartascini (2017) with a certain probability economic crisis affects the implementation of tax reforms.Iin addition, the authors identify factors that determine the choice of tax instruments for tax reforms. Russian and foreign models of sustainable development at the macro and micro levels are analyzed in their works Sotnikova, Polenova, Mislavskaya, Petrov, Basova (2019). Modern studies (Lumir Abdixhiku, Besnik Krasniqi, Geoff Pugh, Iraj Hashi, 2017) using various modeling strategies analyze the role of institutional factors in determining the tax evasive behaviour of firms in countries with transitional economies. Processed and aggregated innovation data Korableva, Kalimullina, Mityakova, (2018).

Research Question

The tax burden is the share of revenue paid to the state in the form of taxes. The overall accepted indicator of the tax burden is, in general, the share of taxes in GDP: TB = T / GDP·100%, where T is all tax payments to the country's budget. Factors affecting the tax burden are diverse; among them economic, political, and social ones can be distinguished (Malitskaya, 2019).

Along with the tax burden, one should also consider such a significant indicator as customs and other import duties (as a percentage of tax revenues). Customs duties are of practical interest for analysis since they are not part of the tax system embodied in the Tax Code. This indicator, along with the tax burden, will be an independent factor in the regression model, and the dependent variable will be the GDP growth rate at constant prices. For the representativeness of the future model, let's consider the 2001 – 2017 years' time period (due to the availability of data in the statistical yearbooks of the IMF and WB). In order to analyze in more detail the relationship of all indicators in the model, we will construct 5 regression equations corresponding to each of the BRICS countries - Brazil, Russia, India, China, and South.

The first step is to determine the strength of the relationship between the three selected indicators, for this purpose, in accordance with the table of values for the period 2001-2017, matrices of paired correlation coefficients using the MS Office Excel add-in Data Analysis were constructed for 5 BRICS countries. (Table 1)

Table 1*:* Matrices of paired correlation coefficients between factor indicators

for the BRICS countries

Russia			
Factors	GDP growth rate	Tax revenues	Customs and other import duties
GDP growth rate	1,0000		
Tax revenues	0,6205	1,0000	
Customs and other import duties	0,1364	0,3183	1,0000
Brazil			
Factors	GDP growth rate	Tax revenues	Customs and other import duties
GDP growth rate	1,0000		
Tax revenues	0,5610	1,0000	
Customs and other import duties	-0,4044	-0,7852	1,0000
India			
Factors	GDP growth rate	Tax revenues	Customs and other import duties
GDP growth rate	1,0000		
Tax revenues	0,1631	1,0000	
Customs and other import duties	-0,2228	-0,6037	1,0000
China			
Factors	GDP growth rate	Tax revenues	Customs and other import duties
GDP growth rate	1,0000		
Tax revenues	-0,4107	1,0000	
Customs and other import duties	0,7181	-0,3718	1,0000
South Africa			
Factors	GDP growth rate	Tax revenues	Customs and other import duties
GDP growth rate	1,0000		
Tax revenues	0,0419	1,0000	
Customs and other import duties	0,3018	0,6917	1,0000

Source: composed by authors on the base of OECDStat, Tax Policy Analysis, Global Revenue Statistics Database [Electronic resource]. – Access mode: http://www.oecd.org/tax/tax-policy/global-revenue-statistics-database.htm

Thus, the strongest and the most direct link between a tax burden and GDP growth rate among all BRICS countries is observed in Russia (correlation coefficient is 0,6205), it is also high in Brazil (0,5610), but very weak in India and South Africa (0,1631 and 0,0419, respectively). China differs noticeably from all countries, where the relationship between tax revenue and GDP growth is reversed (-0.4107). Also in China, the strongest positive relationship is observed between the GDP growth rate and customs duties (0.7181), the same connection is direct in Russia and South Africa. Customs duties and GDP growth rates in India and Brazil are inversely related. That is, in general, the BRICS countries do not have a single trend in the relationship of the selected factors.

A regression analysis allows us to clearly and fully determine the relationship between factors. For this, regression equations were constructed for these indicators using the MS Office Excel add-in. For this purpose, the regression equations were constructed according to these indicators using the MS Office

Excel add-in. Data analysis, where x1 is the tax burden factor, x2 is the factor of customs and other import duties, and y is the effective indicator of GDP growth. (Table 2)

Table 2: Factor regression models in BRICS countries

Countries	Regression equation	R-square	Model significance
Russia	y = -11,1469 + 1,2278x1 - 0,2541x2	0,3892	The MR equation is significant
Brazil	y = -21,1064 + 1,5386x1 + 0,3332x2	0,3181	The MR equation is not significant
India	y = 8,1519 + 0,0737x1 - 0,1277x2	0,0509	The MR equation is not significant
China	y = 6,3692 - 0,7127x1 + 1,9381x2	0,5396	The MR equation is significant
South Africa	y = 7,4493 - 0,4048x1 + 1,5032x2	0,1445	The MR equation is not significant

Source: composed by authors

To objectively evaluate the model of the relationship of indicators, one can use the R-squared (the variance explained, or the multiple correlation coefficient squared, which makes it possible to understand what part of all changes in the effective trait falls on the selected factors in the model) and check the significance of the equation based on the Fisher F-test. Thus, it turned out that the most informative regression model belongs to China, where the equation is significant and the R-square is the largest (0.5396), which means that the equation is suitable for further forecasting (Dubovik, 2018). There is also a significant model of the dependence of economic growth on the tax burden in Russia. In the rest of the BRICS countries, the models are insignificant with lower values of the explained variance.

According to the generally accepted hypothesis, it is considered that the increase in the tax burden has a very negative impact on economic growth (Kalacheva, 2019; Kosolapova, 2019). However, the regression analysis of the dynamics of GDP growth rates and tax burden in the BRICS countries in the 21st century demonstrates an ambiguous nature of the relationship between these macroeconomic indicators. Thus, according to the constructed models, in all countries except China, an increase in the tax burden entails economic growth. The following facts may be the causes of this interdependence.
Firstly, an empirical assessment of the effects of tax reforms on the rate of economic growth is a non-trivial and multi-level task. The scale and complexity of tax policy, the consequences of which affect the behavior of millions of agents and businesses, make it obligatory to take into account a lot of dependent determinants (Lehoux, 2019; Ivanova, 2018). At the same time, even models that are comprehensive in terms of the included variables are characterized by a problem caused by the uniqueness of each tax system of such dissimilar countries from different parts of the world (Kolesnichenko, 2018).

Secondly, the fluctuations in the level of the tax burden all this time were within fairly narrow limits without significant fluctuations and gaps. In Brazil, for the period 2001 – 2017, tax revenues as a percentage were in the range of 12.71-16.53%%, in Russia-9.14-16.62%%, in India-8.08-11.18%%, in China-8.57-10.31%%, in South Africa-23.04 – 27.34%%. It can be assumed that such small changes did not have a significant impact on the rate of economic growth, which would have been reflected in a great change in the rate of GDP growth.

Thirdly, an abnormal deviation from the generally accepted hypothesis may indicate an inverse relationship: that is, a GDP growth" pulls" an increase in tax revenues. In this regard, two-factor models were built for the dependence of tax revenues or customs payments on GDP growth. (Table 3)

Table 3: Two-factor regression models in the BRICS countries

Countries	Model of dependence of tax burden on GDP growth rate		Model of dependence of customs payments on GDP growth rate	
	Regression equation	Normalized R-square	Regression equation	Normalized R-square
Russia	y = 12,4931 + 0,3245x	0,3440	y = 8,2153 + 0,0365x	-0,0468
Brazil	y = 13,8643 + 0,2315x	0,2690	y = 4,0971 - 0,1143x	0,1077
India	y = 9,6057 + 0,0996x	-0,0383	y = 19,0283 - 0,3414x	-0,0137
China	y = 10,6135 - 0,0961x	0,0856	y = 2,7857 + 0,2431x	0,4672
South Africa	y = 25,5781 + 0,0331x	-0,0648	y = 3,5338 + 0,1050x	0,0305

Source: composed by authors

Based on the normalized R-square, which allows us to compare different regression models, it is clear that for countries such as Russia, Brazil, India, and South Africa, an increase in the rate of GDP growth entails, to some extent, an increase in the tax burden. Since the rates of economic growth in these countries did not change significantly during the period 2001 – 2017, remaining approximately at the same level (in Brazil, on average, 2.33%, in Russia – 3.44%, in India-6.78%, in South Africa-2.81%), which means that tax systems do not interfere with the macroeconomic development of the BRICS member states. For China, which is famous for its export-oriented, open economy and foreign trade, the model of dependence of customs and other import duties on the rate of GDP growth is more typical.

The tax system can act as a powerful stimulator of economic development, especially during a difficult geopolitical situation, falling oil prices and increasing capital outflows from the BRICS countries, which for a given time period, are no longer characterized by their former high (about 10%) and attractive economic growth rates for investors. The greater the share of taxes in GDP, the greater the volume of gross domestic product redistributed through the tax system, the more efficient is the tax system.

Global experience shows that as tax burdens on taxpayers increase, the efficiency of the tax system first increases and reaches its maximum, but then drops sharply (Petrov, 2019; Turishcheva, 2019). At the same time, the losses of the budget system become irreparable, as part of the taxpayers goes bankrupt or closes production operations, while the other part finds both legal and illegal ways to minimize established and payable taxes. If the tax burden is reduced in the future, a longer period will be needed to restore disrupted production.

Discussion

An analysis of the tax burden in the BRICS countries is impossible without detailed elaboration of the method of its creation or the structure of generating tax revenues of the consolidated budgets of countries. In Table 4 the data on the specific weight of the most significant taxes and deductions are presented, including corporate income tax, individual income tax, social insurance deductions and property tax, in the tax revenues of the BRICS budget in 2017.Table 4. The budget revenue structure of the BRICS member countries by groups of main taxes and deductions,%

Countries	Corporate income tax	Individual income tax	Social insurance deductions	Property tax
Russia	10,6	10,5	21,9	4,0
Brazil	14,0	7,0	8,4	2,0
India	25,9	10,4	0,3	1,8
China	22,2	8,3	9,1	3,5
South Africa	14,8	39,0	0,4	1,6

Source: OECDStat, Tax Policy Analysis, Global Revenue Statistics Database [Electronic resource]. –Access mode: http://www.oecd.org/tax/tax-policy/global-revenue-statistics-database.htm

A clear comparison of the structures should be presented in Fig 1.

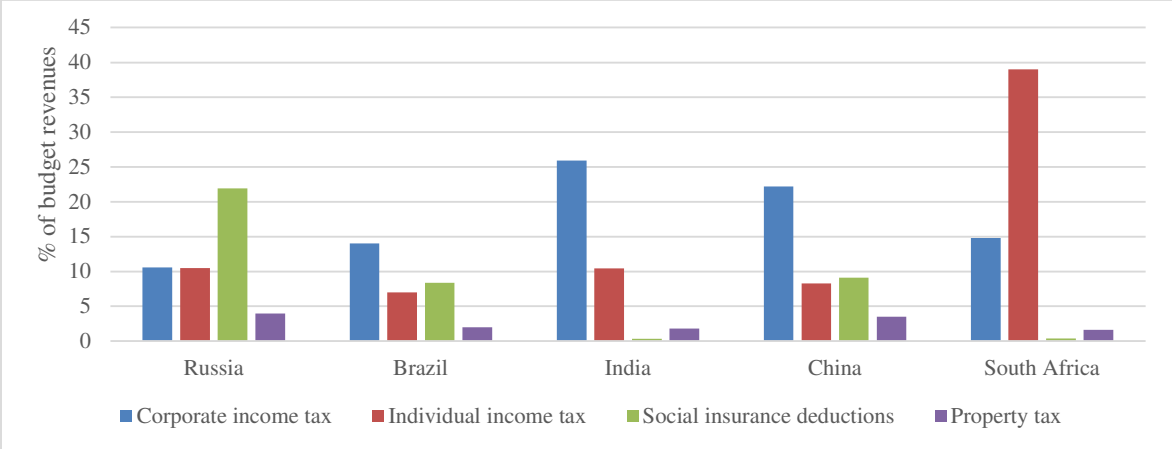

Fig. 1: The budget revenue structure of the BRICS member countries by main tax and deduction groups

Source: OECDStat, Tax Policy Analysis, Global Revenue Statistics Database [Electronic resource]. – Access mode: http://www.oecd.org/tax/tax-policy/global-revenue-statistics-database.htm

Thus, according to the national tax revenue structure, one can see a greater orientation of BRICS members toward the collection of taxes on the commercial sector, which can be caused either by higher profit tax rates for business or by a significant share of legal entities, that is, so-called economies of scale, as in China. However, South Africa and Russia are singled out from this list. In the Republic of South Africa, revenues generated from personal income taxes predominate, while in the Russian Federation social insurance deductions are dominant/prevailing, which in many countries are completely insignificant, like in India and South Africa, which can be a confirmation of an inactive government social protection policy or an encouragement of personal initiative in the formation of their social package through private funds without mandatory contributions. In general, as in the regression analysis of economic growth factors from the tax burden, the BRICS countries do not have a unified model or pattern of the structure of tax revenues, which proves their uneven development and asynchrony.

It is possible to track how taxation is reflected in the most important driving force of modern economic growth - small and medium-sized businesses, using the world's global ranking of Doing Business, based on 10 key indicators that determine the conditions for easy of starting a business and unhindered implementation of business activity. Among these indicators is the tax criterion, therefore, in Table 5 we consider the ratings of the BRICS countries on this

Table 5: Rating dynamics of Doing Business in the BRICS countries as a whole and in terms of taxation, 2015 - 2017

Countries	2015		2016		2017	
	Overall rating	Tax Rating	Overall rating	Tax Rating	Overall rating	Tax Rating
Russia	62	49	51	47	40	45
Brazil	120	177	116	178	123	181
India	142	156	130	157	130	172
China	90	120	84	132	78	131
South Africa	43	19	73	20	74	51

Source: World Bank, Doing Business project [Electronic resource]. – Access mode: https://www.doingbusiness.org/

Based on the rating data, two subgroups can be identified, which should be characterized as follows. Firstly, there are states among the BRICS countries where tax policy is a burdening factor that impedes the development of small and medium-sized businesses on a larger scale. For example, in Brazil, India, China, the tax rating is always lower than the rating as a whole, which means that the tax burden in these countries 'pulls down' both business and economic growth. However, in Russia (until 2017) and South Africa the reverse trend is observed: taxation is always higher than the overall rating, therefore, these countries' higher positions compared to the other three countries are explained in many respects by a more flexible and business-friendly tax policy. On the whole, a positive regression relationship between taxation and ease of doing business can be seen only in Russia. In the other BRICS countries there is no single trend, which means that this criterion is not fundamental to economic growth.

Conclusion

Thus, the study of the importance of the tax burden for the economic growth of the BRICS countries allows us to conclude that, under current conditions at the macro level, optimization and revision of the tax burden will become possible and more effective only if there is a more significant and strong correlation between the growth rate of the gross national product and tax burden. The models for constructing their dependence on each other, as well as the structure of the formation of this burden (or tax revenues and deductions as a whole) in the five member countries of the association, are asynchronous for many reasons: uneven development, different mentalities, historical factor, the role of the shadow economy, which is not reflected in officially published statistical materials and significantly distorting the real situation.

Taking into account these factors, as well as the fact of a global slowdown in economic growth, stagnation, an urgent task for the BRICS countries now is to create such conditions that will simultaneously solve two problems. Firstly, they will provide more comfortable and acceptable circumstances for doing business in the legal economic space.Secondly, that part of the correlation of the tax burden with the GDP growth rate, which is taken away by the shadow sector and is not directly reflected, will pass to the tax system, which means that the regression models will become more objective and real. Only under such conditions it is possible for countries to develop effective tax regulation rules to accelerate and maintain their economic growth.

References

- Akhmadeev, R.G., Kosov, M.E., Bykanova, O.A., Turishcheva, T.B. 2018. Development of venture financing to ensure economic security of a country. Proceedings of the 32nd International Business Information Management Association Conference, IBIMA 2018 - Vision 2020: Sustainable Economic Development and Application of Innovation Management from Regional expansion to Global Growth, 51-56

- Dubovik, M.V., Novikova, E.S., Sigarev, A.V. 2018. The role of information communications technology in the development of companies' business strategies: The Russian experience. International Journal of Civil Engineering and Technology, 9 (10), 1131-1139

- Hamed Ghiaie, Gregory Auclair, Jean Frederic Noah Ndela Ntsama (2019) 'Macroeconomic and welfare effects of tax reforms in emerging economies: A case study of Morocco,' *Mathematical Social Sciences*, 41: 666-699

- Ivanova, Y., Nikeryasova, V., Balikhina, N., Savrukov, A. 2018. Ways to improve the mineral replacement tax system: Taking the experience of commonwealth of independent states countries. International Journal of Energy Economics and Policy, 8 (5), 97-103.

- Kalacheva O.N. 2019. A Survey of Modern E.U. Approaches towards Amortization Policies. Proceedings of the 34th International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Management of Innovations through Sustainable Economic Competitive Advantage Vision 2025, pp. 4515-4522

- Kolesnichenko, E., Ozerov, I., Safonova, N., Malitskaya, V. (2018) Digitalization of management as the way of increasing the social and labor activity of young people. Proceedings of 32nd International Business Information Management Association Conference, IBIMA 2018 - Vision 2020: Sustainable economic development and application of innovation management from regional expansion to global growth, 2955-2964

- Koomin Kim, Seunghoo Lim (2018) 'Analysis of state general sales tax policy: A complementary approach to the effects of causes and the causes of effects,' *The Social Science Journal*, 55: 128-138

- Korableva, O. N., Kalimullina, O. V., Mityakova, V. N. (2018). Innovation activity data processing and aggregation based on ontological modelling. Paper presented at the 2018 4th International Conference on Information Management, ICIM 2018, 1-4.

- Kosolapova, M.V., Muravitskaya, N.K., Tolmachev, M.N., Melnikova, L.A., Petrov, A.M. 2019. Technology for solving the problems related to the implementation of the concept of preserving capital in accounting and statistics. International Journal of Recent Technology and Engineering. 8 (3), 789-792

- Lehoux, L., Duck, H., Akhmadeev, R., Morozova, T., Bykanova, O. 2019. Sustainable development facets: Taxation solutions for the energy industry. Journal of Security and Sustainability Issues. 9(2),457-472.

- Lumir Abdixhiku, Besnik Krasniqi, Geoff Pugh, Iraj Hashi (2017) 'Firm-level determinants of tax evasion in transition economies,' *Economic Systems*, 41: 354-366

- Mark Hallerberg, Carlos Scartascini (2017) 'Explaining changes in tax burdens in Latin America: Do politics trump economics?,' European Journal of Political Economy, 48: 162-179

- Malitskaya, V.B., Chirkova, M.B., Shirobokov, V.G., Volkova, N.N. (2019) Development of accounts receivable management in Russia. Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 723-728

- Petrov A.M., Nikiforova E.V., Kiseleva N.P., Grishkina S.N., Lihtarova O.V. 2019. Creation of the reporting on sustainable development of companies based on socioeconomic measurement statistics. International Journal of Recent Technology and Engineering. 8 (2), July 2019, 4005-4012

- Petrov, A.M., Kiseleva, N.P., Kevorkova, Z.A., Melnikova, L.A., Yshanov I.G. 2019. Present development practices for tax, financial and statistical reporting in the Russian Federation. International Journal of Innovative Technology and Exploring Engineering. 8 (12), October 2019

- Rebecca Lessem (2019) '"The impact of the tax cut and jobs act on the spatial distribution of high productivity households and economic welfare", by Daniele Coen-Pirani and Holger Sieg,' *Journal of Monetary Economics*, 105: 72-73

- Sotnikova L.V., Polenova S.N., Mislavskaya N.A., Petrov A.M., Basova M.M. 2019. Sustainable development, macro and micro level: Russian and foreign model. International Journal of Recent Technology and Engineering. 8 (2), 4524-4532

- Turishcheva, T.B., Akhmadeev, R.G., Chaykovskaya, L.A. 2019. Institutional environment of internal controls in autonomous establishments. International Journal of Innovative Technology and Exploring Engineering, 8 (12), 2353-2357.

- Turishcheva, T.B., Ponomareva, D.A., Luzgina, A.S. 2019. Review of the key requirements for the financial statements complying with the international and Russian accounting standards. Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 3031-3039.

- Van Kolpin (2019) 'Apolitical SALT-free Tax Equilibria,' *Mathematical Social Sciences*, 101: 99-103

Kahoot! A Tool for Making Econometrics More Enjoyable

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Abstract

The aim of this paper is to assess the usefulness of Kahoot! as a formative assessment tool in making learning more enjoyable and in understanding the content of an abstract subject (econometrics); in addition to that, Kahoot! was used for collecting feedback. The study was conducted at the Bucharest University of Economic Studies on undergraduate second year students during the academic year 2019-2020. The results show that most of the students associate econometrics with statistics (followed by mathematics), and think Kahoot! makes learning more fun, though when asked to state which activities helped them most in understanding the content, a large majority perceived exercises and writing on the blackboard as most useful. Moreover, the study reveals that most of the students want to enjoy a course and they love integrating technology within it; as to the integration of Kahoot! within the course, most of them stated that Kahoot! should be played at the end of each lesson.

Keywords: Econometrics, Advanced Statistics, Gamification, Formative Assessment Tool, Feedback.

Introduction

Higher education students are excited when innovative instruments that make learning more enjoyable and help them master the content are introduced, especially in difficult courses like econometrics (Mirica et al. 2019). Gamification apps, especially Kahoot! is one such instrument (Bicen and Kocakoyun, 2017). While this can be subject of a relative fruitful debates, gamification is treated as a scientific area of interest by some researchers and for a detailed description on the subject matter and its history see Landers et al. (2018), Raczkowski (2014) or for a more critical view Dale (2014) or Bogost (2015).

The aim of this paper is to assess the usefulness of Kahoot! in making learning more enjoyable and in understanding the content of an abstract subject (econometrics). The study was conducted at the Bucharest University of Economic Studies on undergraduate second year students during the academic year 2019-2020.

Founded in 2012 as a joint venture between 3 entrepreneurs/programmers and the Norwegian University of Technology and Science, Kahoot! is an online platform for delivering interactive applications in which teaching content is disseminated according to a specified set of rules designed to increase engagement rate through instant gratification [Kahoot!, 2020]. Dellos (2015) provides a rich description of the platform and its core functionalities.

At simple search of 'Kahoot!' keyword using Google Scholar (Google, 2020) we can retrieve approximately 11.000 results containing scientific articles regarding more or less a plethora of assessments in measuring students satisfaction/performance derived from using the online teaching platforms in class. Such studies, as done by Felszeghy et al. (2019) for teaching medicine students histology or Zarzycka-Piskorz (2016) for teaching grammar of a new language, mainly praise the benefits of capturing and maintaining the attention span and stimulating students motivation, through constant interaction mediated by the electronic environment. While solutions to problems old as time in education are welcomed, a critical assessment of the new tools and their impact on long-term effects for students and teachers, alike, is needed and all the praise should be carefully taken into account, given the new cultural environment in which students have to succeed (Toyama, 2015).

The paper is structured as follows. Firstly, we provided a description of the methodological design, secondly we present the results, followed by conclusions.

Methodology

Kahoot! was used within the econometrics course as a formative assessment tool at the end of two chapters: Time Series and Simultaneous Equation models. Also, at the last course, Kahoot! was used as a formative assessment tool for the overall content as well as for collecting feedback on the course. In order to collect students' feedback as accurate as possible, five questions were added after the ones used for formative assessment:

- **Q1.** "State one word to which you associate Econometrics" – this is an open ended question aimed to provide an insight on what students think of the subject;
- **Q2.** "Of all learning activities, which one do you find most joyful?" – prior this open ended question students were asked to think of all the course activities they participated in and state one that made their learning more enjoyable;
- **Q3.** "Of all learning activities, which one do you find most useful for understanding the subject?" – prior this open ended question students were asked to think of all the course activities they participated in and state the one that helped them master the content and make connections between econometrics and other subjects;
- **Q4.** "Of all learning activities, which one would you keep?" – providing that students already thought to the course activities from two different perspectives (the one that brings more joy and the one that is more useful), this open question aimed at providing an insight on which activities should be kept for the next academic year;
- **Q5.** As the feedback from previous Kahoot! games was positive, several students stating that we should play more, one final multiple choice question on this specific activity was added: "We should play Kahoot!: At the beginning of each lesson; At the end of each chapter; At the end of each lesson; Only at the end of the course".

Collecting feedback as an integral part of a Kahoot! game is recommended by Gebbels (2018). In order to be sure that students answer spontaneously, without much prior thinking, the chronometer was set as follows: 60 seconds for questions 1 to 4 respectively and 30 seconds for the last question.

The game was played on two series of students comprising of 32 players in the first series and 41 players in the second one. One must note that students in the second series didn't have any contact

with the students in the first series. Moreover, some students didn't answer to these questions. In the case of the second series, the fourth question was skipped due to lack of time. As the course content was the same for both series and students didn't interact among themselves, the results will be presented globally, for both series.

Results

As follows, we will present the results obtained from the survey to which the students from the two series responded.

Figure 1 presents the number of answers per question. As one can observe the lowest number of answers was registered for the skipped question, while the highest was registered for the one that required students to associate Econometrics with one word. This is natural, as this question was the first in this series of questions collecting feedback. Another reason why we have a smaller number of answers to the question of which they would keep is that decisions are always more difficult to make.

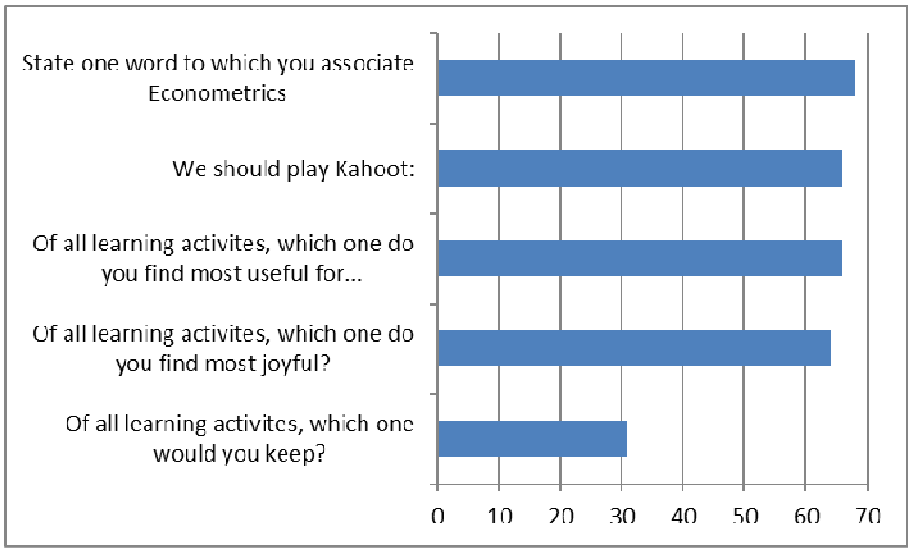

Figure 1 : Number of answers per feedback question; source: designed by the authors

Figure 2 presents the words that students associated Econometrics with. Most of the students stated that econometrics is associated with statistics, followed by mathematics. Indeed econometrics could be called advanced statistics and even if it is based on various mathematical concepts, it has a high degree of applicability. This proves that most of the students gathered a good insight of the subject. However, there are students that still have a certain degree of anxiety regarding econometrics, as some of them associated the course with feelings such as failure (failed exam) and depression (depression, torture, atomic bombs, nasty, an additional year of college). Such feelings of anxiety could be reduced trough integrating joyful learning techniques tailored for econometrics and the specific age group into the teaching process (see Andrei et al. 2019). Other students could not master the material properly, yet they didn't associate negative feelings with it, rather they stated their opinion in an objective manner; such students associate econometrics with the unknown, ambiguity or trick.

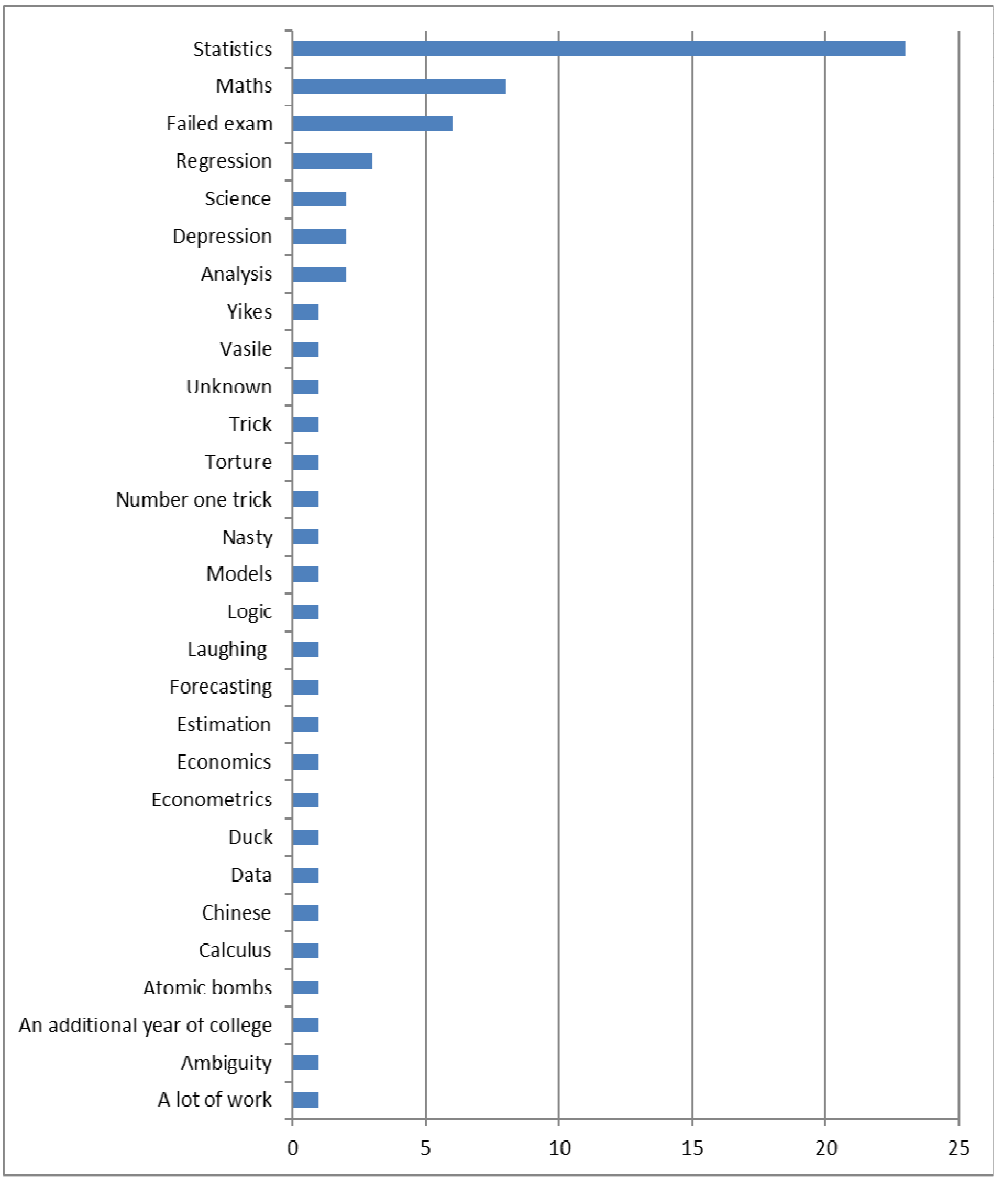

Figure 2 : Distribution of answers to the question "State one word to which you associate Econometrics"

source: designed by the authors

Next, students were asked to reflect upon the course activities from two perspectives: to what extent an activity makes their learning more enjoyable and to what extent an activity helps them in understanding the content. The results are presented in figures 3 and 4, respectively. As one can observe from figure 3, most students stated that Kahoot! makes learning more fun. Moreover, some of them referred to Kahoot! as "this one", suggesting that they were fully engaged in the activity. Very few of them pointed out that the teacher (referred also as "you") made their learning more enjoyable. On the other hand, when they were asked to state which activities helped them most in understanding the content, most of them perceived exercises and writing on the blackboard as most useful. Some students stated that nothing helps in understanding the subject, while some of them also associated negative feelings with this issues (see "prayers" – anxiety, "whatever" – indifference).

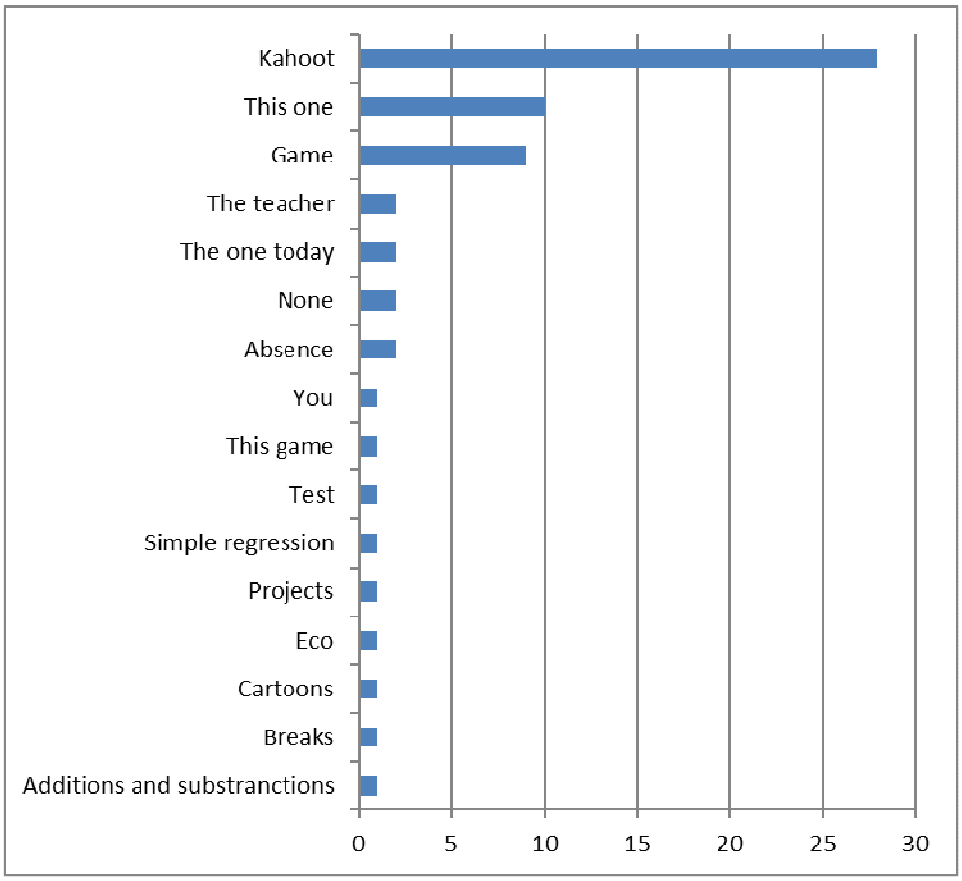

Figure 3: Distribution on answers to the question: "Of all learning activities, which one do you find most joyful?"

source: designed by the authors

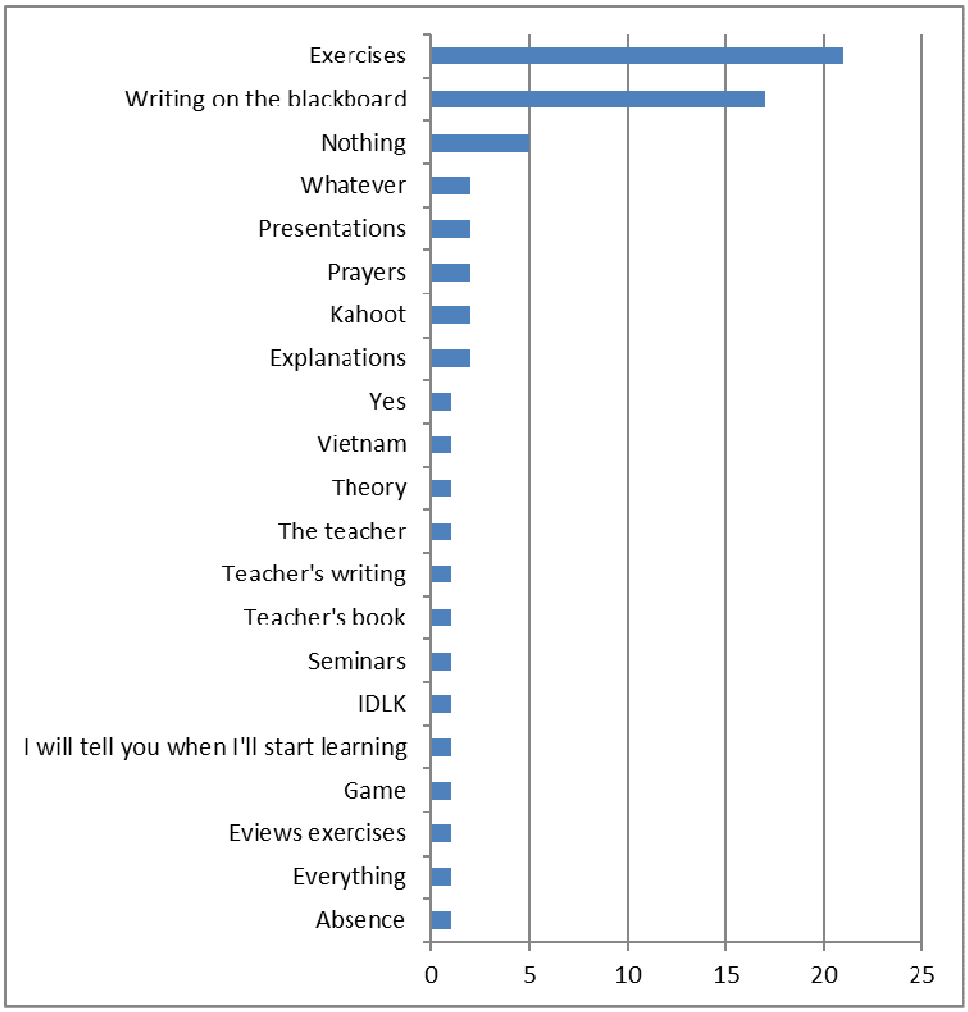

Figure 4 : Distribution of answers to the question: "Of all learning activities, which one do you find most useful for understanding the subject?

source: designed by the authors

Figure 5 shows the distribution of answers to the question: "Of all learning activities, which one would you keep?". This question is important because it provides insights on students motivation for being present to the course. As one can observe, most of them stated that Kahoot! and games should be kept. Moreover, some of them referred to Kahoot! as "this one", once again demonstrating their engagement in the activity. This result shows us that most students want first and foremost to enjoy a course and they prefer integrating technology within it. Our findings are in line with the existing literature. For example Newman et al. (2018) found that students want to have courses that embed Kahoot!, Moodle and Power points.

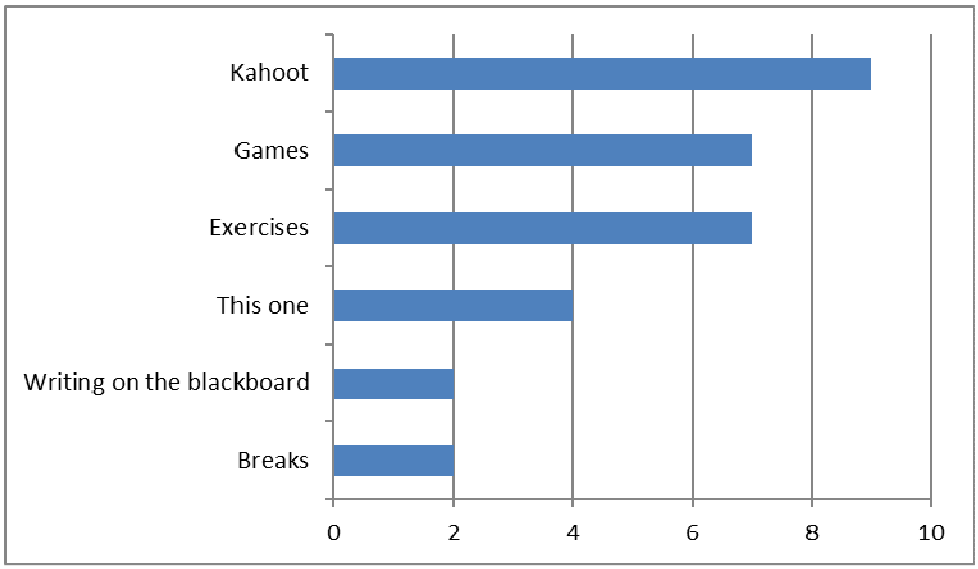

Figure 5 : Distribution of answers to the question: "Of all learning activities, which one would you keep?"

source: designed by the authors

Finally, students were asked to provide their opinion on how should Kahoot! be integrated within the course. As one can observe from figure 6, most of them stated that Kahoot! should be played at the end of each lesson. Some of them also mentioned that we should play at the beginning of each lesson or at the end of each chapter and very few of them only at the end of the course. In the context that the game was introduced at the end of two chapters as well as the end of the course, their answers may suggest that there is a need for making some lessons more enjoyable. Moreover, students may anticipate the various contexts that Kahoot can be used for: formative assessment, review or introducing new concepts (according to https://kahoot.com/schools/ways-to-play/ accessed 2 February 2020)

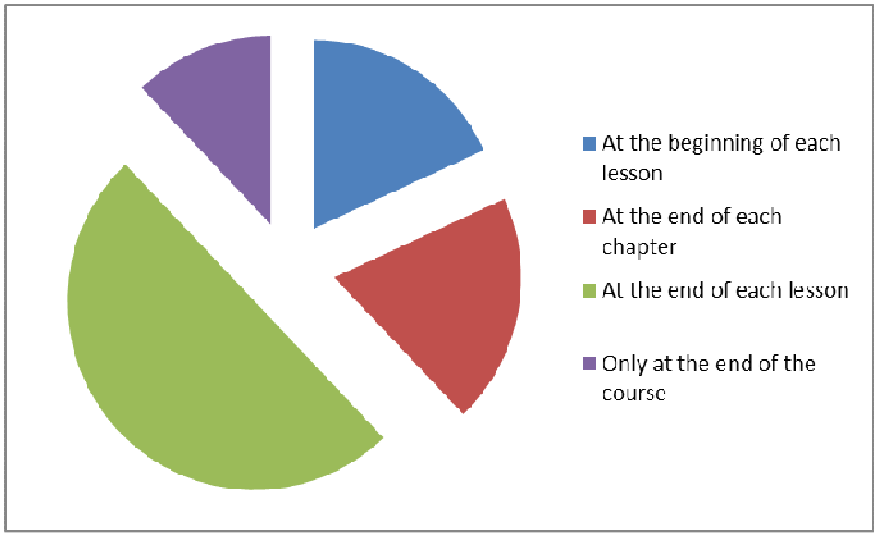

Figure 6 : Distribution of answers to the question: "We should play Kahoot! …"

source: designed by the authors

Conclusions

The assessment of the Kahoot! tool to discover if it makes learning more enjoyable and if it is useful for a better understanding of an abstract subject such as econometrics can bring improvements in the learning process. From student's perspective Kahoot! proves its ability of being an enjoyable way of learning, this could be seen in the figure 3 where the question was "Of all learning activities, which one do you find most joyful?" the majority made reference to Kahoot! ("Kahoot!", "This one", "The today one"). Although apparently Kahnoot! is not perceived by students as useful in understanding the subject matter, this tool offers to teacher a very good opportunity for collecting feedback and improving the learning process. In just a few minutes the teacher gained valuable insight to the associations that students make about econometrics (figure 2), what they consider useful in understanding the concepts (figure 4) and when during the semester is better to use Kahoot! (figure 6).

Kahoot! like tools decrease anxiety caused by a new and complex subject such as econometrics and create a better perception of the "pair" teacher-subject and even help to improve the learning process by collecting feedback. A possible development of the study might be comparing the final results between groups of students (one group that used Kahoot! and another that did not). Moreover, comparative analysis concerning the perception before and after a course where Kahoot! was used should be performed.

References

1. Andrei T., Mirica A., Petreanu T. E. Approaching Econometrics as a Serious Game in order to Provide Professional and Soft Skills to Undergraduate Students, 33rd IBIMA Conference: 10-11 April 2019, Granada, Spain, ISBN: 978-0-9998551-2-6, p. 7634-7640, abstract available at https://ibima.org/accepted-paper/approaching-econometrics-as-a-serious-game-in-order-to-provide-professional-and-soft-skills-to-undergraduate-students/ (accessed 2 February 2020)
2. Bicen, H. & Kocakoyun, S. (2017). Determination of university students' most preferred mobile application for gamification. World Journal on Educational Technology: Current Issues. 9(1), 18-23.
3. Gebbels, M. (2018). Re-engineering challenging and abstract topics using Kahoot!, a student response system. Compass: Journal of Learning and Teaching, 11(2).
4. Landers, R. N., Auer, E. M., Collmus, A. B., & Armstrong, M. B. (2018). Gamification science, its history and future: Definitions and a research agenda. *Simulation & Gaming*, *49*(3), 315-337.
5. Raczkowski, F. (2014). Making points the point: Towards a history of ideas of gamification.
6. Dale, S. (2014). Gamification: Making work fun, or making fun of work?. *Business information review*, *31*(2), 82-90.
7. Bogost, I. (2015). Why gamification is bullshit. *The gameful world: Approaches, issues, applications*, *65*.
8. Kahoot! (2020). Available at: https://kahoot.com/company/ Accesed 02 February 2020
9. Dellos, R. (2015). Kahoot! A digital game resource for learning. *International Journal of Instructional Technology and Distance Learning*, *12*(4), 49-52.
10. Felszeghy, S., Pasonen-Seppänen, S., Koskela, A. *et al. (2019)* Using online game-based platforms to improve student performance and engagement in histology teaching. *BMC Med Educ* **19,** 273. https://doi.org/10.1186/s12909-019-1701-0
11. Zarzycka-Piskorz, E. (2016). Kahoot it or not? Can games be motivating in learning grammar?. *Teaching English with Technology*, *16*(3), 17-36.
12. Plump, C. M., & LaRosa, J. (2017). Using Kahoot! in the classroom to create engagement and active learning: A game-based technology solution for eLearning novices. *Management Teaching Review*, *2*(2), 151-158.
13. Toyama, K. (2015). The looming gamification of higher ed. *Chronicle of Higher Education*, *62*, 10-17. Available at: http://www.hodgespodge.us/uploads/2/0/0/6/20067361/the_looming_gamification_of_higher_ed_-_the_chronicle_of_higher_education.pdf . (Accessed 02 February 2020)
14. Mirică A., Petreanu T.E., Glăvan R. I. Assessing an Innovative Way of Teaching Econometrics 33rd IBIMA Conference: 10-11 April 2019, Granada, Spain, ISBN: 978-0-9998551-2-6, p. 7626-

7633 abstract available at https://ibima.org/accepted-paper/assessing-an-innovative-way-of-teaching-econometrics/ (accessed 2 February 2020)
15. Newman T., Beetham H. Knight S. (2018) Digital experience insights survey 2018: findings from students in UK further and higher education available at http://repository.jisc.ac.uk/6967/1/Digital_experience_insights_survey_2018.pdf (accessed 2 February 2020)
16. https://kahoot.com/schools/ways-to-play/ accessed 2 February 2020

An Evaluation of Counter-Ecological Behaviors of Workers in Relation to Their Sex

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Abstract

The authors of this study undertake to discuss the problem area of evaluation of counter-ecological behaviors in the place of work. The basic goal is to examine whether there exists a dependence between the respondent's sex and their evaluation of selected counter-ecological behaviors. The article is of the theoretical-empirical character. The authors conclude that evaluations of the degree of negativism of counter-ecological behaviors are high, whereas there does not occur any significant dependence between women and men regarding these evaluations. They recommend to Polish enterprises that they should turn socially responsible through implementation of corporate social responsibility (CSR) with the aim to prevent and eliminate the counter-ecological behaviors that are observed by the respondents in their workplaces.

Keywords: Workplace Behaviors, Counter-Ecological Behaviors, Gender Differences.

Introduction

Since times immemorial organizations have been interested in increasing work efficiency. This efficiency is in an absolute way connected with organizational behaviors of members of organizations (stakeholders). Upon applying the bipolar criterion, it needs concluding that organizational behaviors can be divided into purely positive – altruistic, organizational civic behavior (OCB) (e.g., Organ et al., 2006; Jachnis, 2008) and extremely negative – counterproductive work behavior (CWB) (e.g., Marcus & Schuler, 2004; Spector, Fox, Penney, Bruursema, Goh & Kessler, 2006; Trevino et al., 2006; Szeliga-Duchnowska, 2018). Therefore, one of the goals of an organization is creating such a work environment where the former will be willingly taken up and readily increased, while the latter – consciously avoided and consistently eliminated as undesired due to their negative nature (Viswesvaran & Ones, 2000; Campbell & Wiernik, 2015). Relations between social responsibility of business and corporation ethics and OCB were studied from the perspective of workers' identifying themselves with the organization (El-Kassar et al., 2017). Taking into consideration the aspect of behaviors which ought to be eliminated, it needs observing that in the literature on the subject – as far as both theoretical and empirical works are concerned – a lot more attention has been paid to CWB, whereas counterproductive sustainability behaviors (CSB), which can be described as a counterpart of CWB in the sphere of sustainable development, have been treated marginally only (Ones & Dilchert, 2009, 2012; Wiernik et al., 2010). Natural environment is the foundation of sustainable development, the economy – its tool and welfare of society – its goal. Bearing the above in mind, the authors concentrated their research attention on questions connected with ecology in organizations since:

1. The scales which illustrate CWB do not focus on behaviors against ecology. For instance, the scale elaborated by Gruys and Sackett (2003) lists such behaviors as: theft, damaging property, absence, harassment and violence. Only a few authors, including Ciocirlan (2017), deal with the problem of environmental counterproductive workplace behaviors (ECWBs), which – apart from

organizational citizenship behaviors for the environment (OCBEs) as well as environmental in-role behaviors (EIRBs) – make the components of environmental workplace behaviors (EWBs).
2. The stakeholders' behaviors which pose risk of or – in a direct way – result in a harm to the environment stand in opposition to the justified interests of each organization (Dilchert, 2018).

Companies are required to be socially responsible. Therefore, enterprises all over the world undertake to launch a variety projects in the field of environmental protection, which constitutes one of the fundamental elements of corporate social responsibility (CSR) (Śmiechowski, Lament, 2017; Gonzalez, Ling, Glantz, 2012; Joseph, Gunawan, Sawani, Rahmat, Noyem, Darus, 2016; Pierce, Negreiros, Cerabolini, Kattge, Díaz, Kleyer, Buffa, 2017; Mazur-Wierzbicka, 2013; Fukushima, 2013; Valcárcel, Lucena, 2014). The most precise explanation of the notion of corporate social responsibility is presented by ISO 26000 which treats CSR as a company's responsibility for its decisions and – in consequence – activities that are beneficial to society and environment through transparent and ethical behaviors (Polska Norma PN-ISO 26000:2012). Protection of environment is understood here as minimizing the negative impact of the company on natural environment, yet also as communicating with the company's stakeholders (including employees) concerning environmental matters and implementation of pro-ecological actions (Leoński, 2016; Olejniczak, 2013; Lewicka-Strzałecka, 2006; Rybak, 2004; Jabłoński et al., 2010).

The environmental effectivity of an organization to a great extent depends on its workers' voluntary participation in pro-ecological actions. Workers of each organization can undertake to conduct numerous environmental activities, such as recycling or car sharing scheme. Buhl, Blazejewski and Dittme (2009) introduced the concept of employee-driven eco-innovation, specified as "ordinary employees' voluntary engagement in innovation activities within an organizational context that, intentionally or not, lead to environmental improvements."

In this study, the authors used the expression "counter-ecological behaviors" with the aim to examine whether there exists a dependence between the demographic variable, that is the employee's sex and his/her evaluation of counter-ecological behaviors. Obtaining an answer to the research problem defined in this way will allow identifying perception of counter-ecological behaviors on the part of workers of both sexes. As Ratalewska (2013) claims, it turns out that the same situation can be perceived quite differently by two persons, can become subject to different interpretations or descriptions, and that evaluations of this situation offered by its participants can differ considerably, as well. Moreover, solving the research problem will provide organizations which pay attention to the issue of environmental protection with some useful clues that can prove effective in this respect.

In the study, an analysis of secondary sources and scientific literature was carried out, the focal point being the differences and similarities between women and men, with particular attention paid to relations between the sexes and concern shown by their representatives for natural environment. The majority of research dealing with this issue shows females as being more pro-ecological. Next, the analysis of the relevant empirical material collected by the authors is presented. Accordingly, the characteristics of the research sample is given and the results of the examination are presented, followed by a discussion of the findings. The study ends with a summary containing conclusions and recommendations.

Gender and Environmental Concern

The stereotypes of gender resemble one another throughout the world: men are considered to be concentrated on tasks and action, whereas women focus on emotions and social relations. In many studies, very small differences, however, have been found between men and women as regards pro-ecological behaviors and the observed differences depend on location and types of behaviors (Hunter et al., 2004; Briscoe et al., 2019; Desrochers et al., 2019; Vicente-Molina et al., 2018; Chan et al., 2019; Rončević & Cvetković, 2016; Xiao & McCright, 2012). Thus, women typically display a higher level of concern for environment in comparison with men (Briscoe et al., 2019; Lee, 2009; Rončević & Cvetković, 2016; Unanue et al., 2016). Women also appear to be more engaged in

pro-ecological household-oriented activities (e.g., recycling) and men in pro-ecological behaviors oriented towards society (e.g., protests). Differences between the sexes on the level of private environmental behaviors (oriented towards households) are more coherent within nations that find themselves at the upper end of the wealth distribution. Women are more concerned than men with regard to health-related environmental problems.

Glass, Cook and Ingersoll (2016) examined several aspects of gender in leadership on environmental strategy. Firms characterized by gender diverse leadership teams are more effective than other firms at pursuing environmentally friendly strategies.

Witek underlines that a special role in households is played by women. Regarding American retail market, women's expenses determine the allocation of 85 cents out of every Dollar spent (MacEachen, 2008), thus the influential role of women in transforming the market of ecological products must be stressed. Women more frequently than men purchase ecological products (Suki, 2016). Also, the fact of having children is a special factor that stimulates buying ecological articles (Frostling-Henningsson et al., 2014). Research shows that a statistical buyer of ecological products is a woman ranging between 30 and 45 years old, with a high income, well-educated and having children (Nasir & Karakaya, 2014). Strużycki (2004) emphasizes that consumers (primarily women-consumers) make the basic group responsible for creation of the ideological layer of ecological awareness – subjects who exert a direct influence on realization of ecological goals and values within the household and outside it.

The analysis of relevant secondary research points to the fact that women display a much greater concern for ethics than men, which translates into their attitude towards ecology (Zelezny et al., 2000). Moreover, they are more inclined towards accepting the future time perspective, hence their greater engagement for the environment. Women's pro-ecological attitudes are to a broader extent connected with health and safety, especially if there are children who live with them. They are also more willing to engage in voluntary services (Musick & Wilson, 2008). Women show greater interest in living in a safe environment and in health, whereas men display a tendency towards perceiving environment as a resource to exploit (Olli et al., 2001).

Authors also raise the significant question of burdening women with professional work, on the one hand, and their duties connected with running households and bringing up children, on the other one. Bourdieu (2004) draws attention to the fact that job markets are informally regulated and feminine occupations are an extension of their roles in the household and family (teaching, caring, services). Women can be more concerned about environmental issues and engaged in environmental protection, yet regular housework restricts their environmental activism. Still, since many forms of pro-ecological behavior can be undertaken in the context of everyday activities, women can display a number of environmentally-friendly behaviors while doing housework (Tindall, Davies, Mauboules, 2003; Kennedy, Kmec, 2018).

It also follows from the analysis of secondary research that women, especially those having children, are more inclined towards responding to ecological questions. However, it needs underlining that at present the vocational activity of Polish women has been the lowest for years and companies' boards are dominated by men. As many as 42% of the men who took part in the survey conducted by Millward Brown worry that if women are recruited to be members of the board, they will run serious difficulty reconciling their professional duties with those in the family (Dobosiewicz, 2018).

Method

The literature includes many studies on gender differences, however, the impact that gender have in shaping the pro-environmental and counter-ecological behaviors is stil unclear. The basic goal of the study is to examine whether there exists a dependence between the respondent's sex and their evaluation of selected counter-ecological behaviors.

The following hypothesis was formulated:

H_1: Evaluation of counter-ecological behaviors differs with respect to the employee's sex.

The research was conducted between 15 July and 15 August 2019 among students of WSB University in Opole. The first step consisted in sending out information about the realized research to students of the following majors: management, management engineering, logistics, finances and accountancy, administration and internal security. The request to fill in the Internet-based questionnaire of the survey (CAWI) was addressed to students in employment. Participation in the examination was voluntary and anonymous. The research was of the pilot character.

Characteristics of the sample

There were 342 students of WSB University in Opole who participated in the CAWI examination (262 women and 80 men), in employment, at various ages and with different lengths of employment and work experience (Table 1). Over 90% of the respondents live and work in the area of Opole Voivodship.

Table 1: Structure of the respondents due to their sex, age and work experience (n=342)

	Frequency	%
Sex		
Women	262	76.6
Men	80	23.4
Age		
18–23 years	72	21.1
24–38 years	175	51.2
39–53 years	83	24.3
54 years or older	12	3.5
Length of employment		
Up to 1 year (inclusive)	24	7.0
Over 1 year up to 5 years (inclusive)	120	35.1
Over 5 years up to 10 years (inclusive)	55	16.1
Over 10 years	143	41.8

Among the respondents there were three times more women than men. The largest number of the examined (over 50%) were students in the age group ranging between 24 and 38 years. The length of employment of nearly 60% of them was over 5 years. The above is connected with the specifics of the university, which consists in the following:

- The decisive majority of students regarding the structure of the university are women;
- The study courses on offer are dedicated to people who are professionally active, ones that are willing to reconcile studies and regular work (extramural students attend classes every second weekend, while intramural courses are run on weekdays three days a week) – 85% of the WSB University students combine studying with employment.

Results and Discussion

For the assessment of selected counter-ecological behaviors in the workplace 14 items of the survey questionnaire were used. The respondents' task was to evaluate the individual behavior on the 11-degree scale (from 0 – the behavior is not negative to 10 – I regard the behavior as very negative). It was expected that the respondents' sex could have an influence on the evaluation of individual behaviors. The results of the examination of negativism of particular types of behavior are presented in Table 2.

Table 2: How much negative do you rank the following behavior of people in your work place?

	Women		Men		Total	
	M	**SD**	**M**	**SD**	**M**	**SD**
wasting food	6.41	3.97	7.22	3.52	6.60	3.88
using more material than necessary	7.61	2.87	7.59	2.74	7.60	2.84
soiling the place of work on purpose	6.40	4.09	7.07	3.96	6.56	4.06
leaving lights on in rooms which are not used	6.49	3.54	6.96	3.14	6.61	3.45
using obsolete energy-inefficient electric bulbs	6.24	3.50	5.41	3.53	6.04	3.52
using obsolete energy-consuming appliances	6.28	3.37	5.56	3.40	6.11	3.38
overusing the stand-by mode in electronic/household appliances (instead of completely switching them off)	6.26	3.14	5.30	3.68	6.04	3.30
not segregating rubbish	7.31	3.41	6.70	3.90	7.16	3.54
burning leaves, grass, tree branches	6.46	4.20	6.22	4.18	6.40	4.19
burning rubbish	6.56	4.35	7.04	3.74	6.91	4.25
taking rubbish to the forest in order to dump it on wild landfills, pouring hazardous waste into the sewerage system	6.59	4.56	7.56	4.18	6.82	4.48
using disposable ball-pens	5.76	3.59	5.11	3.72	5.61	3.63
using plastic cutlery, styrofoam or plastic containers for food or mugs, etc.	6.15	3.70	5.80	3.58	6.07	3.67
not reporting problems or abuses connected with environment, which are noticed in the work place	6.29	3.65	6.14	3.76	6.25	3.67

where: M - mean, SD - standard deviation

In order to verify the hypothesis assuming that perception of negativism of individual types of counter-ecological behaviors in the place of work depends on sex, the single-factor variance analysis (ANOVA) was used. In the majority of cases, comparison of the results points to a lack of significant differences between the sexes. The lack of vital differences concerns such aspects as: wasting food, dirtying place of work, leaving lights on, not sorting rubbish, burning leaves, using disposable ball-pens, using disposable containers for food, not reporting problems and instances of abuse connected with environment, which are noticed in place of work. In both of the examined groups, there dominated a negative assessment of the excessive usage of materials (in the group of women: M=7.61; in the group of men: M=7.59, p=0.972). At the same time, using disposable ball-pens was evaluated the least negatively (in the group of women: M=5.76; in the group of men: M=5.11, p=0.458).

It follows from the conducted analyses that accepting the significance level to be α=0.10, statistically significant differences in the assessment of behaviors in dependence on sex concern such aspects as: using energy-inefficient electric bulbs (F=3.489; p=0.063), using energy-consuming appliances (F=2.877; p=0.091), overusing the standby mode in electronic/household appliances (F=5.397; p=0.021), burning rubbish (F=7.562; p=0.006) and dumping rubbish on wild landfills (F=2.905;

p=0.089).

It is worth noticing that 73.4% of the respondents (Table 3) were thinking about the impact of the examined negative behaviors on the environment (72.9% of the women and 75.0% of the men). Still, there were found no significant differences between the sexes in this respect (independence test, p=0.352). It seems that it is generally those workers who pay attention to the influence of anti-ecological behaviors on natural environment who can voluntarily undertake behaviors that are beneficial to the environment.

Table 3: Have you ever pondered over how the negative behaviors mentioned in the questionnaire affect the environment?

	Yes	No	It's hard to say	Total
Women	191	20	51	262
Men	60	9	11	80
Total	251	29	62	

Apart from the employees' negative behaviors mentioned in the questionnaire, the respondents notice also other actions occurring in their places of work, which have a negative impact on the environment. They include, among others, using plastic bags to pack articles in shops, burning plastic bags, excessive usage of water in the period of drought, not shutting windows when the air-conditioning is switched on.

Table 4: Who, in your opinion, is responsible in your workplace for the occurrence of behaviors that are detrimental to the environment (the organization itself; only the employee who applies negative behaviors; both the employee and the organization)?

	The organization itself	Only the worker who applies negative behaviors	Both the worker and the organization	Total
Women	12	15	234	261
Men	3	6	72	81
Total	15	21	306	

The survey revealed that 27.2% of the respondents did not ponder over the impact of the examined negative behaviors on the environment. It is still possible to note a number of instances which are an undesired heritage of the communist system ("The company has been operating in the market for over 30 years and, unfortunately, nothing is changing here.")

How to make employees (and the management) reflect on their conducts and change counter-ecological behaviors? There is a need for building a formalized system of preventing attitudes which impact the environment in a negative way (e.g., in the form of organizational procedures). The decisive majority of respondents (89.7% of the women and 88.9% of the men) were of the opinion that it is both the worker and the organization who are responsible for the occurrence of behaviors that are detrimental to the environment (Table 4). Merely 5.7% of the women and 7.4% of the men attributed the responsibility exclusively to the worker. There are no significant differences between the sexes in this respect.

Conclusion

Concluding, it needs stating that the research goal has been achieved – the question whether there exists the dependence between the respondent's sex and their assessment of selected counter-ecological behaviors has been verified. The obtained results indicate that there do not occur any significant differences between females and males regarding the examined sphere. At the same

time, it should be added that the respondents evaluated behaviors against the environment to be negative, the most frequently given grade being a 6 (on the scale between 0 and 10).

The findings of the research have implications for managers. Respondents of both sexes do notice counter-ecological behaviors in their places of work. It can be inferred from the research done by the authors that pro-environmental motivations in the companies employing the respondents have not been popularized or characteristic yet, and their actions are not consistent. Thus, the recommendation for companies to create environments that are friendly to pro-ecological activities. The pro-ecological activities at the workplace can be used in order to achieve a reduction in the negative environmental impact of companies targeted by CSR.

The results of the research contribute to understanding how to create a positive work environment. In addition, these findings can increases the effectiveness of company in planning, designing and implementing sustainability initiatives.

References

- Bourdieu, P. (2004). Męska dominacja, Warszawa: Oficyna Naukowa.
- Briscoe, M. D., Givens, J. E., Hazboun, S.,Krannich, R. S. (2019). At home, in public, and in between: gender differences in public, private and transportation pro-environmental behaviors in the US Intermountain West. *Environmental Sociology*, 1-19.
- Buhl, A.; Blazejewski, S.; Dittmer, F. (2016). The More, the Merrier: Why and How Employee-Driven Eco-Innovation Enhances Environmental and Competitive Advantage. *Sustainability*, *8*, 946.
- Campbell, J. P., & Wiernik, B. M. (2015). The modeling and assessment of work performance. *Annual Review of Organizational Psychology and Organizational Behavior*, 2, 47-74.
- Chan, H. W., Pong, V., & Tam, K. P. (2019). Cross-national variation of gender differences in environmental concern: Testing the sociocultural hindrance hypothesis. *Environment and Behavior*, *51*(1), 81-108
- Ciocirlan, C. E. (2017). Environmental workplace behaviors: Definition matters. Organization & Environment, 30(1), 51-70.
- Desrochers, J. E., Albert, G., Milfont, T. L., Kelly, B., & Arnocky, S. (2019). Does personality mediate the relationship between sex and environmentalism?. *Personality and Individual Differences*, 147, 204-213.
- Dilchert, S. (2018). Counterproductive sustainability behaviors and their relationship to personality traits. *International Journal of Selection and Assessment*, 26(1), 49–56.
- Dobosiewicz J. , Kobiety na wysokich stanowiskach. Dlaczego wciąż jest ich tak mało? https://businessinsider.com.pl/rozwoj-osobisty/kobiety-na-stanowiskach-zarzadzajacych-w-polsce/egscy8b (08.03.2018)
- El-Kassar, A.N., Yunis, M., El-Khalil, R. (2017). The Mediating Effects of Employee-Company Identification on the Relationship between Ethics, Corporate Social Responsibility, and Organizational Citizenship Behavior. *Journal of Promotion Management*, 23 (3), 419-436.
- Frostling-Henningsson M., Hedbom M., Wilandh L. (2014), Intentions to Buy "Organic" Not Manifested in Practice. *British Food Journal*, Vol. 116, No. 5, 872-887.
- Fukushima, T. (2013). The significance of CSR in A/R CDM promotion from the case study of Japan: a focus on corporate forest-related activities and emission trading. *Journal of forest research*, *18*(4), 293-304.
- Gonzalez, M., Ling, P. M., & Glantz, S. A. (2012). Planting trees without leaving home: tobacco company direct-to-consumer CSR efforts. *Tobacco Control*, *21*(3), 363–365.
- Glass, C., Cook, A., & Ingersoll, A. R. (2016). Do women leaders promote sustainability? Analyzing the effect of corporate governance composition on environmental performance. *Business Strategy and the Environment*, *25*(7), 495-511.
- Gruys, M. L., & Sackett, P. R. (2003). Investigating the dimensionality of counterproductive work behavior. I*nternational Journal of Selection and Assessment*, 11(1), 30–42.

- Hunter, L. M., Hatch, A., Johnson, A. (2004). Cross-national gender variation in environmental behaviors. *Social science quarterly*, *85*(3), 677-694.
- Jabłoński, A., Jabłoński, M., Primus, A., & Spytkowska, M. (2010). *Ekologiczna, społeczna odpowiedzialność biznesu* (Environmental Corporate Social Responsibility). Raport przedsiębiorstw i gmin odpowiedzialnych ekologicznie. Europejskie Forum Odpowiedzialności Ekologicznej, Katowice.
- Jachnis, A. (2008). *Psychologia organizacji. Kluczowe zagadnienia.* Warszawa: Difin.
- Joseph, C., Gunawan, J., Sawani, Y., Rahmat, M., Noyem, J. A., & Darus, F. (2016). A comparative study of anti-corruption practice disclosure among Malaysian and Indonesian Corporate Social Responsibility (CSR) best practice companies. *Journal of Cleaner Production*, *112*, 2896-2906.
- Kennedy, E. H., & Kmec, J. (2018). Reinterpreting the gender gap in household pro-environmental behaviour. *Environmental Sociology*, *4*(3), 299-310.
- Lee, K. (2009). Gender differences in Hong Kong adolescent consumers' green purchasing behavior. *Journal of Consumer Marketing*, 26(2), 87-96.
- Leoński, W. (2016). Ekologiczne aspekty społecznej odpowiedzialności biznesu. *Studia i Prace WNEiZ US*, (43/1), 45-53.
- Lewicka-Strzałecka, A. (2006). *Odpowiedzialność moralna w życiu gospodarczym*. Warszawa: IFiS PAN.
- MacEachern D. (2008), The Power of the Big Green Purse, *National Wildlife (World Edition)*, Vol. 46, No. 5.
- Marcus, B. & Schuler, H. (2004). Antecendents of counterproductive behavior at work: A general perspective. *Journal of Applied Psychology*, 89,. 647-660.
- Mazur-Wierzbicka, E. (2013). Ekologiczna odpowiedzialność przedsiębiorstw w ramach CSR - korzyści dla przedsiębiorców. *Research Papers of the Wroclaw University of Economics / Prace Naukowe Uniwersytetu Ekonomicznego we Wroclawiu*, (288), 106–114.
- Musick M., Wilson J. (2008), Volunteers: A Social Profile, Indiana University Press, Indianapolis.
- Nasir, V. A., & Karakaya, F. (2014). Consumer segments in organic foods market. *Journal of Consumer Marketing*, *31*(4), 263-277.
- Olejniczak, K. (2013). Wpływ wybranych czynników ekologicznego aspektu CSR na przewagę konkurencyjną przedsiębiorstw działających na terenie województwa śląskiego. *Rocznik Ochrona Środowiska*, *15*, 2840-2849.
- Olli E., Grendstad G., Wollebaek D. (2001), Correlates of Environmental Behaviors. Bringing Back Social Context. *Environment and Behavior*, 33(2), 181-208.
- Ones, D. S., & Dilchert, S. (2009). Green behaviors of workers: A taxonomy for the green economy. In S. Dilchert & D. S. Ones (Chairs). Environmentally friendly worker behaviors, senior leader wrongdoing, and national level outcomes. Symposium conducted at the annual meeting of the Academy of Management, Chicago, Illinois.
- Ones, D. S., & Dilchert, S. (2012). Employee green behaviors. In S. E. Jackson, D. S. Ones, & S. Dilchert (Eds.), Managing human resources for environmental sustainability (pp. 85–116). San Francisco, CA:Jossey-Bass/Wiley.
- Organ, D.W., Podsakoff, P.M., MacKenzie S.B. (2006). Organizational Citizenship Behavior: Its Nature, Antecedents, and Consequences. London, New Delhi: Thousand Oaks, SAGE Publications.
- Pierce, S., Negreiros, D., Cerabolini, B. E. L., Kattge, J., Díaz, S., Kleyer, M., Buffa, G. (2017). A global method for calculating plant CSR ecological strategies applied across biomes world-wide. *Functional Ecology*, 31(2), 444–457.
- Polska Norma PN-ISO 26000:2012 *Wytyczne dotyczące społecznej odpowiedzialności* została opracowana w KT 305 ds. *Społecznej odpowiedzialności* i opublikowana 5 listopada 2012 r.
- Ratalewska M. (2013). Spostrzeganie społeczne i jego znaczenie w procesie komunikacji międzyludzkiej. *Studia Ekonomiczne Regionu Łódzkiego*, 11, 159-168.
- Rončević, N., & Cvetković, K. (2016). Students' Attitudes and Behaviours in the Context of Environmental Issues. *Socijalna ekologija: časopis za ekološku misao i sociologijska istraživanja okoline*, *25*(1-2), 11-37
- Rybak, M. (2004). *Etyka menedzera-spoleczna odpowiedzialność przedsiębiorstwa*. Warszawa: PWN.

- Spector, P.E., Fox, S., Penney, L.M., Bruursema, K., Goh, A. & Kessler, S. (2006). The dimensionality of counterproductivity: Are all counterproductive behaviors created equal? *Journal of Vocational Behavior,* 68, 446-460.
- Suki N.M. (2016), Consumer Environmental Concern and Green Product Purchase in Malaysia: Structural Effects of Consumption Values. *Journal of Cleaner Production*, 132, 204-214.
- Strużycki M. (2004). *Ekologia w rozwoju i działalności handlu*, Instytut Rynku Wewnętrznego i Konsumpcji, Warszawa.
- Szeliga-Duchnowska A. (2018). Gender and counterproductive work behaviors among police officers, *Zeszyty Naukowe. Organizacja i Zarządzanie,* 116, 147-162.
- Śmiechowski, K., & Marzanna Lament. (2017). Impact of Corporate Social Responsibility (CSR) reporting on pro-ecological actions of tanneries. *Journal of Cleaner Production*, 161, 991–999.
- Tindall, D. B., Davies, S., & Mauboules, C. (2003). Activism and conservation behavior in an environmental movement: The contradictory effects of gender. *Society & Natural Resources*, *16*(10), 909-932
- Trevino, L.K., Weaver, G. & Reynolds, S. J. (2006). Behavioral Ethics in Organizations A Review. Journal of Management. Vol. 32. p. 951-990.
- Unanue, W., Vignoles, V. L., Dittmar, H., & Vansteenkiste, M. (2016). Life goals predict environmental behavior: Cross-cultural and longitudinal evidence. *Journal of Environmental Psychology*, *46*, 10-22.
- Valcárcel, M., & Lucena, R. (2014). A quantitative model to assess Social Responsibility in Environmental Science and Technology. *The Science Of The Total Environment*, *466–467*, 40–46.
- Vicente-Molina, M. A., Fernández-Sainz, A., Izagirre-Olaizola, J. (2018). Does gender make a difference in pro-environmental behavior? The case of the Basque Country University students. *Journal of Cleaner Production*, *176*, 89-98
- Viswesvaran, C., & Ones, D. S. (2000). Perspectives on models of job performance. *International Journal of Selection and Assessment*, 8(4), 216–226.
- Wiernik, B. M., Ones, D. S., Dilchert, S., Hill, L., D'mello, S., & Klein, R. M. (2010). Understanding environmentally unfriendly behaviors of employees. In A. Sanders and A. Huffman (Chairs), Earth and I/O: Implications for a sustainable workforce. Symposium conducted at the annual conference of the Society for Industrial and Organizational Psychology, Atlanta, Georgia.
- Xiao, C., & McCright, A. M. (2012). Explaining gender differences in concern about environmental problems in the United States. *Society & Natural Resources*, *25*(11), 1067-1084.
- Zelezny L.C., Chua P.-P., Aldrich C. (2000), Elaborating on Gender Differences in Environmentalism. *Journal of Social Issues,* Vol. 56, No. 3, 443-458.

The Directions of Development of Public Electronic Services in Poland In Times of Demographic Crisis

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Abstract

The demographic crisis is a problem faced by the authorities of all EU countries and a number of countries in the world. Therefore, in many spheres of social and economic life it is necessary to implement innovative solutions and services supporting the functioning and development of ageing societies and responding to ever newer needs and expectations. In recent years, new technologies and the spread of the Internet have played a major role in the modernisation of services. It seems interesting to see how the rapidly developing computerisation helps modern communities to function. The aim of the article is to present public e-services in Poland that help to combat the demographic crisis. Special analyses were given to e-services in the area of social security, including social insurance, health insurance and family policy.

Keywords: Public E-Services, Public Administration, Ageing Society.

Introduction

Nowadays, one of the most important challenges facing communities and governments is population ageing. Even in countries where fertility rates in recent years were still at a level indicating generation renewal, the latest survey results show very worrying trends[1] [Papon, Beaumel, 2019]. The growing awareness of the negative effects of this phenomenon has led to the initiation of measures aimed at their reduction. The results of social diagnoses and forecasts, as well as objectives and guidelines for action, contained in numerous strategy papers and plans developed at all levels of governance, from international to local, are used as the reference point for combating the demographic crisis. The analysis of numerous strategy papers, normative acts or social policy programmes of an international character clearly shows that they are currently very focused on family, pro-natalist or senior citizen policies.

In pursuing individual policies, at the national level, the states (including Poland) implement specific solutions in accordance with the prevailing models of social policy. First of all, changes aimed at increasing the birth rate are introduced, including in particular financial benefits for children and youth, development of care and educational services, changes in social insurance are implemented, or legal provisions supporting work-life balance are modified. Secondly, states' authorities implement changes in the pension, health care and social assistance systems. There are more and more services aimed at seniors. The solutions implemented in the countries are diverse, depending, among other things, on the needs of specific communities and largely depend on financial possibilities. These services are usually provided by local authorities and central government. Third sector organisations and the economic sector also play a significant role.

[1] In France, where over the years fertility rates have been among the highest in the EU, the National Statistics Institute – INSEE published a report in January 2020 which shows that statistically there are 1.87 children per woman on average and families with children are already a minority among couples living together (45%).

In order to meet social expectations, public authorities try to take advantage of the development of modern information technologies and offer newer and newer e-services, understood in this study as activities undertaken by public entities which consist in enabling citizens to fulfil a specific obligation or entitlement by means of electronic communication at a distance without the simultaneous presence of the parties. Although e-services are usually managed centrally, citizens often use them via platforms and websites of lower-tier territorial units, which are competently responsible for the provision of certain services, as well as of other entities, for example banks offering in Poland services such as setting up a trusted profile or submitting a child benefit declaration. It is also common practice to use national platforms with the identification of entities responsible for the implementation of a specific e-service at lower levels, as exemplified by child benefit declarations under the 500+ or "Good Start" programme – the latter is designed to partially cover the costs of purchasing school kits for children before the start of the school year. Benefits are usually paid by the lowest local government units in Poland – municipalities.

The aim of the article is to show the development of e-services in public administration in Poland, with particular emphasis on services helping to combat the demographic crisis, and to indicate recommendations that will be helpful in creating new solutions in this direction. The article presents mainly e-services addressed to young families, in the first stages of their development, and to seniors.

Numerous research methods were used in the study. First of all, the method of analysis of statistical data, legal acts, documents available on the websites of both government and self-government administration, as well as data obtained from other sources, e.g. Statistics Poland data, reports from public opinion polls, etc. The descriptive and comparative method allowing to achieve the objective and draw conclusions was also used.

Entities Responsible for Providing Public Services And E-Services in Poland

Socio-economic and technological development, observed for several decades now, has led to reforms in many countries, which consisted in a serious systemic and administrative reorganisation. In Central and Eastern European countries in particular excessive centralisation of power prevented verification of community needs and provision of adequate and tailored public services [Terzoli, Siebörger, Tsietsi, Gumbo, 2018, p. 85-98].

In Poland, as a result of natural evolution, progress and the changing needs and requirements of the population, the Act on the Introduction of the Basic Three-Tier Territorial Division of the State was implemented in 1998 [Act of 24 July 1998]. As part of the decentralisation processes local government units received new powers, including those relating to the provision of public services, understood as a whole range of services that are performed within the framework of the state's activities in various fields, for the benefit of all its citizens.

Currently in Poland, the state, at the central level, divides individual tasks in the structure of successive tiers of local government units [Lindgren, Jansson, 2013, p.163-172]. Such a division gives the local government a large scale of independence in deciding on the scope, type or financing of a given measure. The basic level of public administration dealing with the provision of public services is the municipal self-government, whose task is to satisfy the collective needs of the community, in particular in the field of health care, education, culture, physical culture, social assistance, municipal housing, municipal roads, streets, bridges, squares and traffic organizations, local public transport, waterworks and water supply, sewage system, removal and treatment of municipal sewage, maintenance of cleanliness and order and sanitary facilities, dumps and disposal of municipal waste, communal cemeteries, supply of electricity, heat and gas, communal greenery and trees, land management, environmental protection, public order and fire protection [Act of 8 March 1990]. A similar, albeit slightly smaller scope of activities and competencies, and with the reservation that it concerns tasks of a supra-municipal nature, is at the disposal of the county self-government [Act of 5 June 1998]. The province self-government, on the other hand, performs regional tasks, in particular in the scope of supporting the development of science and activities aimed at raising the level of education of citizens, public education, including higher education, health promotion and

protection, supporting the development of culture and the protection and proper use of cultural heritage, social assistance, pro-family policy, physical culture, tourism, maintenance and development of social and technical infrastructure, including public roads and collective transport, water management equipment and public safety [Act of 5 June 1998]. A special role in the provision of public services falls to the state, which plays a triple role – regulator of service activities, direct organizer and an entity offering public services.

The new division of competences and responsibilities has had a positive impact on state management, brought budget savings, and, what is very important, has significantly increased social activity and mobilised society to become more active for the common good than before. The citizens began to express their needs and expectations more actively, and the primary point of contact between the citizen and the state turned out to be the lowest-tier, and at the same time closest to the problems of the citizens, local government units – municipalities, which to this day are responsible for providing most services. In addition, the development of various forms of participatory democracy [see: Ronchi, 2019, p. 59-68] and a significantly greater influence on the development of one's own communities and solving given, often specific problems, are of great importance in shaping public [see: Golubeva, Gilenko, 2019, p. 249 – 264] services tailored to the needs of communities. On the one hand, new opportunities for citizens' participation have forced changes in the tools used, on the other hand, the development of new technologies has increased the need and opportunities for citizens to participate in public life [see: Zheng, Holzer 2019, p. 211-227]. For example, in Poland, when developing strategy papers of local government units, consultations with residents are carried out. In addition to classic debates, panel discussions, meetings, community members discuss using new information technologies. Contemporary, although still crawling, e-participation is not only about casting a vote on-line or participating in a survey. These are also Internet forums, blogs and, above all, discussions in social media. Providing the citizens with a greater opportunity to participate in the performance of certain functions, thanks to, among others, the development of e-administration [Weerakkody, Reddick, 2013; Weerakkody 2012], has led not only to the participation of the inhabitants or better diagnosis of the existing situation in the region, but also to more precise and reliable response to citizens' needs. Although not all local government units use new media, a clear, positive trend is already visible and should be further supported.

The Ministry of Digitalisation, whose mission is to "create a digital impulse for the development of Poland", is responsible for supporting the creation of Internet content and e-services, development of broadband infrastructure and promotion of digital competences among citizens and officials. Legal acts which in any way affect the area of computerisation, before being referred to the Council of Ministers, have been verified by the Committee of the Council of Ministers for Digitisation (KRMC) since 2012. Earlier, since 2007, this body existed under the name of the Committee of the Council of Ministers for Computerisation and Communications. This body is composed of undersecretaries of state of individual ministries and representatives of central offices. The aim of the body is to coordinate the computerisation policy by verifying legal acts as well as issuing recommendations in the area of computerisation. In Poland there is also the Joint Commission of Government and Local Government (KWRiST), which is the most important forum for cooperation between the central and local government administration. Permanent teams dealing with specific thematic areas operate within KWRiST. The Information Society Team is responsible for matters related to computerisation. It proposes and consults legal, organisational and technical solutions in the area of e-government addressed to local governments and develops good practices. The consultative and advisory body of the minister in charge of computerisation is the Council for Digitisation, appointed for a two-year term of office. As regards the distribution of EU funds for computerisation, two bodies are of key importance – the POPC and the Regional Operational Programme Monitoring Committee. The Monitoring Committee shall act as an independent advisory and consultant body. It is appointed by the Managing Authority of the Operational Programme Digital Poland. It is composed of representatives of the government, local government and organisations from outside the administration, in particular scientists, social and economic partners and non-governmental organisations. The meetings of the Monitoring Committee may be attended by representatives of other institutions, including the European Commission, as observers [www.gov.pl; www.archiwum.mc.gov.pl].

Development of E-Services in Public Administration in Poland

In Poland, the development and use of information and communication technologies by citizens, both in individual households and among enterprises, is observed year to year. The latest survey conducted by the Statistics Poland [Information and communication technologies usage in public administration units, enterprises and households in 2019][2] shows that in 2019 there was at least one computer in 83.1% of households with at least one person aged 16–74. This indicator is growing steadily year by year, but its rate is slower every year. In relation to 2018, it increased by less than 0.4%. In 2019, as many as 86.7% of households had access to the Internet, while in the year 2018 – 84.2%. Broadband Internet had 83.3% in 2019 and 79.3% in 2018.

Both the access to the Internet and the type of Internet connections varied and depended to a large extent on the type of household, place of residence and degree of urbanisation. Households with children were more likely to have access to the Internet; the percentage of households with Internet access was higher in cities than in rural areas, and taking into account the degree of urbanisation, most people used it in highly urbanised areas. The reasons for not having the Internet have remained virtually unchanged for several years now. The main reason is the lack of need to use it and the lack of skills. Too high equipment costs and access fees are indicated less and less often as the reason for not having the Internet [see: Manoharan, Holzer, 2012].

The computerisation of the Polish society is also evidenced by the data on the use of new technologies by enterprises. The percentage of companies using ICT security measures, including technologies that process, collect and transmit information in electronic form, was 87.2% in 2019. Almost half of the entities surveyed had practices aimed at raising staff awareness of ICT security issues. A smaller percentage of companies used paid cloud services. In 2019 it amounted to 17.5%, but compared to 2018, a significant increase is observed – by as much as 6%. Among cloud computing services, the most popular were e-mail services, used by 12.9% of enterprises. Robots were used by 7.5% of enterprises, including industrial robots – 5.7% and service robots – 2.9%. The highest percentage of companies using robots was recorded among large entities – 28.4%. The interest of these companies focused mainly on industrial robots (25.3%) and less frequently on service robots (8.1%) [Information and communication technologies usage in households in 2019 – Part 2].

Analysing the results of the surveys, it is clear that the percentage of people shopping online in Poland is also growing year on year. In 2019 this indicator amounted to 53.9% among people aged 16-74. It should be noted, however, that this form of shopping is more popular – by 9.7% – among urban residents compared to rural ones.

For many years now, public administration units in Poland have been making numerous efforts to ensure that as many official matters as possible can be handled over the Internet, without personal contact, which is beneficial to such units themselves, as well as the citizens. In 2018 as many as 96.6% of public administration units offered electronic services to citizens, and among them the largest number of entities provided e-services in the area of civic affairs (81.9%). Access to services via the Internet was made possible by all Marshal Offices. In 2018, 72.2% of local government units – and among them 75.1% of municipal offices – declared access to the Internet through a DSL connection. On the other hand, central government units preferred access to the global network through other fixed broadband connections – 91.1%, and all of them provided employees with remote access to unit resources. Today, mobile technologies are becoming increasingly important. In 2018, this type of access was declared by 70.5% of Polish offices. It is also interesting that in 2018 almost 75% of public administration units employed ICT specialists [Information and communication technologies usage in public administration units in 2018].

[2] The survey covered: as regards enterprises-entities with at least 10 persons employed; as regards households-households with at least one person aged 16-74 and persons of this age, except for persons living in collective households; as regards public administration units-state and local government administration bodies.

In 2019 Poland, people that used public administration services via the Internet in the last 12 months accounted for 40.4 percent of the population aged 16-74. In the last 12 months this percentage has increased by 4.9%. Recently, the group of people who use the option of downloading forms and returning completed ones has been growing every year. In 2019, the percentage of persons downloading forms increased by 2.5 p.p. per year, and of those sending them by 6.8 p.p. per year.

Table 1: Use of e-services in public administration in Poland in 2019.

	Total in %	**Age in years**			**Gender**		**Education**			**Professional status**		**Place of residence**	
		16-24	25-54	55-74	women	men	primary	secondary	higher	active	inactive	city	village
People using the Internet in the last 12 months	82.1	99.6	93.5	55.1	81.5	82.6	64.4	78.7	98.4	91.7	64.7	86.2	75.8
People using public administration services via the Internet in the last 12 months	40.4	29.8	53.3	21.4	41.3	39.6	9.0	32.0	75.6	52.0	19.6	46.6	31.1
- to search for information on public administration websites	24.9	20.3	32.7	12.6	25.4	24.3	5.6	18.7	48.7	31.9	12.2	28.8	18.8
- to download official forms	24.6	16.9	33.8	11.1	24.8	24.4	3.5	17.2	52.4	32.6	10.1	28.7	18.4
- to send out completed forms, including to send tax returns	31.4 27.5	20.8 14.9	42.6 38.0	15.2 13.5	32.0 28.1	30.8 26.9	4.9 3.3	23.2 20.4	63.5 56.0	41.9 37.3	12.4 9.8	37.0 32.7	22.9 19.7
People not using public administration services via the Internet in the last 12 months	41.6	69.8	40.2	33.7	40.2	43.1	55.4	46.7	22.8	39.7	45.1	39.6	44.7

Source: Own study based on: Information and communication technologies usage in households in 2019 – Part 2.

The table 1. clearly shows some important conclusions. Today, the Internet is used by almost all people aged 16-24. It is interesting that in this age group less than 20% use public administration e-services, but as many as 59% do not need to send official forms in general, which may partially justify such a surprising result of the survey. The situation is different among people aged 35-54, where the percentage of people using public e-services is 53.3%. In this age group, 20.1% of respondents declared no need to send official forms. Significant differences in the use of public e-services also occur depending on the place of residence, education or professional status. E-services are used by 46.6% of people living in cities and only 31.1% of people living in villages. People with primary, lower secondary and vocational education use e-services much less frequently (only 9%), while among people with higher education the number reaches 75.6%. Also professionally active people are more likely to use technological facilities – 52%. Among the professionally inactive, only less than one in five use public e-services [Information and communication technologies usage in households in 2019 – Part 2].

E-services Supporting the Functioning and Development of Ageing Societies

Ageing societies have specific needs and problems. In Poland, the duties of public administration include securing expectations and solving social issues. Supporting functions are performed by non-profit organisations, the economic sector and very dynamically developing social economy entities. In recent years, changes can be seen that are aimed at combating the demographic crisis [Sukkird, Shirahada, 2018, p. 214-232]. Financial benefits for children are introduced, the pension system is modified, additional benefits for seniors are provided and laws are amended, in particular those relating to the combination of professional and private life [see: Szczudlińska-Kanoś, 2019]. These changes do not always fully meet the initial objectives, and the costs they generate are a cause for disputes when making changes. While there are still ongoing discussions on the legitimacy and effectiveness of solutions implemented to combat the demographic crisis, the development of public e-services supporting the functioning of an ageing society does not raise such controversies. Modern public services, through the use of the Internet, are being welcomed by an increasing percentage of citizens; these services include in particular: Electronic Platform of Public Administration Services (ePUAP), Electronic Services Platform of the Social Insurance Institution (PUE ZUS), obywatel.gov.pl website, biznes.gov.pl website. Currently, the Portal of the Republic of Poland (Portal RP) – gov.pl is being created, which is to be the basis for all public information and e-services. Work is underway to integrate the websites of ministries and central and voivodeship offices offering digital services to citizens. Currently, public e-services can be used by people who are able to confirm their identity on the Internet, i.a. by means of a trusted profile, a tool which acts as an electronic signature in communication with public administration [Regulation of the Minister of Digitization, 2018]. The trusted profile was established in 2011, and by 2016 it was used by mere 400 thousand people, the vast majority of whom were officials. At the beginning of 2020 more than 4.7 million Poles had a trusted profile, of which more than 2.1 million created it in 2019 [*Oh, what a year it was,* 2019].

In Poland, the catalogue of e-services [see: Goldkuhl, Röstlinger, 2010] that support the functioning of an ageing society has grown significantly in recent years. Table 2 presents selected public administration e-services available in Poland. It includes those that have the greatest impact on the quality of life of the elderly and families, especially those with children. It should be emphasised, however, that e-services which enable checking one's own data in the Register of Identity Cards, confirming identity with a smartphone (mObywatel application), checking if an identity card is invalidated or suspended, confirming student/pupil status, confirming data submitted to the Register of Contact Data (RDK), checking passport readiness status, checking one's own data in the PESEL register, submitting documents for issuing a driving license, settling taxes or receiving individual tax interpretations are also very popular.

Table 2: E-services in Poland supporting the functioning and development of ageing societies

	E-services
Social security	• Electronic Services Platform of the Social Insurance Institution; • Pension – information portal, retirement age calculator; • Submitting applications for 500+ for senior citizens and disabled people;
Health	• e-prescription; list of unrealized prescriptions in the smartphone (mObywatel application); • e-referral; • Patient's Internet Account (IKP); • Patient's Integrated Guide – service information; • Medicines directory – information portal; • The Disabled – information portal; • Ecoportal – health and environmental information portal;

Family	• Family – information portal; • Reporting the birth of a child; • Obtaining copies of civil-status certificates (birth, marriage, death); • Submitting the "500+" programme applications – child benefit for each child up to the age of 18, regardless of the income earned by the family; • Submitting the "Good Start" programme applications – 300 PLN for a child who starts a new school year; • Submitting the "Big Family Card" applications – a system of discounts and allowances on goods and services for families with three or more children.
Documents	• Obtaining one's own identity card or the identity card of a child or person under one's care; • Reporting or withdrawing the suspension of one's own, child's or another person's identity card; • Reporting the loss of or damage to one's own identity card, the identity card of a child or of a person under one's care; • Reporting the invalidation of one's own identity card, the identity card of a child or of a person under one's care; • Reporting unauthorised use of one's own personal data or that of a child or a person under one's care;

Source: Own study based on: https://www.gov.pl/web/gov/uslugi-dla-obywatela, access: 14/01/2020.

Noteworthy is the latest data published by the Ministry of Digitization, which shows that in 2019 the service introduced in June 2018 – reporting the birth of a child – proved to be particularly popular. By the beginning of 2020, over 45,000 births had been reported. This is a great convenience for parents, as the law requires that the birth of a child be reported within 21 days of the certificate of live birth being issued. The certificate of live birth is issued by an authorised person who has received the delivery – a doctor or a midwife – and, at the latest three days after its issue, it shall be forwarded to the Registry Office. The service enabling address registration or deregistration was also very popular. In 2019, Poles used it over 60 thousand times. Applications submitted online in the 500+ and "Good Start" programmes are also very popular. After the modifications of the 500+ programme, when, from July 2019, all children up to 18 years old regardless of the family income are entitled to the benefit, only during the first week as many as 38.8 percent of eligible families submitted online applications. It was noted that in 2019 there was 7.5 times more interest in applying for 500+ online in the first week of the programme for the new period than in 2018 [www.tvn24bis.pl].

Summary

In recent years, Poland has seen significant development of digital technology, also in the public sector. The need to function more effectively in order to properly perform the assumed tasks and objectives has often forced public administration to computerise many processes and services. The study pays particular attention to services that are most desirable for ageing societies. The implementation of new solutions in the fight against the demographic crisis has entailed some changes, including technological ones. It is clear from the analyses presented above that numerous positive modifications have already taken place in the area of computerisation of public services in Poland; a number of improvements have been introduced, but it should be noted that still a public e-service is identified with a form, application or document that can be sent via the Internet. So this is the first stage in the implementation of the so-called front-office public service. The further process – the actual e-service should take place at the middle-office and back-office level, where services should be combined into packages. It would be advisable that one application for a specific random event should be used to deal with multiple issues. For example, reporting the birth of a child could result in obtaining a birth certificate, giving an individual PESEL number, obtaining benefits for the birth and upbringing of a child, notification to a medical clinic. Only those e-services that meet citizens' expectations will be useful and appreciated in the future. They need to be simplified as much as possible, especially in times of the demographic crisis, when they will be used by increasingly older populations. Therefore, the use of process management methods and techniques is inevitable

when creating e-services, as a precise process analysis of a service allows, among other things, to verify and evaluate subsequent component activities, and to improve them.

References

- Act of 8 March 1990 on Municipal Self-Government, Journal of Laws 2001, No.142, item 1591 as amended.

- Act of 24 July 1998 on the Introduction of the Basic Three-Tier Territorial Division of the State. Journal of Laws 1998, No.96, item 603 as amended.

- Act of 5 June 1998 on County Self-Government, Journal of Laws 1998, No.91, item 578 as amended.

- Act of 5 June 1998 on Province Self-Government, Journal of Laws 1998, No.91, item 576 as amended.

- Goldkuhl G., A. Röstlinger (2010), 'Development of public e-services - a method outline', The 7th Scandinavian Workshop on E-Government (SWEG-2010),

- Golubeva A., E. V. Gilenko (2019) 'Creating public value through public e-services development: the case of landscaping and public amenities in St. Petersburg' [in:] A. Chugunov, Y. Misnikov, E. Roshchin, D. Trutnevs, 'Electronic governance and open society: challenges in Eurasia', Springer, St. Petersburg, Leeds, 249-264.

- Lindgren I., G. Jansson, (2013) 'Electronic services in the public sector: A conceptual Framework', *Government Information Quarterly*, 30 (2) 163-172.

- Manoharan A., M. Holzer (eds.), 'E-governance and civic engagement: factors and determinants of e-democracy', Information Science Reference, USA 2012.

- 'Oh, what a year it was... E-service summary of 2019!', [Ach, co to był za rok… E-usługowe podsumowanie 2019!] https://www.gov.pl/web/cyfryzacja/ach-co-to-byl-za-rok-e-uslugowe-podsumowanie-2019, access: 16/01/2020.

- Papon S., Beaumel C. (division Enquêtes et études démographiques, Insee), 'Bilan démographique 2019 La fécondité se stabilise en France', https://www.insee.fr/fr/statistiques/4281618, access: 17/01/2020.

- Ronchi A. M. (2019), 'E-services. Toward a new model of (inter)active community', Springer Nature Switzerland 59-68.

- Regulation of the Minister of Digitization of 10 September 2018 on the Trusted Profile and Trusted Signature (Journal of Laws of 2018, item 1760).

- Sukkird V., K. Shirahada, (2018) 'E- Health service model for Asian developing countries: A case of Emergency Medical Service for elderly people in Thailand', [in:] M. Khosrow-Pour (ed.), 'Optimizing current practices in e-services and mobile applications', Business Science Reference, IGI Global, USA, 214-232.

- Szczudlińska-Kanoś A. (2019), 'Polityka rodzinna w okresie przemian. Kontekst krajowy i międzynarodowy' [Family policy in the transition period. National and international context], Studia i Monografie Instytutu Spraw Publicznych Uniwersytetu Jagiellońskiego [Monographs and Studies of the Institute of Public Affairs of the Jagiellonian University], Kraków.

- Terzoli A., I. Siebörger, M. Tsietsi, S. Gumbo, (2018), 'Digital Inclusion: A model for e – infrastructure and e-services in developing countries' [in:] V. Odumuyiwa, O. Adegboyega, Ch. Uwadia (ed.), 'E-infrastructure and e-services for developing countries', 9th International Conference, AFRICOMM 2017, Lagos, Nigeria, Proceedings, Springer, 2018, 85-98.

- Weerakkody V. (ed.), (2012) 'Technology enabled transformation of the public sector: advances in e-government', Information Science Reference, USA

- Weerakkody V., Ch. G. Reddick (ed.) (2013) 'Public sector transformation through e-government: experiences from Europe and North America', Routledge, New York, London.

- 'Information and communication technologies usage in public administration units in 2018', [Wykorzystanie technologii informacyjno-komunikacyjnych w jednostkach administracji publicznej w 2018 r.] www.stat.gov.pl, access: 19/10/2020.

- 'Information and communication technologies usage in households in 2019 – Part 2' [Wykorzystanie technologii informacyjno-komunikacyjnych w gospodarstwach domowych w 2019 roku - część 2], https://stat.gov.pl/obszary-tematyczne/nauka-i-technika-spoleczenstwo-informacyjne/spoleczenstwo-informacyjne/wykorzystanie-technologii-informacyjno-komunikacyjnych-w-jednostkach-administracji-publicznej-przedsiebiorstwach-i-gospodarstwach-domowych-w-2019-roku,3,18.html, access: 18/01/2020.

- **'**Information and communication technologies usage in public administration units, enterprises and households in 2019**'**, **[**Wykorzystanie technologii informacyjno-komunikacyjnych w jednostkach administracji publicznej, przedsiębiorstwach i gospodarstwach domowych w 2019 roku**]** https://stat.gov.pl/obszary-tematyczne/nauka-i-technika-spoleczenstwo-informacyjne/spoleczenstwo-informacyjne/wykorzystanie-technologii-informacyjno-komunikacyjnych-w-jednostkach-administracji-publicznej-przedsiebiorstwach-i-gospodarstwach-domowych-w-2019-roku,3,18.html, access: 18/01/2020.

- Zheng Y., M. Holzer (2019) 'Explaining the diffusion of e-services and e-participation at the municipal level: a study in New Jersey**'** [in:] M. Holzer, M. Zhang, Wei Hu, **'**Administrative system innovation and building a public service-oriented government**'**, Cambridge Scholars Publishing, UK, 211-227.

- http://archiwum.mc.gov.pl/en/the-areas-of-our-activity, access: 15/01/2020.

- https://www.gov.pl/web/cyfryzacja/e-uslugi, access: 15/01/2020.

- https://tvn24bis.pl/z-kraju,74/500-plus-na-pierwsze-dziecko-ile-rodzin-zlozylo-wnioski-w-pierwszym-tygodniu-lipca,951698.html, access: 20/01/2020.

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Management of family policy instruments aimed at balancing work and private life - example of Poland

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Abstract

At a time of ubiquitous demographic crisis, family policy issues are becoming increasingly important. The end of the single breadwinner family era and changes in family models have made it necessary to implement instruments that will help to reconcile household duties and professional life. The diversity and multiple dimensions of activities in this area require proper management. The aim of the article is to present both the existing instruments and those that are in the process of being initiated, aimed at achieving a balance between professional and family life in Poland and to indicate the main problems in managing them.

Keywords: Public Management, Family Policy, Life Balance

Introduction

The demographic and economic changes in the family model, which have been observed for several decades now, not only in Poland, but in most countries in Europe and around the world, determine the directions of changes in family policy. The roles of individual family members are changing, as are their needs and expectations. As a result, new challenges are emerging for public authorities and modern family policy, requiring a series of measures and decisions, which in turn are implemented using specific instruments. These measures must be properly coordinated and managed. Their execution is the responsibility of the entities in power, including the legislative authorities, and their implementation is usually entrusted to public administration bodies at central and local government level. In a situation where there is a lack of proper management in the area of family policy and the state's actions for families constitute only a set of various solutions supporting families, it is obvious that reversing unfavourable demographic trends and facing new problems becomes impossible. This is particularly unfavourable in countries where there is no coherent strategy, long-term planning in this area and where responsibility for family policy lies with numerous institutions, supervised by different bodies, between which there is no uniformity of objectives and expenditure for specific tasks. In other words, public management in the area of family policy is not carried out properly.

Today, unfavourable demographic changes, combined with more difficult access to resources, cause a number of other problems that arise, among others, in public finances, pension systems, health systems and the labour market. In order to meet the challenges, thoughtful action is needed on a number of fronts, aimed in particular at increasing fertility rate in the long run. However, procreation decisions are determined by a number of factors, which include, in particular, the financial situation of families, having their own home/flat, the stability of employment and the access to services necessary to raise a child. It is therefore extremely important to implement legal, organisational or technological instruments and solutions which could support the balancing of work and private life and facilitate raising children.

The aim of the article is to present the existing instruments, but also those that are in the process of initiation, aimed at achieving work-life balance in Poland, to indicate the main problems in managing them and possible solutions. The article uses mainly descriptive and comparative methods. Moreover, numerous statistical data, reports, results of inspections of public institutions were analysed, allowing to achieve the objective and draw conclusions. The study can be of particular interest to theoreticians and practitioners in the field of public management, public policies and can inspire professionals in

the technology sector to create tools supporting remote work that is desired by employees and indicated by them as an aid to achieving a “life balance”.

Strategic documents and legal acts of international and domestic character regulating family policy in Poland

The implementation of tasks within the framework of specific public policies, including family policy in the European Union countries, takes place taking into account the general objectives, outlined in strategy papers functioning at different levels – from international to local – and respecting basic rules, principles, methods and tools of public management [see: Yang, Huang, 2020].

Family policies, depending on the model that has evolved over the last decades and depending on traditions, needs, financial resources, social approach as well as the expectations of families, are conducted in various ways [see: Eydal, Rostgaard, 2018]. Within the European Union, family policy and the management of its instruments are left to the Member States, with significant support of EU legislation [see: I. E. Kotowska, 2010, p. 59-78.]. The countries belonging to the European Community must therefore comply with the general guidelines contained in the strategy papers. Community regulations have been included in the Lisbon Strategy, the Europe 2020 Strategy as well as in numerous directives and communications. In particular, the provisions of the Europe 2020 Strategy in the section on social inclusion emphasize the need to act for the benefit of family and children in such areas as education and health care. On the other hand, in connection with the efforts to ensure the stability and competitiveness of the economy, there are also demands for active labour market policies, including those related to ensuring work-life balance and conditions allowing participation of both parents in the labour market. Issues concerning the functioning of the family and its members have also appeared in documents aimed at implementing the UN Agenda for Sustainable Development 2030 [Sustainable Europe 2030].

From the point of view of the subject matter of the study, it is important that on June 13, 2019, the European Union countries adopted the Directive on work-life balance for parents and carers [Directive (EU) 2019/1158], and the Member States have 3 years to implement the legislation. The Directive aims to increase women's participation in the labour market by, among others, providing parental leave for fathers, which will give them the opportunity to bond with their children and to become more involved in caring for children after their birth. The assumption is that women will not be burdened with so much unpaid work and will therefore theoretically gain more time for paid employment. This is also intended to help reduce the gender pay gap. The Directive applies to all workers with both employment contracts and other employment relationships, including part-time employment contracts or employment relationships. In addition, the regulations also apply to fixed-term employees, persons employed under a contract with a temporary employment agency or having an employment relationship with such an agency. The current Directive provides for an individual right to four months of parental leave, two of which will not be transferable to the other parent. If the father decides not to exercise this right, the unused leave is forfeited. The Directive aims to harmonise the work-life balance standards in all Member States and stipulates that each country must provide for at least four months of parental leave which can be taken by both mother and father. An additional support in the implementation of the objective of equal opportunities for women and men in the labour market is the implementation of regulations concerning paternity leave. According to the regulations, it is to be at least 10 working days during the period of the birth of the child and it is to be paid at least the amount of national sickness benefit. Another novelty in the “life-balance” directive is the introduction of care leave, the main purpose of which is to facilitate labour market participation for men and women with caring responsibilities. Such leave shall be a minimum of five working days throughout the year, but Member States may decide whether it may be taken in parts, depending on the specific case.

There are many legal acts in Poland which regulate issues related to family policy in its broadest sense. The multiplicity and diversity of definitions of the concept of family itself[1], or family policy, needs to be clarified each time. This article assumes that a family is "two or more persons who are bound together as husband and wife, as jointly living partners (cohabitants) – persons of the opposite sex or – as parent and child" [Households and Families, Demographic Characteristics, p. 21]. Family policy, on the other hand, is considered from a broader perspective and defined as actions taken by the state also in areas not directly related to the family, but which have an indirect impact on its functioning. Instruments that facilitate balancing of work and private life are further regulated by other legislation, including in particular those relating to social security and employment issues [Act of 13 October 1998; Act of 25 June 1999; Act of 26 June 1974].

Among Polish strategy papers, the *Długookresowa Strategia Rozwoju Kraju. Polska 2030. Trzecia fala nowoczesności* [*Long-term National Development Strategy Poland 2030. The third wave of modernity*] deserves attention [Resolution No. 16 of the Council of Ministers of 5 February 2013]. The document assumes an increase in the fertility rate to 1.70 in 2030. In 2018 it amounted to 1.435, in 2017 to 1.453, while in 2016 the rate measuring the average number of children per woman was 1.357 [Population. Size and structure and vital statistics in Poland by territorial division in 2018]. This rate is unsatisfactory, as it is assumed that its value must fall between 2.10 and 2.15 to guarantee simple generation renewal. In *the Long-term National Development Strategy*, the directions of intervention were identified, related to, among others, providing real support for families, large ones in particular, and promoting fertility through reducing costs related to care and upbringing of children, especially those resulting from combining professional career with family life. In this area it is proposed to introduce a number of new organisational and legal solutions and to enable their widest possible use. They include in particular the development of flexible forms of organized child care services of various duration, the development of home care and schooling, the development of multifunctional facilities providing multilateral services to young children and their parents, the development of care services for several families and institutional care services for children under 3 years of age. Reducing costs associated with childcare consists also in improving the availability and quality of care and educational services for children in kindergartens and schools, as well as the use of financial instruments to promote professional activity, inter alia in the tax and family benefits systems [Long-term National Development Strategy Poland 2030, 2013]. Importantly, from a management point of view, these elements are not linked to specific implementation actions, either in this strategy or in the medium term strategies [Coordination of family policy in Poland, 2015].

Issues related to family policy and instruments supporting life balance are also reflected in regional voivodeship development strategies, regional social policy strategies, and strategies developed at the local level, such as social problem solving strategies. Legal regulations clearly define which strategy papers are to be created and implemented in local government units [see: Szczudlińska-Kanoś, Peter – Bombik, 2016a, 2016b]. However, there are many imperfections in these strategies. The errors concern the diagnosis of problems that are specific and characteristic of particular communities. There is also a specific selectivity and focus on certain categories of families, while ignoring and skipping the problems of other categories. Some imperfections, related, among others, to the selection of indicators of achievement of objectives, which are not always practical, are also worth noting. Moreover, it happens that during the course of the strategy, mainly due to changes in the needs and requirements related to social and economic development of communities, new papers are created. Previous objectives and targets remain unrealized. It is also impossible to evaluate them. Although in

[1] The most important Polish legal acts relating to the notion of the family are the following: Constitution of the Republic of Poland of 2 April 1997, Journal of Laws of 1997, No. 78, item 483, as amended; Act of 25 February 1964 – Family and Guardianship Code, Journal of Laws of 1964, No. 9, item 59, as amended; Act of 23 April 1964 – Civil Journal of Laws of 1964, No. 16, item 93, as amended; Act of 17 November 1964 – Code of Civil Procedure, Journal of Laws of 1964, No. 43, item 296, as amended; Act of 28 November 2003 on Family Benefits, Journal of Laws of 2003, No. 228, item 2255, as amended; Act of 12 March 2004 on Social Assistance, Journal of Laws of 2004, No. 64, item 593, as amended; Act of 9 June 2011 on Family Support and Foster Care System, Journal of Laws of 2011, No. 149, item 887, as amended;

local government units most of the activities do not go beyond the statutory obligations, a number of local initiatives and programmes are often noted, which not only aim at social support for families, but also help to reconcile professional work with raising children. These include various workshops, conferences, trainings, but also the organisation of care and educational services for the youngest.

Polish instruments facilitating life-balance – current state and vision for the future

In recent years, Poland has seen a significant development of family policy and instruments which facilitate the functioning of families with children. Among other things, maternity leaves have been extended and numerous changes in their rules have been made, parental and paternity leaves have been introduced, the possibilities of using child-care leaves have been modified, and the provisions on social security contributions in the case of taking child-care leave have been changed. Financial benefits for children have been implemented, tax reliefs for families with children have been modified and mothers (in special cases fathers) who raised a minimum of four children have been given the possibility of collecting the minimum pension. Moreover, in Poland, after meeting the income criterion, various social assistance benefits for giving birth and bringing up children are available. Since 2011, the availability of education and care services has also improved, although there are still huge shortages in this area. From the point of view of the subject matter of this article, only the family policy instruments that have the greatest impact on work-life balance have been analysed in detail. In particular, parental leaves, education and care services and the rights of employees raising children will be presented

Referring to the EU requirements of 2019, most of the above expectations were already met in Poland when the directive was announced.

In Poland, maternity leaves have been extended continuously since 2007. Initially, the length of maternity leave for single birth was 20 weeks. Between 2010 and 2014, an additional maternity leave was introduced, which was gradually extended – from 2 to 6 weeks, and in 2013 a new type of parental leave of up to 26 weeks was introduced. Currently, maternity leave after single birth is 20 weeks. Afterwards, parents are entitled to 32 weeks of parental leave. If a parent declares from the beginning to take 52 weeks, the monthly benefit amounts to 80 percent of the base pay received in the last 12 months. If declarations are made for subsequent periods, the monthly benefit for the first 26 weeks of maternity leave amounts to 100 percent of the base pay, and in subsequent months – 60 percent. For the first 14 weeks, with exceptions, it is the mother who is obliged to take the leave. The rest can be taken by the father on the same terms. Leave can also be taken together by both parents, but then the periods add up. While on parental leave, it is possible to work for the employer granting this leave for no more than half of the full time. Where a worker expresses his or her wish to work, parental leave is granted for the remainder of the working time and proportional extension and payment applies [see: Maternity and paternity leave in the EU].

Irrespective of the maternity and parental leave, the father has the exclusive right to take paternity leave. This leave is up to 2 weeks and can be taken within 24 months after the birth of the child. It is paid in 100 percent.

After the end of parental leave, both the mother and the father can take child-care leave. It is an unpaid leave, but after meeting the income criterion, a parent can apply for a social welfare allowance for raising a child. The child-care leave, with exceptions for disabled children, is 36 months and can be taken up until the child turns 6. It is important that, within this period, 1 month is allocated to the other parent only, without the possibility of transferring it.

Importantly, from the moment of pregnancy until the day of childbirth, and later throughout the whole period of maternity, parental and child-care leave, a female employee is protected by the Labour Code and, apart from exceptional cases, cannot be dismissed from work. Women employed on civil law contracts or when a contract ends during pregnancy or maternity leave, have the

employment relationship extended until the day of childbirth, which, with a few exceptions, makes it possible to take the childbirth leave.

In addition, after the birth of a child, a woman returning to work is entitled to a breastfeeding break, the number and time of which depend on the number of children fed and the number of hours of work per day. Parents can also take the so-called childcare days – 2 days or 16 hours in each calendar year for both parents together, without giving any reason for absence from work, until the child turns 14. These days are 100 percent paid. Without the consent of the employee caring for a child up to the age of 4, overtime, night work, intermittent working hours or posting away from the permanent workplace are not permitted.

The law also regulates sick leave for employees in the event of a child's illness. In general, for the care of a sick child under 14 years of age, both mother and father can use a maximum of 60 days together. However, when a sick child over 14 years old requires care, the allowance lasts a maximum of 14 days. The amount of the care allowance is 80% of the basis of the allowance, which usually equals 80% of the employee's average monthly salary. Employees with children can also use the tax relief for children when submitting their annual tax return, by which the amount of income tax due for the year can be reduced.

In terms of the availability of child care and educational services, clear progress has been made for several years now [see: Report from the Commission to the European Parliament, 2015]. In 2011, Poland introduced the Act of 4 February 2011 on Care for Children under the Age of 3 [Act of 4 February 2011], under which, at present, care for children under the age of 3 can be organised in the form of a nursery, children's club, or it can also be taken by a day carer and a nanny. Following the introduction of this law, both the number of institutions providing care services and the number of places in these institutions have increased significantly. In 2011, there were 571 institutions providing such services with a total of 32,053 places. In 2017 there were as much as 4271 institutions and 111,348 places [see: Report of the Council of Ministers]. There were also changes in the pre-school education prevalence rates for 3-year-olds, which in the school year 2018/2019 amounted to 77.9%, for 4-year-olds – 89.4%, for 5-year-olds – 95.0% [www.eacea.ec.europa.eu].

The instruments presented above are only of a signalling nature, as there are a number of other support, schemes, reliefs and benefits that may help to combine household and professional duties. There are also new ideas that are being considered for implementation in the future.

The political parties currently in power, responsible for the development and management of family policy instruments, also see a need to support both the parents and the employers. The current electoral programmes include a number of new solutions that can be introduced in the future. In particular, it is proposed to take action to close the gender pay gap by introducing new legislative solutions. Major employers are to be required to conduct payroll surveys every two years in order to detect and prevent unjustified bad practices. An obligation to publish reports on equal pay by the largest companies is also to be introduced. In order to create a parent-friendly working environment, solutions will be implemented allowing to combine professional activity with child raising, making it easier to work remotely. In particular the employee being a parent of a child aged 1-3 will be added to the catalogue of cases in which the employer must approve the employee's application for teleworking, work with the use of new technologies, provided that the nature of work allows to perform it outside the employer's premises. Technological and IT innovations that could be applied in the above mentioned situations are therefore important. On the other hand, the state is to support employers in creating so-called company nurseries and kindergartens. Support will primarily consist in easing the procedures for obtaining permits to open such facilities [Law and Justice Programme 2019]. Despite significant improvements in the availability of childcare services, it is still necessary to increase the number of places in nurseries and kindergartens, nursing homes for seniors, including day care homes and day care centres. It is proposed that nurseries, kindergartens and schools should be accessible only to vaccinated children and vaccinations should be free of charge [Civil Coalition Programme]. Care should also be extended to older children and it is therefore expected that every primary school will provide free and professional extra-curricular care for students until their parents

return from work. In addition, it would be helpful to create the possibility of reducing working time by one hour for parents bringing up children under 10 years of age and commuting children to school or kindergarten [Electoral Programme of the Polish People's Party].

The promotion of a family partnership model and a fair distribution of roles in childcare should be supported, among others, by promoting paternity leave and guaranteeing two months of paid parental leave specifically for fathers [Electoral program of the Democratic Left Alliance Electoral Committee]. As far as leaves are concerned, it is also proposed to guarantee one of the parents the possibility to work part-time for 12 months after the parental leave and pay them the additional amount of PLN 1,000 to the salary collected during that time, regardless of the form of employment [Electoral Program of the Polish People's Party]. There is also the idea that sickness benefit for pregnant women, which is currently financed by the employer as sick pay for 33 days, should be financed from the beginning by the Social Insurance Institution (ZUS) in order not to expose employers to additional costs[Civil Coalition Programme].

Summary

In recent years, Poland has seen a significant improvement in activities for the functioning of families and in terms of supporting parents in combining work with household duties. Numerous laws, programmes, children's benefits, etc. have been implemented. In terms of the funds allocated to family policy in relation to the average salary, but also in terms of family spending in social spending in general, Poland has ranked higher and higher in the European Union over the recent years[www.gov.pl; ec.europa.eu][2]. New concepts, visions, ideas arise. However, there is a problem in managing these instruments. State measures for the family are a set of various instruments and there is a lack of a comprehensive family policy that would translate into a permanent change in unfavourable demographic trends, which in turn causes a number of other socio-economic problems. The measures implemented are institutionally dispersed and the minister in charge of the family does not perform the function of a coordinator of family policy, because legal and systemic solutions, with a few exceptions, do not provide him/her with the power to influence the instruments of family support which are the responsibility of other ministers. The lack of a specific strategic and institutional framework for the management of family policy instruments makes it impossible to define and evaluate the achievement of its objectives. The problems are also evident in financial plans and their implementation [see: Coordination of family policy in Poland, 2015].

In order to reverse unfavourable demographic trends, it is necessary to strengthen family policies and implement solutions that will translate into the achievement of the objectives set. For this to be possible, changes must be made to the management of family policy. It is necessary to create coherent strategy papers of national, regional and local character, which would respond to contemporary challenges. Management at the central level requires integration and inter-ministerial cooperation. It should also not be forgotten that the effectiveness of instruments, both those already existing and those planned for implementation, depends to a great extent on statutory guarantees and stability in their use.

References

- Act of 25 February 1964 – Family and Guardianship Code, Journal of Laws of 1964, No. 9, item 59, as amended;
- Act dated 23 April 1964 – Civil Code, Journal of Laws of 1964, No. 16, item 93, as amended;

[2] According to the European Statistical Office, the highest share of spending on family benefits (in total social spending) was recorded in Luxembourg. In 2016, it was more than 15 percent of the total spending on social benefits offered by the state. According to Eurostat, in Poland, which ranked third, family benefits accounted for 13% of all social benefit spending. According to Eurostat, in 2017, out of 28 EU countries, 12 spent more money on social benefits than Poland;

- Act of 17 November 1964 – Code of Civil Procedure, Journal of Laws of 1964, No. 43, item 296, as amended;
- Act of 26 June 1974 Labour Code, Journal of Laws 1974, No. 24, item 141, as amended.
- Act of 13 October 1998 on Social Insurance System, Journal of Laws of 1998, No. 137, item 887, as amended;
- Act of 25 June 1999 on Money Benefits from Social Insurance in case of Illness and Maternity, Journal of Laws of 1999, No. 60, item 636, as amended;
- Act of 28 November 2003 on Family Benefits, Journal of Laws of 2003, No. 228, item 2255, as amended;
- Act of 12 March 2004 on Social Assistance, Journal of Laws of 2004, No. 64 item 593, as amended;
- Act of 9 June 2011 on Family Support and Foster Care System, Journal of Laws of 2011, No. 149, item 887, as amended;
- Act of 4 February 2011 on Care for Children under the Age of 3, Journal of Laws. 2011, No. 45, item 235, as amended;
- Civil Coalition Programme "Twoja Polska" *[Your Poland]*.
- 'Coordination of family policy in Poland'(2015) [Koordynacja polityki rodzinnej w Polsce], Information on control results of the Supreme Audit Office, Warsaw.
- Directive 2019/1158 of the European Parliament and of the Council of 20 June 2019 on work-life balance of parents and carers and repealing Council Directive 2010/18/EU; https://eur-lex.europa.eu/legal-content/PL/TXT/PDF/?uri=CELEX:32019L1158rom=EN, access: 22/10/2019.
- Eydal G. B., Rostgaard T. (ed.) (2018) 'Handbook of Family Policy', Edward Elgar Publishing, UK,USA.
- 'Households and Families, Demographic Characteristics. National Population and Housing Census 2011' (2014) [Gospodarstwa domowe i rodziny, Charakterystyka demograficzna. Narodowy Spis Powszechny Ludności i Mieszkań 2011], Statistics Poland, Warsaw, p. 21, https://stat.gov.pl/files/gfx/portalinformacyjny/pl/defaultaktualnosci/5670/5/1/1/l_gospodarstwa_domowe_i_rodziny_nsp2011.pdf, access: 25/01/2020.
- https://eacea.ec.europa.eu/national-policies/eurydice/content/organisation-programmes-children-over-2-3-years-26_en, access: 26/01/2020.
- https://www.gov.pl/web/rodzina/wydatki-na-swiadczenia-rodzinne-w-unii-europejskiej-polska-na-podium;
https://ec.europa.eu/social/main.jsp?langId=en&catId=1246&newsId=9104&furtherNews=yes, access: 26/01/2020.
- Kotowska I. E. (2010) 'Uwagi o polityce łączenia pracy zawodowej i rodziny w kontekście nowej demografii Europy i zmian na rynku pracy', [in:] J. Szambelańczyk, M. Żukowski (eds.), 'Człowiek w pracy i polityce społecznej, Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań, p.59-78.
- Law and Justice Programme 2019 "Polski model państwa dobrobytu" *[Polish model of the welfare state]*. Dobry czas dla Polski *[A good time for Poland]*
- 'Long-term National Development Strategy Poland 2030. The third wave of modernity' (2013) [Długookresowa Strategia Rozwoju Kraju. Polska 2030. Trzecia fala nowoczesności], Ministry of Administration and Digitization, Warsaw.
- 'Maternity and paternity leave in the EU', https://www.europarl.europa.eu/RegData/etudes/ATAG/2019/635586/EPRS_ATA(2019)635586_EN.pdf, access:25.01.2020.
- 'Population. Size and structure and vital statistics in Poland by territorial division in 2018. As of December, 31, Statistics Poland 2019', https://stat.gov.pl/obszary-tematyczne/ludnosc/ludnosc/ludnosc-stan-i-struktura-oraz-ruch-naturalny-w-przekroju-terytorialnym-w-2018-r-stan-w-dniu-31-xii,6,25.htmlaccess: 26/01/2020.
- Electoral Program of the Polish People's Party, Polish Coalition, "Łączymy Polaków" *[We Unite Polish People]*.
- Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the development of childcare facilities for young children with a view to increase female labour participation, strike a work-life balance for

working parents and bring about sustainable and inclusive growth in Europe (the "Barcelona objectives"), Brussels 2015, https://ec.europa.eu/transparency/regdoc/rep/1/2018/PL/COM-2018-273-F1-PL-MAIN-PART-1.PDF, access: 24/01/2020.

- Report of the Council of Ministers on the implementation of the Act of 4 February 2011 on Care for Children under the Age of 3 in 2017.
- Resolution No. 16 of the Council of Ministers of 5 February 2013 on Adoption of the Long-term National Development Strategy. Polska 2030. The third wave of modernity, M.P. of 2013 item 121;
- 'Sustainable Europe 2030' [Zrównoważona Europa 2030], https://ec.europa.eu/poland/news/190130_sustainable_pl; *EU approach to sustainable development*, https://ec.europa.eu/info/strategy/international-strategies/sustainable-development-goals/eu-approach-sustainable-development_pl, access: 11/10/2019.
- Szczudlińska-Kanoś A., K. Peter – Bombik (2016a) 'Family issues in the strategic documents of Polish voivodeships – example of Małopolska Voivodeship' [Problematyka rodzinna w dokumentach strategicznych polskich województw na przykładzie Małopolski], "Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu" [Research Papers of Wrocław University of Economics] no. 438, p. 126-138;
- Szczudlińska-Kanoś A., K. Peter – Bombik, (2016b) 'Family Policy in Strategies of Solving Social Problems in Counties of Małopolska' [Polityka rodzinna w strategiach rozwiązywania problemów społecznych w powiatach Małopolski] "Polityka rodzinna w wymiarze lokalnym, regionalnym i krajowym", no. 456, "Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu" [Research Papers of Wrocław University of Economics], p.41-50.
- The Constitution of Poland of 2 April 1997, Journal of Laws of 1997, No. 78, item 483, as amended.
- The electoral program of the Democratic Left Alliance Electoral Committee "Polska jutra Główne postulaty Lewicy" [Poland of Tomorrow. The main postulates of the Left]. ;
- Yang Qi, Huang Jianyuan, (2020) 'Content Analysis of Family Policy Instruments to Promote the Sustainable Development of Families in China from 1989–2019', „Sustainability 2020", 12, 693.

An Analysis of the Dependence Between Customer's Satisfaction and Loyalty (A Case Study of a Higher Education Service)

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Abstract

The article presents an analysis of the dependence between customer's satisfaction and loyalty, carried out with the use of a case study of an educational service provided by a college of higher education. The goal of the first stage of the study was to identify the qualitative characteristics of the service from the point of view of the student. The second stage consisted in investigating whether there occur differences in the evaluation of the importance of attributes of this service between the examined groups of loyal and disloyal students. The students were asked to evaluate the organization of study courses, distribution of classes being part of the curriculum and available facilitations, to comment on the quality of infrastructure and also to provide characteristics of lecturers. The aim of the third phase of the study was to check whether there exists a statistically significant dependence between the student's loyalty and: *primo* – their readiness to take up studies at university because of some earlier recommendations; *secundo* – their readiness to offer such recommendations; *tertio* – their readiness to again choose the same university. The assessment of the educational service is similar in the group of loyal students and in that of disloyal ones as far as the majority of the analyzed features are concerned. There is a statistically significant dependence between student's loyalty and their readiness to offer recommendations and that of choosing the same university for the second time.

Keywords: Satisfaction, Loyalty, Customer, Service.

Introduction

Clients' requirements still rising. It is indispensable to look for effective ways which will serve to identify and satisfy them. Moreover, the fact that competition is getting stronger and stronger forces companies to take care of their clients on an increasingly high level and to strive for their loyalty. This concerns colleges of higher education, as well. Financial results of educational institutions are more and more often determined by customer loyalty. In order to achieve substantial effects, universities ought to update their corrective actions on the continuous basis within the scope of building relations with customers, checking whether they pursue directions compliant with their customers' demands. In view of the above, identification of the qualitative attributes of the service rendered is gaining an increasingly strong significance nowadays. It is closely followed by measurement of the identified characteristics, which makes it possible to present the level of customer satisfaction within the given attribute of the service and to measure loyalty. The latter is most often conditioned by customer satisfaction and is connected with recommendation of the service.

The aim of the present article is to analyze the dependence between student satisfaction, manifesting itself through a high level of evaluation of qualitative attributes of the educational service and student loyalty, conditioned by systematic use of services provided by the same college of higher education in the long run. In order to accomplish the goal, a multi-stage research was carried out with the application of different methods and tools which enabled to identify the following: 1) qualitative features of the educational service from the point of view of students; 2) possible discrepancies between the groups of examined students, both loyal and disloyal, as regards their assessment of importance of attributes of

the educational service; 3) the existence of dependence between student loyalty and the readiness to take up studies at WSB University as a result of earlier recommendations; 4) the existence of dependence between student loyalty and the readiness to give recommendations; 5) the existence of dependence between student loyalty and the readiness to repeat the choice of the same college of higher education.

Hence, we consider the following hypotheses:

H_1: There is a significant association between student loyalty and the readiness to take up studies at WSB University as a result of earlier recommendations

H_2: There is a significant association between student loyalty and the readiness to give recommendations

H_3: There is a significant association between student loyalty and the readiness to repeat the choice of the same college of higher education.

Satisfaction and Loyalty

Satisfaction is a notion deriving from the Latin words *satis* (sufficient) and *facere* (to make) and means meeting one's expectations. The literature does not provide an unambiguous definition of satisfaction, though. This notion is defined differently depending on individual authors and the scientific domain which they represent. In psychology, the term appears as "the emotional state which ensues in the course of doing something or as a result of achieving a goal" (Skrzypek, 2007). Other definitions feature explanations saying that satisfaction is a sensual feeling connected with consumption, or underlining the subjective dimension of it as well as its gradual formation in the course of successive contacts between the customer and the service. Some definitions put an emphasis on the fact that satisfaction means the whole of the client's attitude towards the product, which manifests itself after consumption has been accomplished or the product has been used (Sobczyk, Lipowski, 2002). Such a definition is reflected also in the norm PN-EN ISO 9000:2006, where customer's gladness can be understood as a feeling which the purchaser experiences upon having used the offer which meets their expectations. Customer satisfaction can be treated as their opinion, too, on the degree of agreement of the transaction with reference to their needs and expectations (Skrzypek, 2002).

One of the basic and most complex models describing formation of client satisfaction is the Expectancy-Disconfirmation Model, according to which, the customer makes and evaluation of the level of their satisfaction, based on a clash of their experiences of the product with the earlier expectations. Thus, satisfaction is "…an emotional answer provoked by the cognitive-evaluative process, in which the consumer compares the perceived features of the product with their own vision of value (the desired state)" (Strobacka, Lehtinen, 2001). If the customer's expectations are met, they feel satisfaction. If, however, the product does not match the customer's earlier expectations, they will feel dissatisfaction. If the qualitative features of the product exceed the customer's expectations, then they feel delight. Regarding the category of "satisfaction", the evaluation of the consumer's experience follows in compliance with certain continuum – from the undesired lack of satisfaction up to the expected satisfaction. The theory of customer satisfaction according to the above-described model is presented in Figure 1.

Customers form their expectations on the basis of their earlier experiences of the product, opinions of third parties (friends, acquaintances, promises from sellers and the competition, etc.). A customer who regularly purchases a given industrial product or a service can be called loyal. They can even raise the level of consumption or recommend the product or the service to other people, independent of actions promoting substitute products or services (Stefańska, 2002). It is glad clients who become regular customers and thanks to good opinions on the product they contribute to building a positive image of the organization and to an increase in its profitability. Loyalty, in the literature dealing with marketing often appears as a category of attitudes or behaviors of purchasers and hence it is defined as the customer's inclination toward using services of the chosen company over a long period of time. Such

attitudes on the part of customers, which are formed as a result of emotional experiences and through their state of awareness, remain subjective feelings raising their individual attachment to products, brands and firms (Wojnarowska, Adamska, 2001).

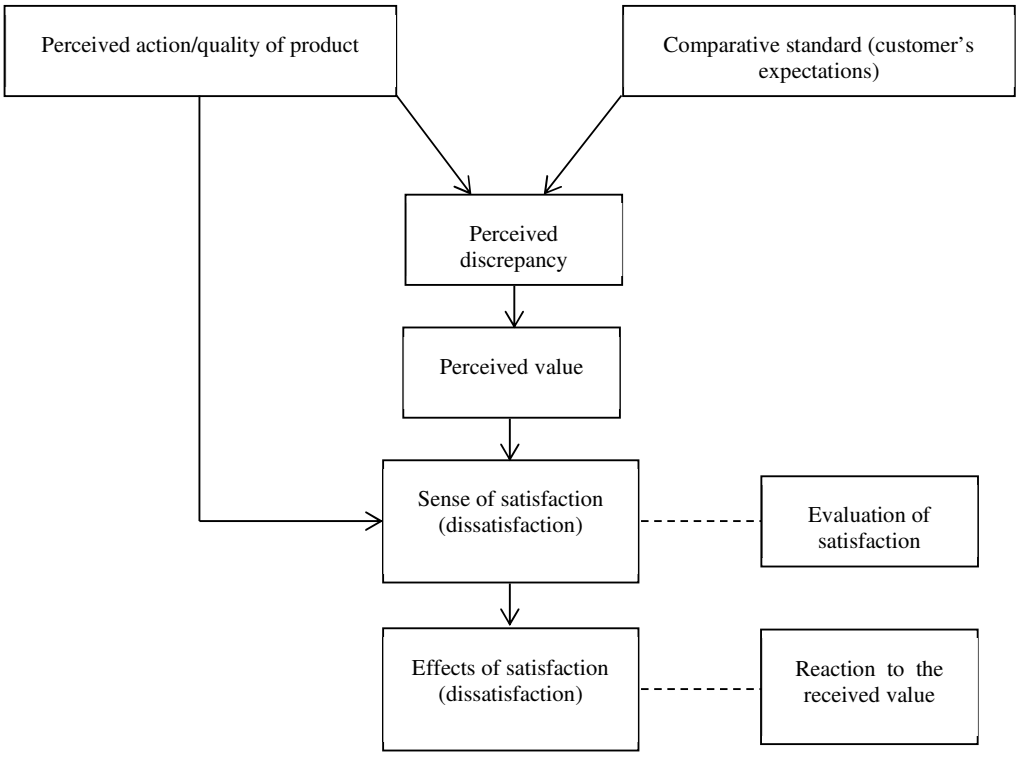

Fig. 1: Theory of customer satisfaction

Source: (Haffer, 2000: 288).

Customers' satisfaction is vital to enterprises of different branches, since it decides their fate, their existence or non-existence in the market, and – as it was mentioned above – to a large extent is deciding in terms of customer loyalty. Similarly, students' satisfaction is important to colleges of higher education not only in view of recruitment of new candidates, but also because of the need to retain students completing the first degree of their studies and to have them pursue their education in study courses of the second degree or post-diploma ones (Appleton-Knapp, Krentler, 2006; Helgesen, Nesset, 2007). As competition in higher education becomes intense, student's satisfaction, and student's loyalty, image of the institution have been widely discussed (Azoury et al., 2014; Balaji et al., 2016; Dejnaka et al., 2016; Psomas et al., 2017; Teeroovengadum et al., 2019).

Kano Method

Kano questionnaire makes it possible to determine individual features/customer requirements as well as references of the these characteristics in the process of perception of quality (Högström et al., 2010; Dominici, Palumbo, 2013). In the majority of cases the perceived quality of the given product or service does not equal the quality that is received.

Kano carried out an analysis of interdependence of customer satisfaction and the quality which is offered. He classified quality attributes of the product into the following categories (Kano et al., 1984):

- *Must be* (M) – they are components which are indispensable to attain satisfaction, a lack of these features causes a drop in satisfaction in customers, while the very presence of them in the product itself will not influence a rise in satisfaction;
- *One-dimensional* (O) – the lack of these attributes results in lowering of the customer satisfaction, whereas their presence causes satisfaction to rise;
- *Attractive* (A) – they are the features which bring a large increase in satisfaction, often deciding with regards to customer loyalty; a lack of attributes of this kind is not of any significance to the customer;
- *Indifferent* (I) – their presence in the product does not cause satisfaction to rise and their lack does not cause satisfaction to decrease;
- *Questionable* (Q) – it is not known when they will become significant to the customer and when their presence can influence a rise in his satisfaction;
- *Reverse* (R) – they are the attributes whose presence brings on customer dissatisfaction, while a lack of them causes satisfaction.

Kano elaborated on a questionnaire which allows determining individual characteristics that are components of the given product and to count them into the given category mentioned above. The respondent gives an answer to questions in two dimensions: 1) the positive one – when the given attribute of a product appears and performs its task, and 2) the negative one – when the defined attribute does not appear or occurs in an unsatisfactory way. Each of the properties of a product is defined by a combination of two replies, which can take five values. As a result, it is possible to obtain 25 variants which are presented in Table 1.

Table 1: Determining the variation of features in Kano method

Feature		**Negative**				
Positive		Like it	Expect it	Don't care	Live with	Dislike it
	Like it	Q	A	A	A	O
	Expect it	R	I	I	I	M
	Don't care	R	I	I	I	M
	Live with	R	I	I	I	M
	Dislike it	R	R	R	R	Q

Source: (Wolniak, Skotnicka, 2008: 144).

It is required that inclusion of the given attributes should be made in the product/service at suitable proportions, both during designing the new product or improving the already existing one. It is vital to be governed by the following principle: the product should contain all the obligatory attributes indicated by the respondents (customers), still the level of these features quality does not have to be the highest possible. On the other hand, in the case of attributes that are expected directly, the level of their quality must be the same or higher than that of products offered by the competition. Attractors, in turn, must reflect the highest possible quality. Only a few attractive features should be chosen and their highest level must be guaranteed. A proper selection of attractive features allows creating a unique product, which results in a competitive advantage (Kano et al., 1984).

On the basis of the highest number of declarations allotted by respondents with regard to the given attribute of the product, one category (A, M, O, R, Q, I) is determined. Such an ordering of attributes makes it possible to develop the appropriate features, that is ones that the customer demands.

Sample and Method

The research was conducted among students of the Department of Economics of WSB University in Opole. For the needs of the examination it was accepted that a loyal student is one inclined toward

systematic making use of services offered by the same university in a long run. A disloyal student – on the contrary – is prone to being persuaded by third parties, like acquaintances or family members; they are interested in offers from other universities which – in their opinions – may turn out better. Loyal students completed their studies of the first grade at the Department of Economics of WSB and pursue their further education in the form of studies of the second degree at WSB. A student who had finished their studies of the first degree at a college of higher education other than WSB University was qualified as a disloyal student.

For the needs of this study, measurement of the effects of satisfaction were made (in compliance with the theory of customer satisfaction presented in Figure 1). The following were examined: readiness to study at WSB University in consequence of earlier recommendations from third parties, opinions delivered (assessment of student's inclination toward offering recommendations) as well as intentions to again choose an educational service provided by WSB University in Opole (assessment of student's inclination towards repeating the choice of the same university).

At the first stage of the research, the technique of "brainstorming" was applied in a group of 20 extramural (weekend) students of the second degree (both loyal and disloyal ones). The examined were requested to point to qualitative attributes of educational service. This method enabled to identify the most important features which, in students' opinions, can be an indicator of the quality of educational services. The results of the first stage of the research were used for elaborating a relevant Kano questionnaire.

Taking into account the above recommendations of Kano method, the authors of this article went on to realize the next phase of the research, in which the respondents-students filled in Kano questionnaire, considering hierarchization of the qualitative attributes of the educational service, which they had identified earlier. That was done in order to qualify individual attributes into the right category of features. The selection of the sample was purposeful and of non-probabilistic character. The survey-based examination covered 218 (76%) students of the first year of extramural studies of the second degree at WSB University in Wroclaw, the Department of Economics in Opole. The respondents attended a lecture being one of the obligatory subjects. The students were asked to evaluate the organization of studies, schedule of classes and facilitations, the infrastructure as well as to give characteristics of the lecturer.

Additionally, the authors made an evaluation of satisfaction (SI) with fulfilment of the given requirement and an assessment of dissatisfaction (DI) with not fulfilment of the formulas given below (Berger et al., 1993):

$$\text{Satisfaction Index } SI = \frac{A+O}{A+O+I+M}$$

$$\text{Dissatisfaction Index } DI = \frac{(-1)(O+M)}{A+O+I+M}$$

The values of SI which are close to 1 mean that meeting the given requirement has a great influence on customer satisfaction. In turn, the values of DI close to 1 mean that not meeting the given requirement has a strong influence on customer dissatisfaction.

Results and Discussion

The technique of "brainstorming" made it possible to extract qualitative attributes of educational service. These features belong to such categories as: organization of study courses, schedule of classes and facilitations, infrastructure and characteristics of lecturers.

The successive phase of the research, which dealt with evaluation of the qualitative attributes of educational service, points to the fact that in the case of most of the analyzed traits this evaluation is similar in the groups of loyal students and disloyal ones (Table 2). It follows from the conducted research that the strongest influence on the student's total satisfaction is exerted by the following: accessibility of lecturers outside classes, the offer by the college of subjects for students to choose and

scheduling of classes in an optimal way. The presence of these components increases the level of client satisfaction to a greater extent than other requirements do. With reference to the customer dissatisfaction index it can be concluded that the lack of information about changes introduced into the schedule is responsible for the highest level of dissatisfaction.

Table 2: Evaluation of the qualitative features of educational service by loyal and disloyal students

Qualitative attributes of educational service	Loyal student			Disloyal student		
	Category	SI	DI	Category	SI	DI
Students' rights and duties are clearly defined.	M	0.44	-0.48	O	0.50	-0.44
Classes are optimally scheduled throughout the day.	O	0.64	-0.26	O	0.62	-0.28
Organization of classes encourages students to be active participants.	A	0.41	-0.21	O	0.50	-0.24
The college offers the possibility of individual curriculum plan/accelerated course of studies.	A	0.46	-0.24	O	0.41	-0.24
The college inform about changes in the schedule of classes.	M	0.34	-0.62	M	0.33	-0.60
Number of people in groups is suitable.	M	0.37	-0.44	M	0.36	-0.46
Contacting individual departments and workers is convenient.	M	0.46	-0.43	M	0.46	-0.47
The college offers subject to choose.	A	0.68	-0.09	A	0.66	-0.16
The college offers paid trainings, workshops.	I	0.34	-0.17	I	0.35	-0.21
The college offers free trainings, workshops.	A	0.56	-0.17	A	0.51	-0.16
Quickness, range and clarity of information given by administrative workers of the college are suitable.	M	0.38	-0.50	O	0.50	-0.38
The college supports students in looking for a job/internship/practice placement.	A	0.56	-0.14	A	0.56	-0.15
Books/journals are available in the college library.	A	0.35	-0.21	A	0.43	-0.23
The college supports students in going abroad to study/serve internship/do practice.	M	0.46	-0.25	M	0.41	-0.36
Classes are held in one building.	O	0.54	-0.26	O	0.50	-0.38
The college provides a suitable number of free parking places for its students.	M	0.48	-0.40	M	0.35	-0.51
The didactic rooms in the college are air-conditioned.	O	0.55	-0.24	M	0.50	-0.36
The college cares for cleanliness in its buildings.	M	0.40	-0.50	M	0.35	-0.57

The college provides access to places of rest between classes.	O	0.54	-0.24	M	0.43	-0.33
The college provides enough computer stations/laptops.	M	0.40	-0.25	M	0.40	-0.40
The college provides access to the Internet.	A=M=O	0.55	-0.27	M	0.46	-0.38
There is a cafe bar/vending machine on the premises of the college.	O	0.61	-0.17	M	0.44	-0.33
There is a photocopy shop on the premises of the college.	O	0.52	-0.30	M	0.46	-0.36
There is a cloakroom on the premises of the college.	O	0.60	-0.15	O	0.53	-0.24
Lecturers clearly define students' duties/obligations.	M	0.40	-0.45	M	0.41	-0.44
Lecturers show a good knowledge of theory.	M	0.31	-0.58	M	0.41	-0.49
Lecturers give good examples from practice.	M	0.49	-0.42	M	0.49	-0.39
Lecturers cover course material preparing students to cope with problems in daily living.	O	0.58	-0.32	O	0.52	-0.32
Lecturers answer questions in an expert way	M	0.48	-0.43	M	0.42	-0.46
Lecturers are communicative.	O	0.51	-0.38	M	0.45	-0.45
Lecurers show a friendly attitude toward students.	O	0.55	-0.38	M	0.48	-0.47
Lecturers allow students to have discussions during classes.	O	0.53	-0.23	O	0.51	-0.27
Lecturers are available to students outside classes.	O	0.64	-0.28	O	0.66	-0.23

At the next stage of the research it was examined whether there exists a statistically significant dependence between student loyalty and firstly – the readiness to take up studies at WSB University (H_1), secondly – the readiness to give recommendation (H_2), thirdly – the readiness to choose the same college of higher education (H_3). The results of the examination (table 3) indicate that there does not occur a statistically significant dependence between student loyalty and their readiness to take up studies at WSB University as a result of previous recommendations from acquaintances or family members (p=0.76). As a consequence, H_1 wasn't supported. It needs underlining that at the same time around 1/3 of the students admitted that studying at WSB University had been recommended to them by an acquaintance of a family member.

Table 3: Loyalty and the readiness to take up studies at WSB upon prior recommendation from acquaintances or family members

Specification		**Did any of your acquaintances of family members recommended to you/others to take up studies at WSB University?**						
		DN	**N**	**RN**	**HS**	**Y**	**DY**	**Total**
Did you complete studies of the first degree (Bachelor course) at WSB University in Opole?	No	4	34	14	7	32	11	102
	Yes	3	39	18	10	28	18	116
	Total	7	73	32	17	60	29	218

where: DN – decidedly not, N – not, RN – rather not, HS – hard to say, RY – rather yes, Y – yes, DY – decidedly yes

The research showed also that 42% of the students who had completed their studies of the first degree at another college of higher education were inclined toward recommending studying at WSB University in Opole (table 4). On the other hand, regarding the group of students who had finished their first degree studies at WSB University in Opole, there were as many as 76% of them inclined toward giving such a recommendation. As a result of the statistical analysis which was carried out, it needs acknowledging that there exists a dependence between student loyalty and the readiness to recommend studying at the same college of higher education ($p=0.00$; H_2 was supported).

Table 4: Loyalty and the readiness to give recommendation

Specification		**Will you recommend studying at WSB University to others?**						
		DN	**N**	**RN**	**HS**	**Y**	**DT**	**Total**
Did you complete studies of the first degree (Bachelor course) at WSB University in Opole?	No	1	0	35	24	36	6	102
	Yes	0	2	3	23	42	46	116
	Total	1	2	38	47	78	52	218

where: DN – decidedly not, N – not, RN – rather not, HS – hard to say, RY – rather yes, Y – yes, DY – decidedly yes

The examination of the dependence between student loyalty and the readiness to choose the same university showed that 42% of the students who had completed their first degree studies at another college of higher education, if the need arose, would again use the offer of WSB University in Opole (table 5). On the other hand, in the group of students who had finished their first degree courses at WSB University in Opole, as many as 72% were inclined toward using the offer again. It follows from the statistical analysis that there appears a statistically significant dependence between student loyalty and the readiness to choose the university again ($p=0.00$; H_3 was supported).

Table 5: Loyalty and the readiness to again use the offer of WSB University

Specification		**Would you, if the need arose, use the offer of WSB University again?**						
		DN	**N**	**RN**	**HS**	**Y**	**DT**	**Total**
Did you complete studies of the first degree (Bachelor course) at WSB University in Opole?	No	1	0	18	40	36	7	102
	Yes	0	2	5	25	43	41	116
	Total	1	2	23	65	79	48	218

where: DN – decidedly not, N – not, RN – rather not, HS – hard to say, RY – rather yes, Y – yes, DY – decidedly yes

The multi-stage research enabled to identify the qualitative attributes of educational service, evaluation of its importance and the dependence between student loyalty and the following: the readiness to take up studies following previous recommendations, the readiness to give recommendation as well as the readiness to again choose the same college of higher education.

Conclusion

In this study it was accepted that a loyal customer of educational service is a student to whom the academic offer of the university in the form of study courses of the first degree appeals and satisfies

their expectations, proving attractive enough to make them ready to use the offer of studies of the second degree and then – to further pursue post-diploma studies at the "tested university", independent of offers coming from the competition. Furthermore, they are inclined toward recommending the service they have experienced themselves to others. In turn, a disloyal student is one whose expectations were not met and/or did not experience delight. Such a student is prone to being persuaded by third parties, to being attracted by other colleges of higher education, whose offers (in his/her opinion) may prove better. They are not inclined toward making use of the offer again or recommending the service. One of the ways of winning loyal students is to arrange for their participation in evaluating the qualitative attributes of educational service with the aim to select and group these which are firstly – indispensable, secondly – made conscious and precise, and thirdly – bring delight (are deciding about loyalty to the greatest extent). The technique of "brainstorming" and, basically, Kano Method must be considered to be useful indeed to achieve this goal.

Recapitulating the research that was carried out, it needs stating that loyal and disloyal students, in unison, selected qualitative attributes of educational service of a college of higher education. It follows from the findings that despite the fact that the so-called disloyal students can make comparisons with other colleges of higher education, whereas the loyal ones do not have a possibility of doing so (comparative perception of the importance of attributes), they agreed, as regards qualifying the qualitative features in the scope of organization of study courses, schedule of classes and facilitations, into the appropriate category of attributes according to Kano method (attractive, obligatory, expected directly, etc.). On the other hand, the strongest impact on the total student satisfaction is made by the following: accessibility of lecturers outside classes, offering subjects to choose by the university as well as optimal planning of classes. Their presence increases the level of customer satisfaction to a greater extent than other requirements do. It can be stated that – with reference to the customer dissatisfaction index – a lack of information about changes introduced into the schedule raises the highest level of dissatisfaction among students.

Colleges of higher education ought to pay attention to the fact that attributes of the given service undergo relatively frequent changes for different reasons. The most frequently occurring causes are the continuing growth of customers' (students') expectations. In view of the above-presented considerations, it should be concluded that in order to attain customer satisfaction, a stable increase in the level of services rendered and – in consequence – satisfying client expectations, it is imperative that customers/students should participate in the process of identification and evaluation of the significance of qualitative attributes of educational service, both in the process of its designing and perfecting.

References

- Appleton-Knapp S.L., Krentler K.A. (2006). Measuring student expectations and their effects on satisfaction: the importance of managing student expectations, *Journal of Marketing Education*, 28(3), 254-264.
- Azoury, N., Daou, L., and Khoury, C. E. (2014). University image and its relationship to student satisfaction-case of the Middle Eastern private business schools. *International Strategic Management Review*, 2(1), 1-8.
- Balaji, M. S., Roy, S. K., and Sadeque, S. (2016). Antecedents and consequences of university brand identification. *Journal of Business Research*, 69(8), 3023-3032.
- Berger Ch., Blauth R., Boger D., Bolster Ch., Burchill G., Du Mouchel W., Pouliot F., Richter R., Rubinoff A., Shen D., Timko M., Walden D. (1993). Kano's Methods for Understanding Customer-defined Quality, CQMJ, 4, 3-36.
- Dejnaka, A., Kulig-Moskwa, K., Łobos, K., Nogieć, J., and Szewczyk, M. (2016). Students' perception of attributes of independent colleges of business profile in the market of higher education in Poland. *Management*, 20(2), 340-359.
- Dominici G., Palumbo F. (2013). The drivers of customer satisfaction in the hospitality industry: applying the Kano model to Sicilian hotels, *International Journal of Leisure and Tourism Marketing*, 3(3), 215-236.
- Haffer R. (2000). Satysfakcja konsumentów i jej pomiar, In: S. Sudoł, J. Szymczak, M. Haffer (eds), Marketingowe testowanie produktów, PWE, Warszawa.

- Haffer R. (2010). Metodyka pomiaru satysfakcji klientów jednostek samorządu terytorialnego powiatu toruńskiego, Toruń.
- Helgesen O., Nesset E. (2007). What accounts for students' loyalty? Some field study evidence, *International Journal of Educational Management*, 21(2), 126-143.
- Hill N., Alexander J. (2003). Pomiar satysfakcji i lojalności klientów, Oficyna Ekonomiczna, Kraków.
- Högström, C., Rosner, M., Gustafsson, A. (2010). How to create attractive and unique customer experiences: An application of Kano's theory of attractive quality to recreational tourism, *Marketing Intelligence&Planning*, 28(4), 385-402.
- Kano N., Seraku N., Takahash F., Tsuji Sh. (1984). Attractive quality and must-be quality, *Journal of the Japanese Society for Quality Control* (in Japanese), 14(2), 39-48.
- Psomas, E., and Antony, J. (2017). Total Quality Management Elements and Results in Higher Education Institutions: The Greek Case. *Quality Assurance in Education: An International Perspective*, 25(2), 206-223.
- Skrzypek A. (2007). Satysfakcja i lojalność klienta w otoczeniu konkurencyjnym, *Problemy Jakości*, 39(7), 4-12.
- Skrzypek E. (2002). Jakość i efektywność, UMCS, Lublin.
- Sobczyk G., Lipowski M. (2002). Czynniki kształtujące poziom satysfakcji klientów banku, In: L.Żabiński, K.Śliwińska (eds), Marketing. Koncepcje, badania, zarządzanie, PWE, Warszawa.
- Stefańska M. (2002). Programy lojalnościowe na rynku usług, In: Z. Kędzior, E. Kieżel (eds), Konsumpcja i rynek w warunkach zmian systemowych, PWE, Warszawa.
- Storbacka K., Lehtinen J.R. (2001). Sztuka budowania trwałych związków z klientami, Oficyna Ekonomiczna, Kraków.
- Teeroovengadum, V., Nunkoo, R., Grönroos, C., Kamalanabhan, T. J., and Seebaluck, A. K. (2019). Higher Education Service Quality, Student Satisfaction and Loyalty: Validating the HESQUAL Scale and Testing an Improved Structural Model. Quality Assurance in Education, 27(4), 427-445.
- Wojnarowska H., Adamska I. (2001). Proces kształtowania lojalności klientów indywidualnych, *Marketing i Rynek*, 8(12), 6-11.
- Wolniak R., Skotnicka B. (2008). Metody i narzędzia zarządzania jakością. Teoria i praktyka, Wydawnictwo Politechniki Śląskiej, Gliwice.

The Case of The European Manufacturer of Electronic Products – Integration Experiences. Plug & Play Supply Chain Integration Concept - IT Challenge

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Abstract

The paper presents the concept of supply chain (SC) integration by cloud and artificial intelligence (AI) based Plug & Play interface, which could improve the efficiency of SC partners. The case study of the European manufacturer of electronic products was based on an in-depth interview with a purchasing manager with experience in the electronic industry. Despite the enormous technological development of information technology (IT) systems applied in SCs, the level of SC integration is still at a very low level. On the one hand, this is due to the widespread low awareness regarding the untapped potential for improving efficiency through SC integration. On the other hand, there is a strong barrier of human possibilities in the context of the implementation of increasingly advanced and complicated IT systems, as well as high costs of their implementation. Therefore, a cheap and easily available IT tool is needed, which, thanks to the use of AI, will allow overcome human limitations and facilitate the integration of SC partners on a Plug & Play basis. The article is expected to help encourage: (1) software vendors to create a new standard of the cloud and AI based Plug & Play interface giving the possibility for each company all over the world to join an international industrial networking site and integrate its IT system (e.g. ERP with APS) with SCs; (2) focal companies to integrate downstream and upstream, active and passive partners in SCs by implementing the cloud-based Plug & Play interface.

Keywords: Bullwhip Effect, Plug & Play Supply Chain, ERP

Introduction

It is difficult to imagine a modern enterprise without any IT support today. However, the question should be asked whether the currently available technological solutions - IT systems in the context of managing not only the enterprise but SCs are sufficient, and if not, how the development should be directed and what goals should be set for the next decade.

Author will refer to the experience of the electronics industry, describing the case of the meter manufacturer and its experiments related to the supply chain integration (SCI).

Referring to IT systems, the author will focus on strictly logistics-related aspects, excluding areas related to finance, accounting, human resources, etc. which are not directly related to information and material flows in the SC and do not pose so many problems related to timely delivery, inventory management, effective production planning. Of course, financial flows are the fuel of material flows, but their transfer is already very efficient today and is not a problem compared to the allocation of components, which with a strong excess of demand reaches several dozen weeks in the electronics industry. The problem that logistics is really facing is balancing supply and demand. Therefore, one should pay attention to the key problem of "bullwhip effect" widely described by Lee at al. (1997), in push supply chains, and therefore when actual information on final demand is not immediately made available to all participants. This phenomenon means that slight demand changes at the level of the end-customer would increase the order amplitude and shortages upstream the SC. This reason leads to a situation in which, with dynamic market changes, new customer needs, product changes, short product lifecycles, or the components for production are missing and then the company incurs the loss

of sales. Or it remains with overcapacity and excessive inventories, which sometimes need to be scrapped or resold at a loss. The problem is not trivial, because it can significantly reduce the results of enterprises.

Kurt Salmon Associates (1993) estimated that the implementation of ECR (Efficient Consumer Response) was to bring savings of USD 10 billion in the food industry and reduce the inventory cycle by 41% from 104 to 61 days. It is worth adding here that ECR focuses only on the final part of the SC, from the manufacturer, through distribution, to retail. Fuller et al. (1993) confirmed that much of between 75 to 100 billion USD of inventory in the 300 billion USD United States grocery industry sales (per annum) was unproductive - "up to a third of total sales just trapped in the pipeline". Furthermore it was summarized - "In short, logistics are undermanaged. That is the opportunity." Although this reflection took place 30 years ago, it still seems to be right. Despite increased awareness among management and the development of IT systems, integration in SCs is still in its infancy.

In the era of widely available Internet and advanced information technologies, the author is convinced that there is a potential for cost reduction through the integration of information systems of active and passive participants of the SC by using a Plug & Play interface and AI. A proposal for such a solution has been presented in the last part of the work. And while in business practice similar initiatives are undertaken and already bring some positive effects, on the one hand they have very limited industry coverage. Most often they form enclaves of highly integrated business partners who exchange demand information upstream. On the other hand, even they do not provide within the feedback loop - downstream, complete and transparent information about up to date production capacity and how the production order is advanced.

Support of logistics processes by IT systems

Due to the limited scope of this article, the author will refer only to those IT solutions that should support SCI, i.e. primarily ERP II, ERP III, Logistics 4.0 and AI.

ERP (Enterprise Resources Planning) systems focus mainly on internal economic processes and their integration, including product distribution, production and supply planning, as well as finance, accounting, human resources. In turn, "ERP II class system can be identified as one optimizing business processes both internal, and the ones occurring in the company's close environment, by offering ready tools allowing for automation of data exchange with partners along the whole logistic chain" Bejger (2016). Bejger assumes that ERP II "solves a significant part of problems with proper servicing of supply chains" and it guarantees, among others: one source of truth; effective transfer of information; minimizing the time devoted to internal business processes, more resources devoted to customer service; checking variant availability; checking actual availability; generating dynamic BOMs and routings; quick and precise transfer of information to MRP, and further along the SC.

As Parys (2005) notes, the implementation of the integrated system is a strategic decision and the largest IT investment in the entire business of the enterprise. However, in the case of very large IT systems, such as ERP, the percentage of abandoned deployments was as much as 65%, and delayed over 21%. The average delay in implementation on the American market was from 6 to 12 months, and the cost increase was from 50 to 100%. In turn, Morris and Venkatesh (2010) cite studies according to which ERP failures is over 60%, and losses are estimated in the range of USD 6 to 100 million. One can see that the implementation of an ERP class integrated system is very difficult and carries a high risk of failure. All the more so the implementation of an even more extensive ERP II system, which may have modules SRM (Supplier Relationship Management), CRM (Customer Relationship Management), SCM (Supply Chain Management), APS (Advanced Planning and Scheduling), PLM (Product Life Management), SEM (Strategic Enterprise Management) (Adamczewski, 2005), raises the bar. Hence Haddara and Constantini (2017) prove that ERP systems are definitely more flexible and integration-ready than ERP II. In addition, it could be more economically feasible for enterprises to implement separate best-of-breed systems, like CRM or SCM, instead of one large system at once. It is worth mentioning here that the next, even more developed version is ERP III, towards integration between manufacturing enterprises and their downstream partners - mainly customers (also potential),

as well as social groups. The ERP III concept is mainly influenced by SOA (Service Oriented Architecture), cloud computing, business intelligence and knowledge management (Vasilev, 2013). Childerhouse et al. (2011) show that majority of studied organizations (regardless of industrial and business sectors, as well as countries) are “experiencing high levels of uncertainty, and are struggling with the fundamental challenges of removing internal boundaries and communicating order information along the supply chain". They summarize that SCI remains just a dream for many practising supply chain managers with the detriment of themselves and their SC partners.

As Tanajura Ellefsen at al. (2019) note Logistics 4.0 definitions are nebulous and the concept is not homogenous, thus it is already at initial stage of the development. Logistics 4.0 includes sources of data such as smart low battery consuming sensors, GPS, RFID tags, as well as the Internet of Things, drones, and innovative applications, making logistic processes smarter, more connected, automated and robotized, which undoubtedly improves logistic system performance and contributes to improved performance of SCs. The number of papers on Logistics 4.0 in combination with AI in Scopus or WoS by 2018 is only 16 items. Conducted preliminary research in Norway and Poland show that companies are classified as AI Novices. It is also stated that companies are not familiar with Logistics 4.0 solutions as well as they do not take advantage from AI potential.

To sum up, on the one hand the systematic development of IT systems is visible, on the other hand there are huge difficulties with their implementation within individual organizations and SCs. Evidently, the complexity of implemented systems often exceeds human capabilities and the support of AI is definitely needed, which in relation to logistics is only at the initial stage of the development.

Research Methodology

This study is based on a case study. The analysis was carried out on the basis of an in-depth interview with a purchasing department manager in a Polish company producing energy meters. Purchasing manager had almost 25 years’ experience in electronic industry and was personally engaged in described below business experiments of integrating supply chain. The respondent played the role of “key informant”. At the same time, the “principle in collection of data in case research” was followed using methods such as “direct observations, content analysis of documents, and archival research” (Voss et al. 2002).

Case study

Lost benefits of the energy meter manufacturer in the context of untapped potential of supply chain integration with IT systems and Internet technology support

In the context of the analyzed case, the Polish manufacturer of meters, for which sales depends on the results of tenders, cost management plays a key role. Material costs constitute the largest share among them. Therefore, the ability to obtain components at the lowest possible market costs is a critical condition for survival, especially given the extremely strong competition from the Far East. Thanks to the right purchasing strategy, the Polish producer managed to face Asian competition (Urbańczyk, 2018). It is also worth analyzing how the manufacturer handled logistics processes through the use of computer systems and Internet technology, whether any actions were taken related to SCI and whether were they effective. The audited company uses an integrated ERP management system. The production schedule in the ERP system is not supported by APS and does not provide complete and reliable information in relation to the current state of running production processes. Therefore, in order to check how many pieces are manufactured during the running production order, it is necessary to ask the production department. One can imagine that manual monitoring of hundreds of orders in a large company exceeds the possibilities of human genius. The problem is aggravated when tools or machines fail, when priority orders delay the execution of previously planned ones, when there are problems with the availability of components or semi-finished products, when the demand for products is increased and pressure is put to keep declared delivery times. The resulting chaos is difficult to control, delays

occur in deliveries, and what is worse, the customer is not even notified in advance and it is very difficult to determine a reliable delivery date.

The producer carried out three experiments related to the exchange of data with his suppliers. The first, right at the beginning of this century, was that suppliers were to supplement their inventory data in specially prepared tables available via a web browser. The experiment showed that suppliers supplemented the data sporadically. Entering data manually proved to be too time-consuming and the experiment ended in failure.

The second experiment, which began in 2002, concerned the disclosure of planning data in a web tender application for qualified distributors of electronic components. The distributor who submitted the most advantageous offer had access to information about inventory, submitted purchase orders (approved and sent to him) and planned purchase orders (which, have not yet been sent to him, visible throughout the planning horizon in the ERP system). The data was downloaded from the ERP system once a day and available on-line via a web browser. They were to help the distributor in making decisions when purchasing components with long delivery time so as to secure the manufacturer's needs in the long term. It turned out that the scheduled purchase orders, although subject to relatively low dynamics of changes in the context of quantities and deadlines, on the one hand were not reliable information (lower price could have been offered by another supplier and then the producer was not obliged to purchase the indicated quantities), on the other hand were not transferred directly to the distributor's IT system and hence were only used by him occasionally for decisions related to the creation of stock. In this context, the solution also did not pass the test, especially since the manufacturer did not have the opportunity to verify whether the distributor made the right purchasing decisions in a timely manner, what stock he maintains and what orders he has placed with the component supplier. Ultimately, the web tender application specified a minimum inventory, which the distributor was required to have, for a period corresponding to the production needs in accordance with the delivery time of the component, so usually it was a stock for about three months of production.

The third experiment, carried out in the years 2010 - 2014, involved the exchange of data between the manufacturer's and distributors' IT systems. Once a day (at night), a text file was sent automatically by e-mail, first from the manufacturer to the distributor, which contained all information regarding inventory, placed purchase orders, planned purchase orders (based on planned production orders in the ERP). The text file was downloaded automatically and processed in the distributor's IT system. As a result, a new text file was generated with information about: expected deliveries from manufacturers of electronic components and their current lead time (LT), available inventories for immediate resale, current available inventory dedicated exclusively to the meter manufacturer, as well as being on his way. The generated file was immediately sent by e-mail to the meter manufacturer. After receipt, it was automatically downloaded, and its data were placed in special tables, allowing the generation of freely filtered reports by the manufacturer's supply department employees. The manufacturer's material index was the key linking the manufacturer's and distributor's system data. The implementation cost was negligible, it only required the IT department to prepare e-mail addresses, set up jobs in the system, develop tables and simple algorithms to complete them and create reports. Neither the manufacturer nor the distributor had to hire additional people, and the IT work was carried out by internal IT departments. Unfortunately, the manufacturer lacked another step in the development of the application that would allow for intelligent processing of received data, and therefore the possibility of rapid recognition of LT in the context of customer inquiries for finished products, showing bottlenecks, anticipating the component unavailability issue for future purchase orders and generating alerts. It can therefore be concluded that the third project also ended in failure. Nevertheless, the idea was correct in the context of verification of events in subsequent links in the SC, i.e. distributors and manufacturers of electronic components. The analysis of the reports allowed for ongoing verification whether the distributor maintained the declared volumes of inventories, and above all, well in advance, revealed time gaps between the expected date of delivery of components to the distributor and the planned date of production of meters. Therefore, it gave time to take corrective actions at the current distributor or to organize deliveries from alternative distributors to maintain the flow of meter production. Unfortunately, the necessity to check hundreds of ordered components one by one meant that the

verification was selective and sporadic, thus insufficient, and did not allow for a lasting efficiency improvement.

The meter manufacturer therefore remained with a number of problems arising from the untapped potential of technological possibilities. This is particularly evident in the context of the specificity of the meter manufacturer. Its clients - power plants decide on tenders in which the first delivery of meters usually has to take place within 6 - 8 weeks. While the process of manufacturing of customized components by subcontractors, among others printed circuits, displays, shunts or terminals lasts about 3 - 6 weeks, which, together with a transport time of 4 - 6 weeks from Asia to Europe, makes it impossible to manufacture meters within the required time. Even worse is the issue of ordering electronic components, especially silicon based, whose natural production cycle is a minimum of 8 - 16 weeks, and in situations of increased demand it reaches up to several dozen weeks. In addition to the components delivery times, usually up to 3 weeks is needed to manufacture the meters. In view of such realities, the manufacturer of meters, placing a tender and knowing the date of the tender settlement, in advance, launches component orders so as to purchase them and bring them at the lowest possible cost. This is critically important in the context of a low bidding price due to the very strong competition, especially from the Far East. As a consequence, the manufacturer of the meters bears the risk that the ordered components will remain in stock if the tender is lost. If the tender for a given type of meter is repeated and it is won, then the components are consumed at a later date and the company bears only the costs of storage. Otherwise, components are basically suitable for scrap. Unfortunately, such situations do happen.

Figure 1 illustrates the situation described above, revealing an additional decision option for waiting with the launch of component orders until the tender is resolved.

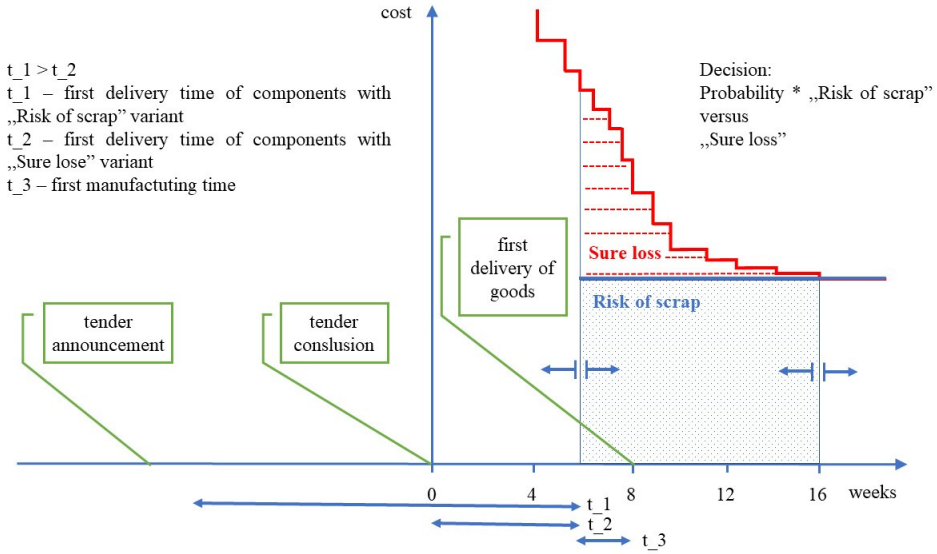

Fig. 1: Trade-off between sure loss and risk of scrap

An additional variant means that the costs of purchasing commodity components are definitely higher due to purchases on spot conditions (electronic components can be up to several times more expensive), while customized ones are slightly higher due to necessary overtime from manufacturers or earlier reservation of production capacity to reduce time delivery. In addition, there are many times higher costs of air transport instead of sea.

In view of the above, two problems are revealed, the first - the manufacturer of meters in practice does not consider the additional option to incur a sure loss for initial deliveries due to the very low sales margin, thus risking the necessity to scrap excessive inventories. This behavior has been explained by Kahneman (2012), a Nobel laureate, who indicates that with high probability of losses, the decision

maker rejects a favorable settlement, showing a propensity for risk seeking. This is economically irrational behavior. When considering the situation of the meter manufacturer, it should be noted that on the one hand, it should analyze both variants. On the other hand, when comparing the results, i.e. a sure loss and cost of scrap (after taking into account the probability of winning a tender), the company should make an economically rational decision, regardless of its emotional attitude. In addition, it would be advisable to configure variants for component types or even individual components, which could further reduce potential losses.

The second problem is that the manufacturer does not have an IT tool to calculate both variants. The purchasing manager is not able to present trade-off in real time in the context of components delivery times and the cost of their purchase. He has the knowledge of LT under normal conditions at fixed prices. These parameters are entered in the ERP system, while LT parameter is not even differentiated in the context of the size of the ordered batch. In addition, any deviations resulting from the dynamically changing availability of production capacity or suppliers' inventories in subsequent links of the chain are no longer visible. Therefore, in order to recognize the real LT, the purchasing department would have to send inquiries to first-tier suppliers, and those to second-tier suppliers, etc. The process of obtaining information would certainly take several days, and at the time of sharing it would be outdated to some extent. The matter becomes much more complicated when additional costs have to be calculated with shortened delivery times. Although the manufacturer would care about gaining every day, obtaining information, identifying bottlenecks and mutual arrangements would take many days. Thus, dynamic consideration of variants, their comparison and creation of different configurations was in practice unattainable.

Only the integration of IT systems of all SC partners upstream, equipped with APS (with monitoring of production processes in real time), through the appropriate interface, gives a chance for effective communication. However, the real challenge for software vendors is the dynamic, without human intervention, introduction into production schedules of additional variants of an earlier production capacity reservation or LT acceleration and their valuation (with the possibility of taking into account previously negotiated conditions). It would also be necessary to include transport services and their dynamic valuation in the context of the selection of different variants.

IT challenge - Plug & Play Supply Chain Integration Concept

Taking into consideration mentioned constraints the new IT challenge appears. There is an opportunity to create the new standard of cloud and AI based Plug & Play interface giving the possibility for each company all over the world to join international industrial networking site and integrate its IT system (e.g. ERP with APS) with supply chains. It should meet several conditions:

- cloud and AI based,
- cost free (source of income for software vendor e.g. from advertising),
- widely available (using Internet, similar to social networking site),
- flexible,
- easy to implement.

Cloud and AI based Plug & Play interface should provide along the entire SC:
- visibility of inventory and available production dates and capacities,
- visibility of current and forecast LT depending on the volume of demand,
- possible variants of capacity reservations, when the demand is unknown (e.g. tenders),
- possible variants of delivery acceleration (shipping or manufacturing),
- possibility to plug in potential participants,
- matching indexes of participants by types, parameters, descriptions,
- possible variants of delivery with active or passive participants,
- cost calculations based on standard or fixed prices,
- possibility of ordering.

Requirements for SC participants would be following:
- sharing inventories and capacities,

- supplying true data in real time,
- sharing price lists of products or services – standard (available for all connected customers) or agreed (only for dedicated customers).

However, the key issue is to disseminate the solution in order to reduce integration costs, and above all through the involvement of all participants of all related industries, to obtain a full dynamically changing picture of the availability of semi-finished products and manufacturing capacity in SCs. Moreover, production schedules of all subsequent participants in the chain would be in line with the final demand at the same time. It is important to ensure interoperability of commonly functioning data formats, so that each enterprise is free to choose the supplier of the IT system. Just as Internet technology had spread around the world, allowing its users to freely use the built-in functions, despite the different web browsers and the vastness of different companies creating websites in different programming languages, so one can imagine that companies that will want to cooperate with each other they will clash together creating a worldwide network of mining, production, distribution, wholesale, retail and transport companies, serving global demand. It can be expected that orchestrators (fifth-party logistics, 5PL) will play an alternative role to the presented concept by providing cloud based IT systems with embedded communication interfaces.

Only the transparency of information and material flows in the production, distribution and transport processes of SC partners in real time would bring milestone in relation to SCM. However Torres and Maltz (2010) state that visibility to market demand is very helpful, but even then, supply chain managers' choices can result in unexpected results. A responsible supply chain manager has to choose not only a strategy (TOC, Kanban, APS, ERP or other), but also inventory targets and a tolerable level of variability in the network. Hence, the role of man would be reduced to connect via a Plug & Play interface with the SC, conducting negotiations, intervening in relation to bottlenecks, parameterizing the system, while artificial intelligence would help man in preparing what-if scenarios and ultimately selecting the optimal trade-off in the context of the delivery time of components and the cost of their acquisition.

Conclusions

In the context of low integration of supply chain partners, and therefore a lack of transparency along supply chains that have the negative consequences of the bullwhip effect, it is necessary to continue the development of IT systems to improve the efficiency of supply chains through their integration. The proposed Plug & Play supply chain integration concept meets this need. Among others, it allows for better risk and cost management in the context of available scenarios of the delivery time of components and the cost of their acquisition, better utilization of production capacity, shortening of purchasing cycles, reduction of production downtime due to stockouts, reduction of excessive inventories and risk of their scrapping. To implement the proposed concept there is a need on the one hand to educate the management in the context of the negative financial consequences of the bullwhip effect (the problem of balancing supply and demand). On the other hand, software vendors should provide widely available, cheap, flexible and easy-to-use cloud-based Plug & Play interfaces using AI to improve the efficiency of supply chains through their integration.

Will software vendors and supply chain leaders see the benefits of such a configured supply network, maybe in a slightly different way? This question remains unanswered, especially since the most technologically advanced automotive industry is mainly focused on integrating flows with first-tier or at most second-tier suppliers, as mentioned by Harrison et al. (2014) in case study about smart cars. Sakuramoto et al. (2019) note that automakers integrating with second-tier suppliers tend to have higher profit margins. Unfortunately, while first-tier or possibly second-tier suppliers work in a pull system, the upstream suppliers in subsequent links still work on the basis of a push system, based on forecasts and exposed to the economically negative consequences of the bullwhip effect. Since car manufacturers, due to the advantage of their bargaining power, have already shifted the burden of maintaining inventory and responsibility for timely delivery of components to first-tier suppliers, will see the benefits of integrating the entire supply chain?

References

- Adamczewski P., (2005) '*Systemy ERP II jako wsparcie e-biznesu*,' in book: Problemy Społeczeństwa Globalnej Informacji: Komputer – przyjaciel czy wróg, Editors: Szewczyk A., Publisher: Uniwersytet Szczeciński, 331-337.
- Bejger, S. (2016) 'The specifics of supply chain of medical kits product group in the context of using Enterprise Resource Planning class systems,' *Economics and Law*, 15 (4), 419-438.
- Childerhouse P., Deakins E., Böhme T., Towill D.R., Disney S.M. and Banomyong R. (2011), 'Supply chain integration: an international comparison of maturity,' *Asia Pacific Journal of Marketing and Logistics*, 23 (4), 531-552.
- Fuller J.B., O'Conor J. and Rawlinson R. (1993), 'Tailored logistics: the next advantage,' *Harvard Business Review,* May-Jun, 71 (3), 87-98.
- Haddara, M. and Constantini, A. (2017), 'ERP II is Dead- Long Live CRM,' International Conference on Project MANagement (ProjMAN), 8-10 November 2017, Barcelona, Spain, *Procedia Computer Science*, 121, 950-959.
- Harrison, A., van Hoek, R. and Skipworth, H. (2014) Logistics management and strategy : competing through the supply chain, Pearson, Harlow.
- Kahneman, D. (2012) Thinking, Fast and Slow, Penguin Books, London.
- Kurt Salmon Associates (1993) Efficient consumer response: enhancing consumer value in the grocery industry, The Research Department Food Marketing Institute, Washington D.C.
- Lee, H.L., Padmanabhan, V. and Whang, S. (1997), 'Information Distortion in a Supply Chain: The Bullwhip Effect,' *Management Science*, 43 (4), 546-558.
- Morris, M.G. and Venkatesh, V. (2010), 'Job Characteristics and Job Satisfaction: Understanding the Role of Enterprise Resource Planning System Implementation,' *MIS Quarterly*, 34 (1), 143-161.
- Parys, T. (2005) 'Bariery wdrożeniowe systemu zintegrowanego klasy ERP i ich postrzeganie przez użytkowników,' in book: Informacja w społeczeństwie XXI wieku, Edition: Monografie i Opracowania nr 540, Publisher: Wydawnictwo SGH, Editors: Rószkiewicz M., Wędrowska E., 171-182.
- Sakuramoto, C., Di Serio, L. and Bittar, A. (2019), 'Impact of supply chain on the competitiveness of the automotive industry,' *RAUSP Management Journal*, 54 (2), 205-225.
- Tanajura Ellefsen A.P., Oleśków-Szłapka J., Pawłowski G. and Toboła A. (2019), 'Striving for excellence in AI implementation: AI Maturity Model framework and preliminary research results,' *LogForum*, 15 (3), 363-376.
- Torres, O.C. and Maltz, A.B. (2010) 'Understanding the Financial Consequences of the Bullwhip Effect in a Multi-Echelon Supply Chain,' *Journal of Business Logistics*, 31 (1), 23-41.
- Urbańczyk, T. (2018) 'Strategic approach to purchasing process in the European manufacturer of electronic products,' *Journal of Positive Management*, 9 (1), 83-96.
- Vasilev, J. (2013) 'The change from ERP II to ERP III systems,' Proceedings of International Conference on Application of Information and Communication Technology and Statistics in Economy and Education (ICAICTSEE), 1/2013, 382-384.
- Voss, C., Tsikriktsis, N. and Frohlich, M. (2002), 'Case research in operations management,' *International Journal of Operations & Production Management*, 22 (2), 195-219.

Emerging Topics in Sustainable Management Research: Management and Economic Perspective

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Abstract

The aim of the study is to identify and explore emerging topics in the sustainable management research field. The research process is driven by the two following questions: (1) are the topics attracting the most of the academia's attention still up-to-date issues? (2) what are the emerging topics of research inquiry in the field? Keywords co-occurrence analysis of bibliometric data retrieved from Scopus points out the following emerging topics: supply chain management, solid waste and recycling, life cycle assessment, climate change and sustainable tourism.

Keywords: Sustainability, Sustainable Management, Bibliometrics, Keywords Co-Occurrence Analysis.

Introduction

Over the last decade, sustainability has become a field of interest for researchers (e.g. Heinberg, 2007; Rainey, 2008; Brown, 2011). Growing attention concerning sustainability issues implies increasingly strong legislation, international environmental management standards, appearance of new responsibility metrics and reporting standards etc. These circumstances force enterprises to adopt different ('greener') approaches not only to retain their licence to operate but also to remain competitive. Sustainability incorporates three dimensions (or value categories): environment, society, and economy, which are otherwise known as People, Planet, and Profit (Porras, 1992). Thus, nowadays the business is increasingly focusing on incorporating a triangle of economic, environmental and social dimensions while making ethical management decisions about corporate growth and development (Łapińska et. al., 2019; Liczmańska-Kopcewicz et al., 2019). In times of such challenges as global warming, pollution and the depletion of natural resources, increasing carbon emission etc., all organizations need to learn how to reduce, reuse and recycle to protect the planet while taking care of society and maximizing profit at the same time. The above mentioned issues constitute a research field of sustainable management. Sustainable management adopts the sustainability idea and synthesizes it with the concepts of management. It means creating the ability to keep a system running without depleting resources, maintaining economic viability as well as nourishing the needs of the present and future generations. In consequence, sustainable management covers many areas and aspects. It refers to applying sustainable practices in the field of businesses, agriculture, society, environment, and personal life by managing them in a way that will benefit current and future generations (Leone & Belingheri, 2017).

The aim of the study is to identify and explore the emerging research topics in the sustainable management research field. Due to the background and research interest of the authors, the study is conducted from the perspective of management studies and economics. The research process is driven by the two following research questions: (1) are the topics attracting the most of the academia's attention still up-to-date issues? (2) what are the emerging topics of research inquiry in

the field? In the research process we employ the method of keywords co-occurrence analysis, which has been found to be effective in mapping neighboring research fields such as e.g. sustainability (Guo, et al., 2017) or the concept of sustainable enterprise / sustainable organization (Lis, 2018).

Theoretical Grounding

Several researchers in the field propose the expression 'sustainability management' in terms of integrating three above said sustainability dimensions into business practices. Starik and Kanashiro define sustainability management as "formulation, implementation, and evaluation of both environmental and socioeconomic sustainability-related decisions and actions" (Starik & Kanashiro, 2013, p. 12), referring to the previous works of Elkington (1998), Stead and Stead (2004) or Bell and Morse (2008). In a similar vein, Hörisch, Freeman and Schaltegger (2014) claim that sustainability management refuses the idea of separating ethical issues from business as the concept does not perceive business and ethics as conflicting but as fundamentally interconnected. They point out that an enterprise does not create economic value simply as an end in itself but also delivers value added back to the whole society. Also Schaltegger and Burrit (2005) argue that sustainable management requires companies to provide an important contribution toward sustainable development of both the economy and the society. Given the above explanations of sustainable management, we can state that the core of the concept is going beyond maximizing short-term profits and instead focusing on long-term gains by creating synergies and mutuality between different interests of business, society and the environment (Hörisch et al., 2014). The holism of the analyzed concept is highlighted by Starik and Kanashiro (2013) who conceptualize sustainability management as a systematic approach towards long-term quality of life improvement.

A growing interest of the academia in exploring the issues of sustainable management is confirmed by the amassing scientific output collected in bibliometric databases. As of 25 January 2020, we retrieved 1,663 Scopus-indexed publications comprising the phrase 'sustainable management' in their titles (Title Search). Extending the scope of search to include titles, keywords and abstracts (Topic Search) brought 11,022 bibliometric records. A similar query conducted in the Web of Science Core Collection database resulted respectively in 1,336 items for Title Search and 8,642 items for Topic Search. What is more, in the 2010s high dynamics of the increase in research production in the field has been observed.

Nevertheless, growing research production in the research field focused on sustainable management has not been profiled and mapped through bibliometric studies. In order to validate that the identified research gap in the body of knowledge really exists, we scanned publications related to sustainable management, indexed in Scopus and Web of Science Core Collection databases. We searched for the following combination of phrases: Title Search ('sustainable management') AND Topic Search ('bibliometric' OR 'bibliometrics' OR 'scientometrics' OR 'informetrics'). As a result of the query, we retrieved 6 items from Scopus and 5 from Web of Science Core Collection (which were duplicates of records indexed in Scopus). One of the retrieved items (Regolini et al., 2013) appeared to relate to library studies, and management of resources of electronic periodicals in particular, rather than sustainability issues. All the remaining publications focus their attention on bibliometric analysis of some specific aspects of sustainable management e.g. sustainable management accounting (Zyznarska-Dworczak, 2018), ecosystems e.g. cork oak (Leal et al., 2019), areas e.g. roadside verges (Bautista Rodriguez et al., 2018), resources e.g. metals (Aznar-Sánchez, Velasco-Muñoz, García-Gómez, & López-Serrano, 2018) or wastes e.g. mining waste (Aznar-Sánchez, García-Gómez, Velasco-Muñoz, & Carretero-Gómez, 2018). It means that the sustainable management research field, considered as a whole, has not been yet mapped with the use of bibliometric methodology, which indicates a research gap. Contributing to filing the discovered gap is the motivation of undertaking this study.

Method of study

Research sample

Scopus was the source of bibliometric data retrieved for the purposes of the sampling process. We searched for the phrase 'sustainable management' in the titles, keywords and abstracts (Topic Search) of publications categorized within the subject areas of Business, Management and Accounting, and Economics, Econometrics and Finance. No limitations regarding the date of publication were imposed. We retrieved 919 bibliometric records (publications), distributed over 20 subject areas. Certainly, Business, Management and Accounting (with 578 publications), and Economics, Econometrics and Finance (459) are the most often represented subject areas. However, they share numerous publications with other subjects areas, among which the most prominent are: Environmental Science (403), Social Sciences (377), Agricultural and Biological Sciences (173), Engineering (155) and Energy (105). The earliest publication dates back to 1992. Nevertheless, in the 1990s, only a few publications were issued every year. In the 2000s, the number increased up to several items per year. The dynamics of growth in research production in the field has been observed in the 2010s – the number of items increased from 38 in 2011 up to 137 in 2019. The majority of the research output is made by journal articles (77%), and is written in English (96%). The detailed parameters of the publications comprising research sample are provided in Table 1.

Table 1: Parameters of the research sample

Category	Items (occurrences)
Date (year) of publication	2020 (16); 2019 (137); 2018 (112); 2017 (94); 2016 (69); 2015 (78); 2014 (61); 2013 (47); 2012 (44); 2011 (38); 2010 (42); 2009 (27); 2008 (25); 2007 (22); 2006 (23); 2005 (15); 2004 (11); 2003 (11); 2002 (12); 2001 (7); 2000 (4); 1999 (7); 1998 (4); 1997 (2); 1996 (5); 1995 (2); 1994 (1); 1993 (2); 1992 (1)
Subject areas (overlapping)	Business, Management and Accounting (578); Economics, Econometrics and Finance (449); Environmental Science (403); Social Sciences (377); Agricultural and Biological Sciences (173); Engineering (155); Energy (105); Decision Sciences (57); Arts and Humanities (33); Computer Science (31); Earth and Planetary Sciences (18); Materials Science (12); Medicine (7); Chemistry (4); Multidisciplinary (4); Psychology (4); Chemical Engineering (3); Mathematics (3); Biochemistry, Genetics, and Molecular Biology (1); Nursing (1)
Document type	Article (708); Conference Paper (66); Book Chapter (55); Review (42); Book (29); Editorial (7); Short Survey (4); Note (2); Letter (1); Undefined (5)
Language	English (880); Spanish (12); Portuguese (11); German (9); French (8); Russian (3); Chinese (2); Lithuanian (2); Ukrainian (2); Romanian (1); Undefined (1)

Source: Own study based on data retrieved from Scopus (25 January 2020).

The retrieved publications include in total 5,466 author and index keywords. Among them, there are 4,262 expressions which occurred only once. Thus, using the formula provided by Donohue (1974; as cited in: Guo et al., 2017, p. 7), we calculated the number of high-frequency keywords (92) and identified a relevant threshold of minimum number of occurrences (10). This threshold is achieved by 106 keywords to be taken for further analysis.

Research Methods and Instruments

In the research process we employed the method of keywords co-occurrence analysis (He, 1999). The process of analysis was supported with the use of VOSviewer software, developed by the researchers of the University of Leiden, the Netherlands (van Eck & Waltman, 2010, 2018). The parameters of VOSviewer used for analysis are presented in Table 2.

Table 2: VOSviewer parameters used for analysis

Item	Characteristic/ value
Type of analysis	Co-occurrence analysis
Unit of analysis	All keywords
Counting method	Full counting
Method of normalization of strength of the links between items	Association strength method
Layout	
Attraction	2 (default setting)
Repulsion	0 (default setting)
Clustering	
Resolution parameter (detail of clustering)	1 (default setting)
Minimum cluster size [N]	1 (default setting)
Merging small clusters	Switched on
Visualization	
Scale	2.00 (Fig. 1), 1.20 (Fig. 2)
Weights	occurrences
Labels size variation	0.00 (Fig. 1), 0.50 (Fig. 2)
Maximum number of lines	1000
High frequency keywords used for analysis [N]	106
Minimum occurrences of a keyword used for analysis [N]	10

Source: Own study with use of VOSiewer (25 January 2020).

Results Presentation

Identifying High Frequency-Keywords in The Research Field

We used the item density visualization function of VOSviewer to recognize the most prominent keywords in the research field representing the leading topics attracting the attention of researchers (cf. Figure 1).

Figure 1: High-frequency keywords in the sustainable management research field

Source: Own study based on data retrieved from Scopus and analyzed with the use of VOSviewer (25 January 2020).

Taking into account the number of occurrences (i.e. the number of documents in which an item is reported) as well as standard weight attributes i.e. links and total link strength, the following expressions are found to be the most prominent keywords in the research field: 'sustainable development', 'sustainable management' and 'sustainability'. As explained by the van Eck and Waltman (2018, p. 5), "For a given item, the Links and Total link strength attributes indicate, respectively, the number of links of an item with other items and the total strength of the links of an item with other items". The top 10 high-frequency keywords in the field and relevant bibliometric data (the number of occurrences and links, total link strength, the average year of publication) are provided in Table 3.

Table 3: Top 10 high-frequency keywords in the sustainable management research field

Keywords	Occurrences	Links	Total link strength	Average publication year
sustainable development	307	105	1159	2013.96
sustainable management	255	101	902	2014.98
sustainability	168	98	528	2013.17
decision making	52	82	262	2013.92
environmental management	49	76	237	2014.57
waste management	46	69	263	2015.33
fishery management	37	32	106	2012.86
biodiversity	36	54	130	2012.89
ecotourism	34	36	106	2011.62
economics	33	63	194	2012.91

Source: Own study based on data retrieved from Scopus and analyzed with the use of VOSviewer (25 January 2020).

In general, the top 10 high-frequency keywords should be considered as mature taking into account the average publication year (ranging in 2011-2015). 'Waste management' (2015.33) is the newest one among them. It means that the expressions characterized by the highest number of occurrences, i.e. manifesting the topics attracting the most of the academia's attention, can hardly be recognized as up-to-date issues. Therefore, in the second step of the study, we used the average publication year as the category to rank the high-frequency keywords in the research field in order to map emerging research topics.

Visualizing Publication Date of High Frequency-Keywords in the Research Field

We used the overlay visualization function of VOSviewer to identify the most up-to-date keywords representing emerging topics in the research field (Figure 2). As explained by the designers of the VOSviewer application (van Eck & Waltman, 2018, p. 9), in overlay visualization scores are assigned to bibliometric items used for analysis. Using the date of publication as such a score, the map visualizes the average publication date for each item (keyword). The colors in the map range from blue (representing the earliest publications) to green and yellow (visualizing the newest publications).

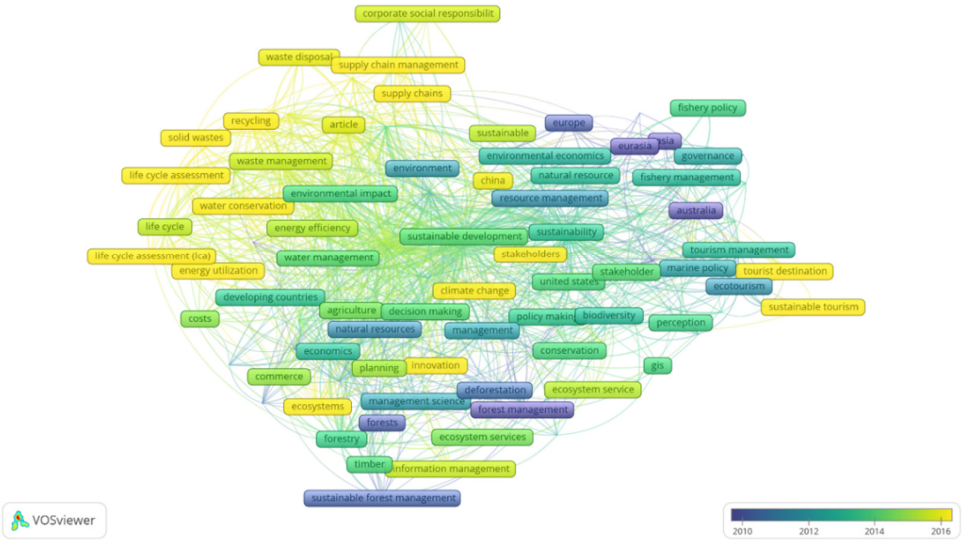

Figure 2: Average date of publication of high-frequency keywords in the sustainable management research field

Source: Own study based on data retrieved from Scopus and analyzed with the use of VOSviewer (25 January 2020).

Among the high-frequency keywords, the following expressions are found to represent the most up-to-date average year of publication (2017.00 and beyond): 'supply chains', 'solid waste', 'risk assessment', 'supply chain management', 'sustainable tourism'. They are followed by 10 other expressions with the average publication year ranging between 2016.00 and 2017.00. All these keywords may be considered as indicators of emerging topics within the research field. Their detailed bibliometric characteristics are presented in Table 4.

Table 4: Bibliometric characteristics of the most up-to-date keywords in the sustainable management research field (sorted by date)

Keyword	Average publication year	Occurrences	Links	Total links strength
supply chains	2017.64	11	32	62
solid waste	2017.44	16	33	86
risk assessment	2017.33	12	31	54
supply chain management	2017.33	15	31	70
sustainable tourism	2017.00	12	9	18
water conservation	2016.92	12	32	86
recycling	2016.88	32	58	211
energy utilization	2016.67	12	27	50
life cycle assessment (LCA)	2016.62	13	36	103
climate change	2016.50	22	41	83
innovation	2016.16	19	29	60
efficiency	2016.12	17	41	85
stakeholders	2016.10	10	17	23
life cycle assessment	2016.07	14	38	105
tourist destination	2016.00	11	19	45

Source: Own study based on data retrieved from Scopus and analyzed with the use of VOSviewer (25 January 2020).

Discussion

The data presented in Table 4 point out five keywords that we consider as worth noticing among emerging research topics, i.e.: (1) 'supply chain management', (2) 'solid waste and recycling', (3) 'life cycle assessment', (4) 'climate change' and (5) 'sustainable tourism'. These keywords, recognized as the emerging topics, prove the complex but at the same time holistic nature of sustainable management. In recent years, implementing sustainability issues has become a major concern for organizations' policies along their supply chains. Also the academia has shown enormous interest in the field of supply chains as confirmed by data presented in Figure 2, pointing out the leading keywords in the sustainable management research field. As already mentioned, a focus on sustainable management means anticipation of future consequences resulting from today's decisions and activities. Given contemporary challenges concerning climate changes, resource depletion, environmental pollution etc., modern supply chain management forces companies to incorporate economic, social and environmental dimensions (Seuring, 2013; Seuring & Müller, 2008) along the whole supply chain. In turn, in recent years the academia has shown growing interest in sustainable supply chain management that interlinks the concepts of supply chain management and sustainability (Pagell & Wu, 2009). It has been already recognized that supply chains are dynamic systems still evolving towards more sustainable practices. However, while following the works related to incorporating sustainability into supply chains, one can easily find out several research driven by different subthemes such as: environmental management and, decision making approach, supplier evaluation and selection, risks management, reverse logistics. The problems concerning supply chain management are directly related to another topics attracting the most of the academia's attention nowadays which are solid waste and recycling. The phrase 'solid waste' refers to the useless, unwanted and discarded materials resulting from day to day activities in the community. Solid waste management is explained as the activities comprising the control of generation, storage, collection, transfer, processing and disposal of solid waste. Recycling means separating, recovering, and reusing components of solid waste that may still have economic value. The academia's interest regarding recycling is related to the fact that being a process of converting waste materials into new materials and objects, recycling can help save lower greenhouse gas emissions that is so important today. Nowadays, while the world population grows, the solid waste generation increases as well. Taking into account societies' increasing awareness and concern about the environment, the need for sustainable waste management, including recycling becomes a priority of the 21st century. However, the proper management of solid waste requires an appropriate technology that is economically affordable, socially accepted and environmentally friendly. Collection, transport, treatment as well as disposal of solid wastes, particularly generated in medium and large cities, have become difficult problems to solve for those who are responsible for their management. As noted by several researchers, there is a relationship between public health status and proximity to waste management areas. It has been recognized that sometimes residents of nearby areas suffer from diseases, such as cancer (Rabl et al., 2008; Deacon et al., 2009; Ranzi et al., 2011). Hence, another significant dimension of a sustainable waste management system is societal acceptance (Handakas & Sarigiannis, 2012).

The findings regarding the newest keywords in the studied research field confirm that issues related to life cycle assessment and climate change attract academia as well. It is worth noticing that all above said pathways (supply chain, solid waste and recycling, life cycle assessment and climate change) are closely related to environmental issues. **Life cycle assessment** (LCA) is a holistic approach to environmental interactions, which covers a range of activities, from the extraction of raw materials acquisition, the production and distribution of energy, through the use, and reuse as well as waste management (McManus & Taylor, 2015). McManus and Taylor (2015) highlight that sustainability policies around the globe are increasingly turning to LCA to guide difficult decisions and select between technology paths. This results from the fact that LCA is a relative tool designed for helping decision makers compare all major environmental impacts when choosing between alternative courses of action. The aforementioned authors present the scope of use for LCA, claiming that it may be effectively applied not only by the business sector but also by policy makers. Moreover, they emphasize the changing nature of LCA by examining its evolution and pointing out the future directions of the approach development as well as emerging challenges.

The fourth topic recognized as emerging in the field of sustainable management refers to climate change. **Climate change** is one of the most challenging issues faced by mankind in the 21st century. What is important, the assessment of the causes and impacts of climate change goes beyond a single component, sector, field, or discipline. Hence, the issues of economic development and growth as well as climate change are closely related. Economic growth results in resource consumption and creating more and more pollution. On the other hand economic development can promote the popularity of low-carbon and energy-saving technologies. In turn more capital is applied to the clean sectors. Technological progress enables companies to enhance energy utilization efficiency and reduce the discharge of carbon dioxide. Additionally, it has been observed that economic growth accelerates the optimization of the industrial structure and the energy consumption structure (Ma & Jiang, 2019).

As argued by Hafezi et al. (2018), the processes of mitigating and managing the concerns related to climate change, should be considered as a whole system with the inclusion of its wide range of components across social, environmental, organizational, and conceptual boundaries. The impacts of climate change are also considered from the perspective of tourism. Thus, it is not surprising that the last of the topic areas identified as emerging in the research field is sustainable tourism. **Sustainable tourism** is defined as all forms of activities, management and development of tourism aimed at preserving natural, economic and social integrity and ensuring maintenance of natural and cultural resources (Niedziółka, 2012). The research on sustainable tourism is closely linked to the problem of climate change caused by carbon dioxide emissions. As noted by Lenzen et al. (2018), tourism's global carbon footprint has been constantly increasing. Therefore, due to its high carbon intensity and continuing growth, tourism will constitute a growing part of the world's greenhouse gas emissions. This phenomenon implies the change of researchers' interest from the question how climate change will alter tourism into the direction regarding the impact of tourism on climate change and general environmental protection.

Conclusions

Concluding, the study has identified and explored emerging topics in research on sustainable management. Thanks to applying the analysis of co-occurrence of high-frequency keywords in the research field combined with their time distribution and total links strength, five areas have been identified as emerging topics: 'supply chain management', 'solid waste and recycling', 'life cycle assessment', 'climate change' and 'sustainable tourism'.

The keywords recognized as the emerging topics confirm multifaceted and holistic gist of sustainable management. It is a multidimensional concept that limits economic growth to the capacity of nature for self-regeneration as well as places respect for human conditions and environmental quality. Consequently, the idea of sustainable management implies redefinition of several issues referring to decision-making along supply value chains, redefinition of predominant patterns of doing business, redefinition of the relationship between human beings and nature as well as creating social wealth and equity. The study raises awareness of possibility to balance fundamentally divergent requirements related to economic, social and environmental dimensions in the process of development and value creation. The identified emerging topics are interrelated and point the important research trends allowing to ensure that human activities will not erode land, air or water resources. Such research pathways as supply chain management, management, life cycle assessment, climate change or sustainable tourism focus on sustainable use of renewable resources, elimination of harmful materials and technologies, reducing global warming etc. which is nowadays necessary for meeting three-dimensional imperative of sustainable management. The study builds up the added value for the research practice through indicating emerging topics of scientific inquiry related to sustainable management from both management and economic perspectives. Its originality derives from employing bibliometric methodology based on keywords co-occurrence analysis, which has not been done before.

We are aware of the limitations of our study. First of all, the study employs only one research method which may be considered as a weakness. Secondly, the research sample includes publications indexed

in only one bibliometric database – Scopus. We are aware that relying on one database may result in some biases, for example the bias towards publications written only in English. In order to mitigate the aforementioned limitations, in further research it is recommended to employ other research methods to ensure triangulation and increase objectivity of the research findings and replicate the study with the use of data retrieved from other bibliometric databases. Among implications of our study and problems inspiring for further research we point out the issues of sustainable production and consumption allowing to do more with fewer resources. This is related to another significant research pathway referring to technological advances and innovation supporting sustainable management, e.g. applying IT revolution in sustainable management. Furthermore, the research on sustainable infrastructure, energy efficiency and renewable energy seem to be of high importance due to contemporary climate change challenges. Finally, the study inclines to pay research attention to science and policy interface focused on an integrative approach to addressing the contradictory context of economic, social and environmental aspects that can build on their synergies while alleviating their trade-offs.

References

- Aznar-Sánchez, JA., García-Gómez, JJ., Velasco-Muñoz, JF., and Carretero-Gómez, A. (2018), 'Mining waste and its sustainable management: Advances in worldwide research,' *Minerals*, *8*(7), art. 284.
- Aznar-Sánchez, JA., Velasco-Muñoz, JF., García-Gómez, JJ., and López-Serrano, MJ. (2018), 'The sustainable management of metals: An analysis of global research,' *Metals*, *8*(10), art. 805.
- Bautista Rodriguez, CS., Camargo Pardo, M., Morel, L., and Bachmann, C. (2018), 'Sustainable management of roadside: Towards a research agenda,' *2018 IEEE International Conference on Engineering, Technology and Innovation, ICE/ITMC 2018*, 17-20 June, 2018, Stuttgart, Germany, art. 8436326.
- Bell, S., and Morse, S. (2008). *Sustainability Indicators: Measuring the Immeasurable?,* Earthscan, London.
- Brown, L. (2011), *World on the Edge: How to Prevent Environmental and Economic Collapse*, Norton, New York.
- Deacon, L., Pankhurst, L., Liu, J., Drew, GH., Hayes, ET., Jackson, S., Longhurst, J., Longhurst, Ph., Pollard, S., and Tyrrel, S. (2009), 'Endotoxin emissions from commercial composting activities,' *Environmental Health: A Global Access Science Source*, *8*(S1), art. S9.
- Donohue, JC. (1974), *Understanding Scientific Literature: A Bibliometric Approach*, MIT Press, Cambridge.
- Elkington, J. (1998), *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*, New Society, Gabriola Island, Canada.
- Guo, D., Chen, H., Long, R., Lu, H., and Long, Q. (2017), 'A co-word analysis of organizational constraints for maintaining sustainability,' *Sustainability*, *9*(11), art. 1928.
- Hafezi, M., Sahin, O., Stewart, RA., and Mackey, B. (2018), 'Creating a novel multi-layerd integrative climate change adaptation planning approach using a systematic literature review,' *Sustainability*, *10*(11), art. 4100.
- Handakas, EJ., and Sarigiannis, DA. (2012), 'Solid waste management: A systems approach,' *Fresenius Environmental Bulletin*, *21*(11 A), 3330–3336.
- He, Q. (1999), 'Knowledge discovery through co-word analysis,' *Library Trends*, *48*(1), 133–159.
- Heinberg, R. (2007), *Peak Everything: Waking up to the Century of Decline in Earth's Resources*, Clairview, London.
- Hörisch, J., Freeman, RE., and Schaltegger, S. (2014), 'Applying stakeholder theory in sustainability management: Links, similarities, dissimilarities, and a conceptual framework,' *Organization and Environment*, *27*(4), 328–346.
- Łapińska, J., Escher, I., Kądzielawski, G., and Brzustewicz, P. (2019), 'Działania społeczne na rzecz zrównoważonego rozwoju przemysłu cementowego w Polsce – dobra praktyka,' *Cement Wapno Beton, 6*, 462–470.
- Leal, AI., Correia, RA., Palmeirim, JM., and Bugalho, MN. (2019), 'Is research supporting sustainable management in a changing world? Insights from a Mediterranean silvopastoral system,' *Agroforestry Systems*, *93*(1), 355–368.

- Lenzen, M., Sun, Y-Y., Faturay, F., Ting, Y-P., Geschke, A., and Malik, A. (2018), 'The carbon footprint of global tourism,' *Nature Climate Change*, *8*(6), 522–528.
- Leone, MI., and Belingheri, P. (2017), 'The relevance of innovation for ethics, responsibility and sustainability,' *Industry and Innovation*, *24*(5), 437–445.
- Liczmańska-Kopcewicz, K., Mizera, K., and Pypłacz, P. (2019), 'Corporate social responsibility and sustainable development for creating value for FMCG sector enterprises,' *Sustainability (Switzerland)*, *11*(20), art. 5808.
- Lis, A. (2018), 'Keywords co-occurrence analysis of research on sustainable enterprise and sustainable organisation,' *Journal of Corporate Responsibility and Leadership*, *5*(2), 47–66.
- Ma, X., and Jiang, Q. (2019), 'How to balance the trade-off between economic development and climate change?,' *Sustainability*, *11*(6), art. 1638.
- McManus, MC., and Taylor, CM. (2015), 'The changing nature of life cycle assessment,' *Biomass and Bioenergy*, *82*, 13–26.
- Niedziółka, I. (2012), 'Sustainable tourism development,' *Regional Formation and Development Studies*, *8*(3), 157–166.
- Pagell, M., and Wu, Z. (2009), 'Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars,' *Journal of Supply Chain Management*, *45*(2), 37–56.
- Porras, IM. (1992), 'The Rio Declaration: A new basis for international co-operation,' *Review of European Community & International Environmental Law*, *1*(3), 245–253.
- Rabl, A., Spadaro, JV., and Zoughaib, A. (2008), 'Environmental impacts and costs of solid waste: A comparison of landfill and incineration,' *Waste Management and Research*, *26*(2), 147–162.
- Rainey, DL. (2008), *Sustainable Business Development: Inventing the Future Through Strategy, Innovation, and Leadership*, Cambridge University Press, Cambridge.
- Ranzi, A., Fano, V., Erspamer, L., Lauriola, P., Perucci, CA., and Forastiere, F. (2011), 'Mortality and morbidity among people living close to incinerators: A cohort study based on dispersion modeling for exposure assessment,' *Environmental Health: A Global Access Science Source*, *10*(1), art. 22.
- Regolini, A., Gentilini, E., Baligand, M. P., and Jannès-Ober, E. (2013), '"Sustainable management" of commercial electronic research resources and of its use in bibliometrics,' *Library Management*, *34*(1), 31–39.
- Schaltegger, S., and Burritt, R. (2005), Corporate sustainability, *The International Yearbook of Environmental and Resource Economics 2005/2006: A Survey of Current Issues,* Folmer, H. and Tietenberg, T. (eds.), Edward Elgar, Cheltenham.
- Seuring, S. (2013), 'A review of modeling approaches for sustainable supply chain management,' *Decision Support Systems*, *54*(4), 1513–1520.
- Seuring, S., and Müller, M. (2008), 'From a literature review to a conceptual framework for sustainable supply chain management,' *Journal of Cleaner Production*, *16*(15), 1699–1710.
- Starik, M., and Kanashiro, P. (2013), 'Toward a theory of sustainability management: Uncovering and integrating the nearly obvious,' *Organization and Environment*, *26*(1), 7–30.
- Stead, WE., and Stead, JG. (2004), *Sustainable Strategic Management*, M.E. Sharpe, Armonk.
- van Eck, NJ., and Waltman, L. (2010), 'Software survey: VOSviewer, a computer program for bibliometric mapping,' *Scientometrics*, *84*(2), 523–538.
- van Eck, NJ., and Waltman, L. (2018), *VOSviewer Manual*, Universiteit Leiden.
- Zyznarska-Dworczak, B. (2018), 'The development perspectives of sustainable management accounting in Central and Eastern European countries,' *Sustainability (Switzerland)*, *10*(5), art. 1445.

The Importance of Investment Consumption in the Deconsumption Behaviourof Polish Consumers

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Abstract

The article describes one of the latest trends in the area of consumption, namely investment consumption. Its assumptions stem from the new culture of consumption which is redefining a person's wellbeing based on non-material values, including the requirements of attending to his/her health and image but also the positive relations with society and the natural environment. The basis for these changes in behaviourresult from moving away from the traditional to the pro-investment system of values. In such an approach there is a changed perception of a human being in the category of social capital, which is subject to investment through educating and increasing skills, as well as creating the conditions required for the protection of health and prevention based on observing the appropriate rules of consumption. Thus work becomes an important source of that capital when treated not as an obligation but an opportunity for self-development.Activities regarding protection of the environment, especially those concerning pro-ecological behaviour defined as investment, guarantee the future development of this capital and provide the basis of deconsumption behaviour, thus becoming the alternative in respect of the values of consumption itself. A consumer interpreted in this way becomes a part of the ecosystem and protects instead of degrading it.The author provides examples from her own research conducted in 2018 using the method of a diagnostic survey applying the technique of a questionnaire to 504 respondents, and qualitative research using the technique of an in-depth interview (IDI) on 56 residents from five regions (voivodeships) in Poland:dolnośląskie, łódzkie, śląskie, lubuskie and opolskie. The aim of the research was to verify the research hypothesis concerning the influence of independent variables such as age, education and economic status, etc. on the preferences of the specific system of values and modes deconsumptionbehaviour.

Keywords: Investment Consumption, New Culture of Consumption, Life Values, Creating The Identity of the Individual.

Introduction

Investment consumption is one of the latest trends in consumption and involves investing in the individual through consumption. The era of consumerism has severed the ties between the economy, culture and human personality; D. Bell called them the axial principles and values which govern individual subsystems. Instead of dedicating the present to the future, we abandon the future for the present. Concentration on status symbols indicated by hedonism is in Bell's view catastrophic, because no culture can be created on the basis of instant gratification (Bell, 1994). The discussion conducted with that author (see: Aldridge, 2006) does not always condemn pleasure as failure of contemporary consumerism, but can view it as it as a motivator stimulating consumer creativity. Consumption interpreted in this way opens up a new era in consumer behaviour based on the culture of consumption which treats it as an investment in the future, and also a contemporary mechanism of control by society.Researchers linked consumption with investment using a certain semantic construction, in which they include not only education but also health protection, leisure and rational nutrition (Bywalec, 2017). In economics, endowing a personwith characteristics of capital is the consequence of profit and loss account but according to some researchers this does not reveal the numerous complexities of a creative nature (Czetwertyński, 2019).The issue of the mechanistic approach in economics to the concept ofHuman Capital was also pointed outby others (Tomer, 2019).The research on investment in education and other kinds of human capital were criticised for omitting aspects related to consumption (Becker, 1990). Contemporary HC shows a tendencyto migration within the global labour markets which does not allow for the return on investment in its

country of origin. However, transfer of skills between countries may influence thegeneration of external effects (Dustmann, and Glitz, 2011). Unfavourable trends in globalisation at the end of the 20th century resulted in the appearance of the category of social capital on the borderline between economics and sociology, constituting the outcome of interactions which are not only economic but also social. The benefits internalised by society become an asset, and the used resources bring about the effect of synergy (Łobocki, 2019).

The new culture of consumption is connected with revaluating the approach to human wellbeing and redefining its axionormative system. The traditional approach to consumption was dominated by a hedonistic attitude which assumed that a person's wellbeing was dependent on personal possessions and the acquisition of material goods (Patrzałek, 2019). The results of research on human wellbeing (M. Ryan, J. Czapiński, M.Zawadzka and others) imply that it grows under the influence of such non-material values as self-realisation, health, satisfactory social relations and a positive self-image of the individual (Czapiński, 2004).Positive social relations have a significant impact on personal wellbeing. Investment in social relations through consumption is linked witha sharing economy. The fact of sharing means that consumption becomes a form of cooperation (Bell, 2014). Research results suggest that the level of sharing consumption in Poland remains relatively low. However at this stage it is difficult to determine whether this results from the wish to limitconsumption in order to make it sustainable or from the motive of frugality which isa characteristic of developing countries (Rudawska, 2016).

Traditional and Pro-investment Systems of Valuesin Polish Society

The research conducted by theauthor in 2018 regarding the deconsumptionbehaviour in the sample of 504 respondents residing in the dolnośląskie, łódzkie, śląskie, lubuskie and opolskievoivodeships (regions) analysed their axionormative systems.It is used a quantitative method based on a standardized survey technique. Field studies were conducted by sociology students of the University of Wrocław as part of research workshops.The research sample was based on deliberate sampling and quota sampling depending on gender, age, marital status, education, number of persons per household, economic status of the respondent in recent years, net income per household member per month and the place of residence.

The results of the author's research, similarly as with data from the Public Opinion Research Centre (CBOS) in Poland, suggest that Polish society favours traditional values headed by the attachment to the family happiness (82.5% of responses). This was followed by values of a decidedly pro-investment nature such as health (74.9%), work (41.6%), education (23.1%), professional career (19.3%), and by having children – social investment – (18.9%). It is characteristic that protection of the environment was ranked slightly higher (9.4%) than consumption (8.4%), which can suggest the competitiveness of the values of the new consumption culture, linked with wellbeing and quality of life rather than with material possessions, see Figure1.

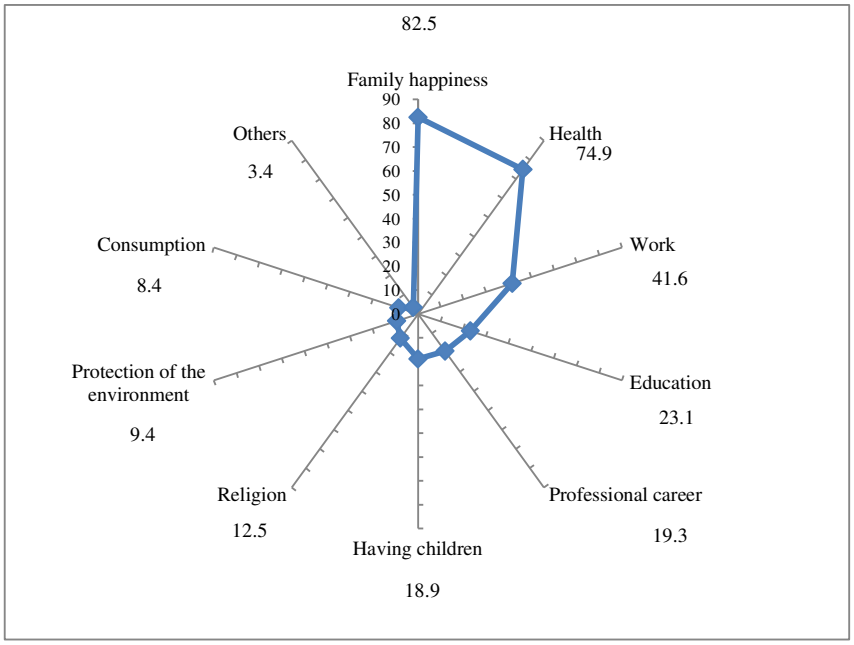


Figure 1: Importance of values in respondents' lives in %, N=504.

Note: the answers do not add up to 100.0% because the respondents indicated their three most important values.

Source: own research.

Importance of Investment Consumption for the Respondents

The system of values is connected with shaping certain attitudes, hence the research analysed the importance of investment consumption for respondents who mostly treat it as 'important' (41.1%), yet more frequently only as 'important' (30.8%) rather than 'very important' (10.1%). This was followed by the preferences which are neutral towards investment consumption, termed as 'neither important nor unimportant' (30.8% of responses), whereas it was classed as 'rather unimportant' (17.7%) and as 'definitely unimportant' (7.2%), see Figure 2.

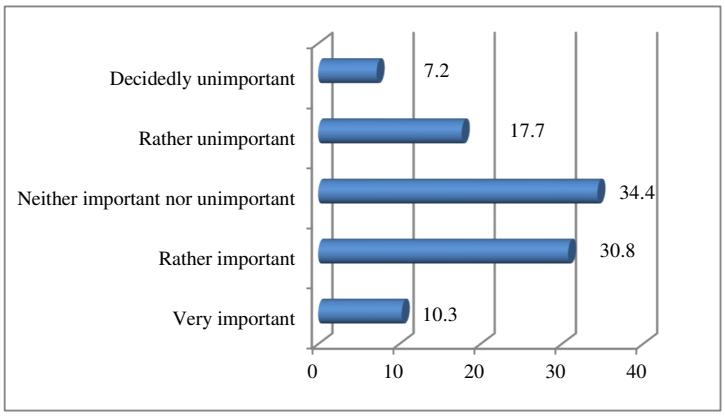


Figure 2: Importance of investment consumption for the respondents in %, N=504.

Source: own research.

The author posed in her own research hypothesis H1stating thatage of the respondentsinfluence the importance placed on investment consumption.. This is very importantfor the persons from the middle age group 36-40 (14.5% of responses) and those aged 31-35 (14.0%) and younger (21-25,

14.3%). Investment consumption is fairly important for persons of a mature age (41-45, 43.2% of responses), older (46-50, 42.5%) and younger (26-30, 39.7%), see Table 1.

Table 1:Importance of investment consumption depending on the age* of respondents

Importance of investment consumption	Age				
	18-20	**21-25**	**26-30**	**31-35**	**36-40**
Very important	3,6%	14,3%	8,8%	14,0%	14,5%
Rather important	20,0%	29,7%	39,7%	28,0%	30,9%
Neither important nor unimportant	30,9%	37,4%	36,8%	24,0%	25,5%
Rather unimportant	29,1%	9,9%	7,4%	30,0%	25,5%
Definitely unimportant	14,5%	7,7%	7,4%	2,0%	3,6%
Total	100,0%	100,0%	100,0%	100,0%	100,0%

Importance of investment consumption	Age				
	41-45	**46-50**	**51-55**	**56-60**	**61-65**
Very important	4,5%	8,9%	12,8%	10,7%	
Rather important	43,2%	42,2%	41,0%	17,9%	15,0%
Neither important nor unimportant	38,6%	26,7%	33,3%	35,7%	45,0%
Rather unimportant	9,1%	15,6%	5,1%	32,1%	25,0%
Definitely unimportant	4,5%	4,4%	7,7%	3,6%	10,0%
Total	100,0%	100,0%	100,0%	100,0%	100,0%

**% of the respondent's age group*

Source: own research.

Investment consumption by generating social capital is today the basis of social well-being.Social capital, as a multidimensional concept, refers to interpersonal relationships, a sense of security, and trust in public institutions. People who have more significant resources of social capital become healthier and happier [11]. Therefore, according to H1, social capital, being the basis of investment consumption, requires shaping in the long-term perspective, and its significance seems to increase with age.

The Dilemma: Current Consumptionor Saving

In respect of the dilemma of current consumption or investment in the future, the respondents more frequently opted for current consumption (35.3% of answers), but also for various forms of investment seen as providing for their old age (28.8%), investment considering the needs of their growing children (22.7%), and investment in the future aimed at maintaining their current levels of consumption (20.5%). A significant percentage of the respondents indicated their inability to save up for their future (16.2%), see Figure 3.

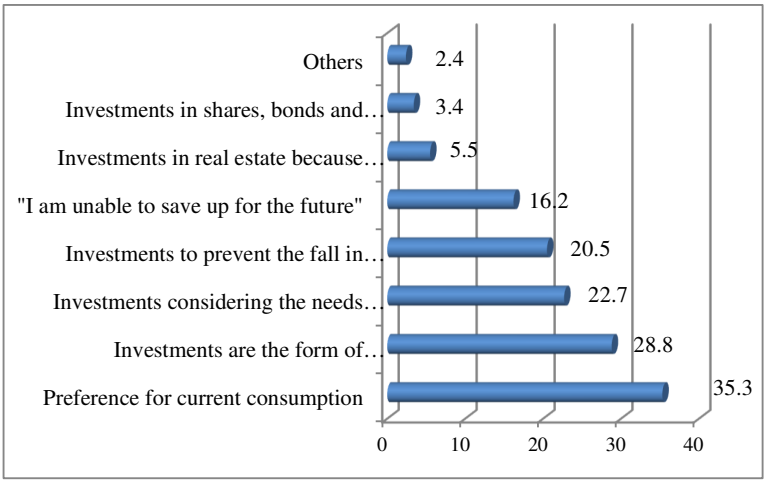
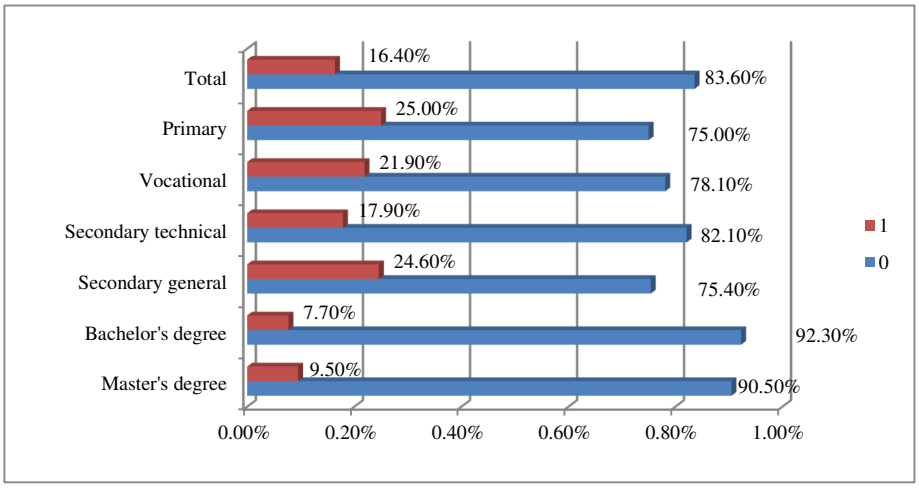


Figure 3. Dilemma of current consumption or investment in the future in the opinion of respondents in %, N=504.

Source: own research.

The author stated in the research hypothesis H2 that the dilemma of current consumption or saving up depends on the respondent's education.Formulating this hypothesis resulted from the earlier considerations according to which an attitude towards saving depends on the course of the process of socialization and education.

The resolution of the dilemma of current consumption or saving for the future which resultsin the lack of savings skillsfrom the inability to save up was most frequent among respondents with primary-school education (25% of responses), followed by those with a secondary-school general education (24.6%) and vocational schooling (21.9%). It was least frequent regarding the respondents with a Bachelor's degree (7.7% of responses) and a Master's degree (9.5%), as shown in Figure 4.



Legend: 1 – future investment, 0– current consumption.

Figure 4: Dilemma of current consumption or investment in the future – "I cannot save up for the future" * and the respondent's age*% of the age group, N=504.

Source: ownresearch

The other hypothesis, H3, posed in the research stated that resolving the dilemma of current consumption or saving which results in the lack of savings skillsfrom the inability to save up depends on the economic condition of the respondent's household.

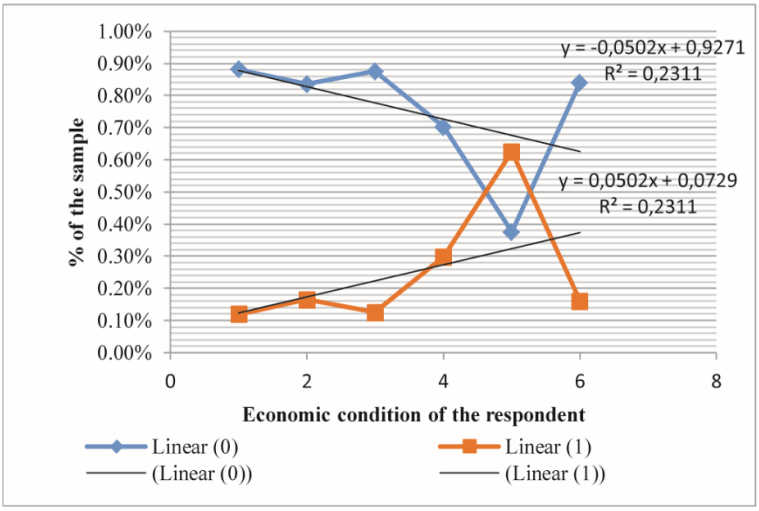


Figure 5: Dilemma of current consumption or investment in the future – "I cannot save up for the future" * and the economic condition of the respondent's household, *% of the economic condition, N=504.

Legend:

Scheme: y – the lack of savings skills, x – economic household'c condition, Linear 1 – future investments, Linear 0 – current consumption.

Source: own research.

The research confirmed the hypothesis regarding the dependence of the ability to save up in the dilemma of current consumption or investment in the future on the economic condition of the respondent's household, shown in the linear function y=0.050x+0.072. Usually resolving the dilemma ofcurrent consumption or saving up for the future which results from the inability to save up applied to respondents whose economic status 'deteriorated significantly' (62.5% of responses) or 'rather deteriorated' (29.8%). The lack of this ability to resolve the analyzed dilemma applied to a lesser degree to those respondents whose economic conditions 'rather improved' (16.5% of responses) or 'decidedly improved' (11.9%), see Figure 5.

The results of the earlier studies carried out by the author also suggest that among the internal factors having the greatest impact on decisions about saving made by households is the level of their income, while among the external factors it is the level of prices (Patrzałek, 2013).

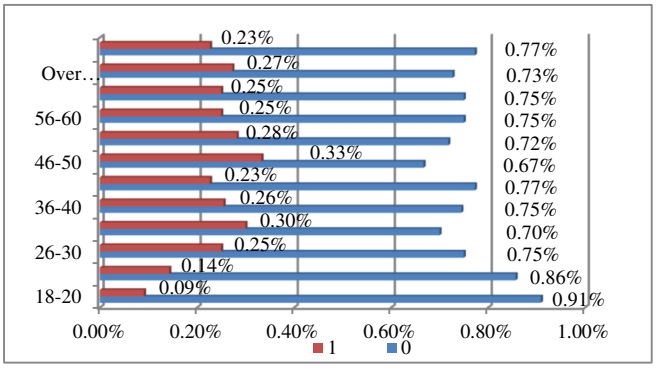
Investment Consumptionas the Creation of Social Identity

Currently, investment consumption is becoming an instrument in creating the identity of an individual within a social strata, and at the same time it determines individual strategies of activity since a personality built with the lack of a clear hierarchy of values becomes internally incoherent. The proliferation of such a model of personality is the consequence of global changes, especially in connection with the development of techniques of virtual communication which exclude traditional methods of socialization (Riesman, 1971).The development ofglobalization and consumer culture meant that we are faced with a reversedsocialisation in which a younger generation creates new rules leading to a devaluation of traditional authority (Welskop, 2019). New forms of investing in oneself appear in this context as a kind of a 'coinvestment' (combining consumption and investment) in the individual capital of the personality, as well as in the case of individuals who are privileged within the scope of this investment such as the children of the respondents. In the author's own research, the respondents included among such modes of behaviour the following:

1. investing in one's education,
2. developing one's competences,
3. investing in the skills and education of one's children,

4. learning foreign languages,
5. taking part in training courses and developing one's competences,
6. investing in beauty care and personal health,
7. active tourism.

Resolving the dilemma of current consumption or investment in the future, considering the needs of one's growing children, depends on the age of the respondent.This was mostly indicated by the respondents aged 46-50 (33.3% of responses) who opted in this dilemma for investing in their children's future, followed by those aged 31-35(30% of responses), and the 51-55 age group(28.2%), see Figure 6.

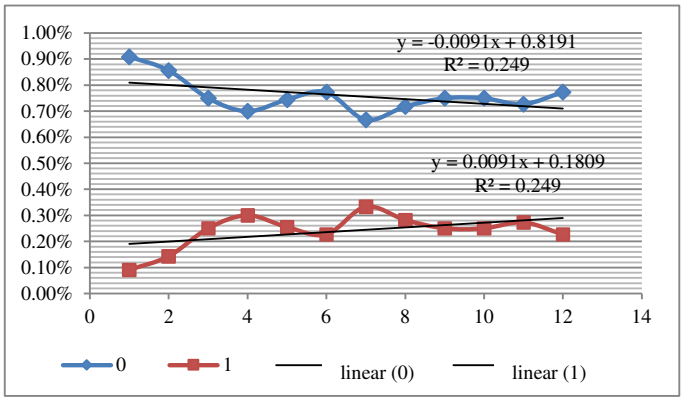


Legend: 1-future investment, 0- current consumption.

Figure 6: Dilemma of current consumption or investment in the future* considering the needs of one's growing childrenand the respondent's age*% of the age group.

Source: own research.

The dependence shown in resolving the dilemma of current consumption or investing in the future considering the needs of one's growing children is linked to the category of the respondent's age and takes on the form of the function of y=0.009x+0.180 where R2=0.249. Although this is not a strong dependence, a growing trend is shown in the groups of middle-aged and older respondents for whom the process of their children growing occurs, see Figure 7.



Discriptions:
Scheme: y- indications for the need of adolescent children, x- respondent's age
Legend: Linear 1- future investment, Linear 0- current consumption.

Source: own research.

Figure 7: Dependence in resolving the dilemma of current consumption or investing in the future* considering the needs of the growing children on therespondents age*% of the age group.

Conclusion

In conclusion it should be stated that investment consumption ought to generate growth of social capital and therefore aims to the highest degree at improving relations between the humankind and the environment both on the macro scale, i.e. the broadly interpreted natural environment, and on the micro scale – the social strata. Indicators of social capital in respect of internalized values have an influence on consumer behaviour concerning the development focused on self-realisation and continuous education, but are also based on the acceptance of non-material values as being most important in the creation of individual identities improving human beings' relations with their nearer and further environment, constituting new communities of collaborative consumption. Free advice, the inclusion in the local space of ill and lonely people, care for abandoned and hungry animals and green areas covered with litter, all provide new dimensions of consumption based on mutual obligations which rebuilds trust in the humanity lost in consumerism. One of the most important generators of consumer behaviour is the rise in importance of the value of health which often used to be associated with older age. The research shows that independently of the individual's age, the relation with health has become a determinant of the quality of life. The use of special diets unrelated to age, education and income has become one of the most important indicators of individual wellness. However, the influence of education on social capital is difficult to assess, especially regarding its consequences in respect of social trust, because they do not include the self-supporting mechanisms and impact of other channels of communication. Most of the empirical works point out the positive influence of age on the level of social trust, yet the alternative results do not show a homogenous outcome because they assume a concave relation between social capital and age. The process of ageing at first increases, and then decreases social capital, hence investments in social capital decrease monotonically with age (Becchetti and Michletti, 2008).

References

1. Aldridge, A. (2006).*Konsumpcja.* Warszawa: Wydawnictwo Sic! s.c.
2. Becker, G. (1990).*Ekonomiczna teoria zachowań ludzkich.* Warszawa: PWN.
3. Bell, D. (1994).*Kulturowe sprzeczności kapitalizmu.* Warszawa: Wydawnictwo Naukowe PWN.
4. Bell, R. (2014).You are what you can access. Sharing and collaborative consumption online, *Journal of Business Research*,*67*(8). Retrived20.11.2019 fromhttps://www.researchgate.net/publication/2624 90610_You_are_what_you_can_ access_Sharing_and_collaborative_consumption_online
5. Becchetti, L., andMichetti, M. (2008).*Kiedy konsumpcja generuje kapitał społeczny.* ECINEQ WP. Retrived19.07.2019 from https://www.ecineq. org
6. Bywalec, Cz. (2017). *Gospodarstwo domowe. Ekonomika. Finanse. Konsumpcja*. Kraków: Wydawnictwo Uniwersytetu Ekonomicznego w Krakowie.
7. Czapiński, J. (2004). Psychologiczne teorie szczęścia.InJ.Czapiński (ed.),*Psychologia pozytywna, Nauka o szczęściu, zdrowiu, sile i cnotach człowieka.* Warszawa: Wydawnictwo Naukowe PWN.
8. Czetwertyński, S. (2019).*Morfologia nieautoryzowanego kopiowania.* Wrocław: Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu.
9. Dustmann, C., and Glitz, A. (2011).*Migration and education*, *CreAM*. Retrived23.11.2019 from https://www.ucl.ac.uk/~uctpb21/ Cpapers/MigrationAndEducation.pdf
10. Tomer, J. F. (2019). Integrating Human Capital with Human Development: Toward a Broader and More Human Conception of Human Capital, *Psychology Published 2014*, Retrived20.11.2019 from https://www.semanticscholar.org/paper/Integrating-Human-Capital-with-Human-Development%3A-a-Tomer/263ef7e791eb8867b7044c17fb463277e2c74842
11. Patrzałek, W. (2020).Inestycyjnywymiar konsumpcji a zrównoważony rozwój.InA. Olejniczuk-Merta, andA. Noga (Eds.), *Inwestycyjny wymiar konsumpcji. Istota, formy, znaczenie*. Warszawa: Poltext Sp. z o. o.
12. Patrzałek, W. (2019).*Dekonsumpcja. Motywy, cele, funkcje*, Wrocław: Wydawnictwo

Uniwersytetu Ekonomicznego we Wrocławiu.

13. Patrzałek, W. (2013).*Procesy komunikacji a mechanizmy podejmowania decyzji w gospodarstwach domowych*, Wrocław: Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu.
14. Riesman,D. (1971).*Samotny tłum*, PWN, Warszawa.
15. Rudawska, I. (2016). Ekonomia dzielenia się, czyli konsumpcja dzielenia się i inne formy alternatywnego dostępu do dóbr, *Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach*,(254).
16. Welskop,W. (2019).*Socjalizacja odwrotna a dewaluacja autorytetu tradycyjnego.* Retrived20.11.2019 from https://www.researchgate.net/publication/265745742_Socjalizacja_odwrotna_a_dewaluacja_autorytetu_tradycjonalistycznego.
17. Łobocki, J. (2019).*Kapitał społeczny jako kategoria ekonomiczna*, Retrived 21.11.2019 from https://www: cejsh.icm.edu.pl>9_J.Lobocki_ Kapital-spoleczny_jako_kategoria…pdf

The Potential and Results of Innovation Activities in Ukraine: A Regional Section

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Abstract

The estimation of innovative potential and efficiency of innovative activity of industrial enterprises of Ukraine in the regional dimension is carried out on the basis of modern statistics using the cluster analysis method. Features and tendencies of financing of innovative activity are considered. Dynamic series of R&D expenditures as a percentage of the Gross Domestic Product across Ukraine and the EU and corresponding trend models are constructed. Structural mismatch of financing of innovative activity in Ukraine is emphasized both by sources of financing and European practice.

Keywords: Innovation Activity, Innovation Potential, Efficiency of Innovation Activity, Clustering.

Introduction

In the contemporary conditions, the competitiveness of economics of the country and regions is largely determined by the innovative activity of domestic enterprises. In the achievement of the aforementioned important role is played by the formed innovative potential of business entities and the degree of its realization in the direction of achieving a high level of efficiency of innovative activity. Considering that the region's position in the innovation activity of the country depends on many factors having both economic and spatial origin, we emphasize that assessing the correspondence between the levels of innovation potential and the efficiency of innovation activity, as well as finding ways to optimize them, are important tasks for ways to reach world standards in the field of research and ensure the competitiveness of economics.

Research Results

In order to study the peculiarities of innovative activity of domestic enterprises in the regional context, we used the method of cluster analysis. Clustering allows you to split a sample of objects (in our case, such a sample is a plurality of regions of Ukraine) into relatively homogeneous subsets (clusters) that include similar objects. For analysis, we have formed a set of features by which the innovation activity of the regions of Ukraine was evaluated.

Indicators that allow to characterize the innovation activity of enterprises in each of the areas can be divided into two groups. The first one included those that allow us to assess the potential of

innovation, namely: the number of innovatively active industrial enterprises, the cost of innovation, the gross cost of R&D, the number of employees involved in the implementation of R&D. The second group combined indicators that show the effectiveness of innovation activity: the volume of realized innovative products (goods, services), the number of enterprises that sold innovative products (goods, services), the number of new technological processes implemented, the number of implemented types of innovative products (goods, services), number of industrial enterprises introducing innovations (products and / or technological processes).

The values of these indicators, obtained from the statistics base of the State Statistics Service of Ukraine for 2018 [1], have been taken logarithm to ensure the proportional distribution of the isolated influence of different indicators on the phenomenon under study. Using package Statistica 8.0 on fig.1 is performed the dendrogram of clustering of regions of Ukraine by innovative potential indicators. Our researches allow us to divide many regions of Ukraine into four clusters. The first cluster includes the Dnipropetrovsk, Zaporizhzhia and Kharkiv regions.

These regions show the highest innovation potential, which is provided by a relatively large number of innovatively active enterprises, significant amounts of costs that enterprises allocate to innovation activity, and in these regions active work is carried out on the implementation of research activities, which is the basis of innovation creation and implementation of business entities.

The second cluster was formed by Kyiv, Lviv, Mykolaiv, Odesa and Sumy regions, which are also characterized by sufficiently high indicators of innovation activity of the enterprises of the region. We can state that the remaining regions of Ukraine, which were included in the third (Vinnytsia, Volyn, Donetsk, Zhytomyr, Ivano-Frankivsk, Kirovohrad, Poltava, Ternopil, Kherson, Cherkasy, Chernivtsi, Chernihiv) and fourth (Zakarpattia, Luhansk, Rivne) show low values of innovation and research costs, a small number of innovative enterprises and research institutions, and thus potentially incapable to provide innovative competitiveness of industry production.

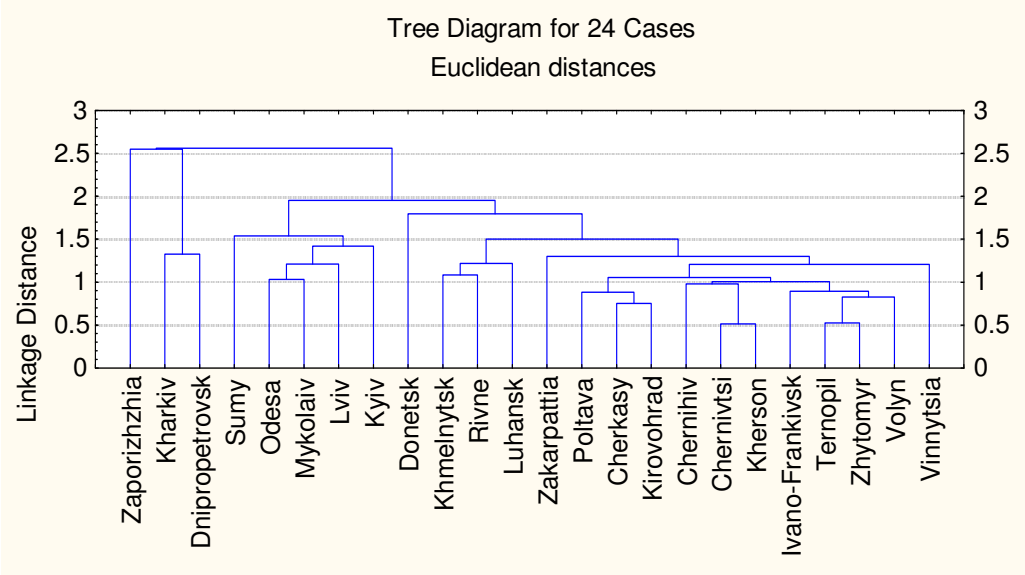

Fig. 1: Dendrogram of clustering of regions of Ukraine by indicators of innovation activity potential according to the data of 2018.
Built by: [1]

It is possible to investigate the efficiency of the innovative potential of the regions of their use in practice by comparing our previously divided regions with their division into clusters based on the

analysis of innovation performance indicators. Figure 2 shows the dendrogram of the corresponding clustering of the regions of Ukraine.

The conducted analysis showed that the first cluster was formed by Dnipropetrovsk, Zaporizhzhia, Kyiv, Kharkiv regions, the second - Donetsk, Kirovohrad, Lviv, Sumy regions. The third cluster includes Vinnytsia, Zakarpattia, Ivano-Frankivsk, Odesa, Poltava, Ternopil, Kherson, Cherkasy and Chernihiv regions, to the fourth - Volyn, Zhytomyr, Luhansk, Mykolaiv, Rivne, Khmelnytsk and Chernivtsi regions.

As we can see, the cluster distribution of regions, which are the so-called “innovation leaders” in assessing the performance of innovative activity of enterprises, quite accurately reflects the totality of subsets of areas distributed according to the existing innovation potential. We can observe the entry into the second cluster of innovatively effective regions of the Kirovohrad region, which, according to the previous clustering, was included in the third cluster, as well as the entering into the third cluster of the Odessa region, which according to the cluster results based on the evaluation of the innovative potential was included to the second cluster. This gives grounds for claiming that the region lacks available innovative development opportunities.
Thus, we can conclude that only a third of Ukrainian regions can be assessed as demonstrating the development of innovative entrepreneurship, which is a threat trend in the context of the need to activate innovative processes in the country’s economy.

The scale of research funding is one of the most important indicators in the development of national scientific, technological and innovation potential. World experience shows that the impact of domestic scientific and technological and innovation potential on the socio-economic development of the country depends largely on the share of domestic gross product (GDP) which spent on scientific research. The state provides budget funding for scientific and technical activities of at least 1,7 percent of gross domestic product of Ukraine.

Substantial inter-regional differentiation by individual characteristics of innovation potential is observed. So, in 2018, 777 enterprises (16,4% of the total) innovative activity was carried out, in 2017 - 759 enterprises (16,2%), in 2016 - 834 (18,9%), in 2015 - 824 (17,3%), in 2014 - 1609 (16,1%), in 2013 - 1715 (16,8%). In the regional dimension, most such enterprises are concentrated in Kyiv (the Capital of Ukraine) (101), Kharkiv (119), Dnipropetrovsk (71), Kyiv (54), Lviv (44) and Zaporizhzhia (36) regions.

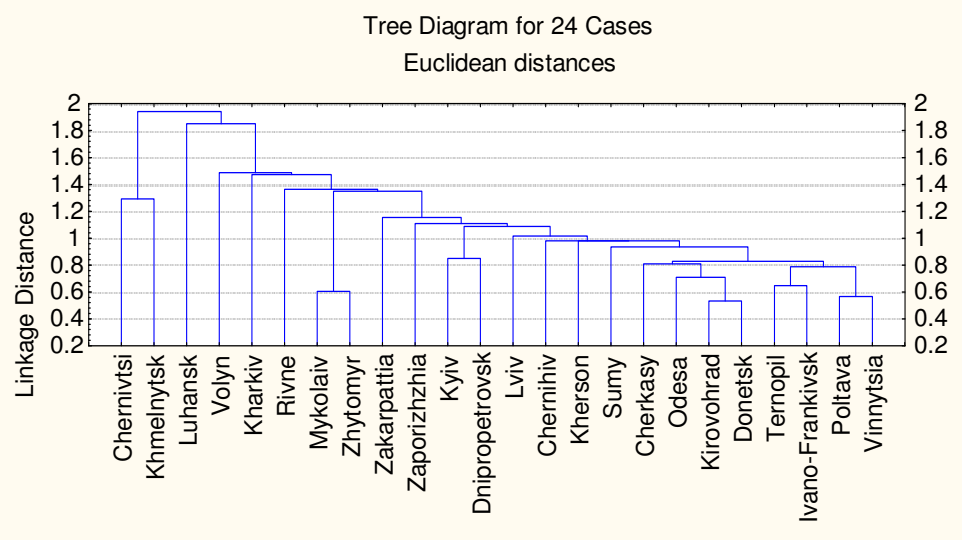

Fig. 2: Dendrogram of clustering of regions of Ukraine according to the indicators of innovation activity of enterprises according to the data of 2018.
Built by: [1]

The own funds of business (88,2% of the total) are significant source of financing for innovation costs in 2017. So, 5,2% of innovative development was financed from the State budget, 0,1% from local budgets, domestic investors spent 0,9%, foreign ones – 0,9% of total expenditures, and the share of loans was 3,9%. Thus, the share of own resources in total financing increased from 59,3% in 2010 to 88,2% in 2018. At the same time, there was a significant decrease in the share of foreign investors from 30% in 2010 to 0,9% in 2016 years.

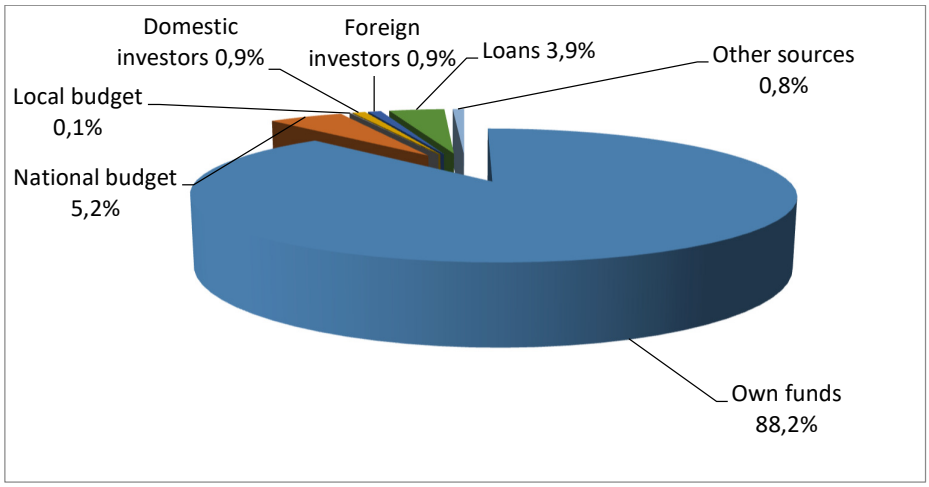

Fig. 3: The cost of innovation in Ukraine by sources of funding

As practice shows, when there is not enough own funds to activate innovation activity, the importance of choosing the sources and effective mechanisms of using financial resources is increasing, especially with limited investment and the lack of institutional and legal environment. The alternative is the rational use of bank loans and funds of foreign investors, but not all enterprises are attractive for bank structures [2, p. 177]. The importance of attracting foreign investment to stimulate innovation is due to the fact that the average Ukrainian company with foreign investment produces 11 times more products than the average national company. Also, in the non-financial sector, there are only 4.6% of enterprises with foreign investments, employing 20.4% of all workers in the sector, producing 34.9% of total gross value added [3].

As we can see, the practical implementation of state funding for this activity differs significantly from the statutory indicators. For the period 2003-2017, the share of R&D expenditure in Ukraine's GDP decreased from 1,19% to 0,45% in 2017, while in the same period EU research expenditure increased from 1,7 up to 2,06 percent of GDP [3]. It is worth noting that in the European Union, in line with the "Europe 2020" strategy, the goal was to increase gross research expenditure from 2% to 3% of GDP [5].

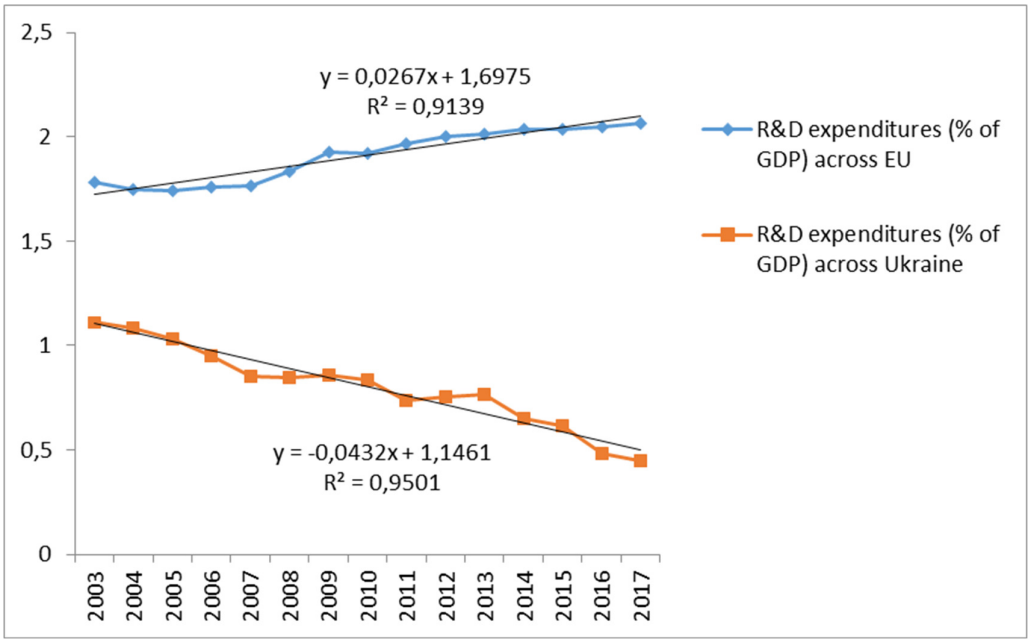

Fig. 4: Dynamic series of R&D expenditures (% of GDP) across Ukraine and the EU and concerning trend models

We smoothed out the dynamic series of the analyzed indicators with the help of trend models. In both cases we can see the linear character of the change in the indicators, the approximation coefficients of the models are quite high (0,91 and 0,95 respectively). But the character of the change is diametrically opposite: there is a declining trend in the share of research expenditures in Ukraine's GDP, which illustrates the negative value of the coefficient in the case of an independent variable in the trend model, while the percentage of spending by EU countries on GDR is increasing. It can also be noted that the unfavorable dynamics of financing Ukrainian research for the Ukrainian innovative entrepreneurship is faster than the rate of increase of R&D expenditures in the EU, since the absolute values of the angles of slope of the trend lines (0,0432 and 0,0267) differ almost twice.

Conclusions

Using cluster analysis, regions of Ukraine were grouped according to the indicators characterizing innovation potential and result of innovative activity. Comparison of the obtained groups of regions shows that the regions that are leaders in innovation potential, as a rule, show the highest level of innovation efficiency. The method used also identified regions that were underutilizing existing opportunities for innovative development, requiring the proper use of existing resources and attracting additional resources. The results of the analysis of financial security show the dominance of own funds in the structure of sources, indicate the lack of financial support for innovation activities by the state, the practical absence of investments of domestic and foreign investors, which is not in line with European practice.

References

1. Scientific and innovative activity of Ukraine. [Online], [Retrieved November 8, 2019], http://www.ukrstat.gov.ua/druk/publicat/kat_u/2019/zb/09/zb_nauka_2018.pdf
2. Yurynets, Z. (2016) Formation of innovative strategies: theory, methodology, practice: monograph, Lviv, SPOLOM.

3. Zakha, D., Kravchuk, V., Kirkhner, R. (2018),'The Economic Impact of Foreign Direct Investment in Ukraine: Key Findings'. [Online], [Retrieved October 18, 2019], https://www.beratergruppe-ukraine.de/wordpress/wp-content/uploads/2018/06/PB_03_2018_ua.pdf.
4. The official site of the World Bank. [Online], [Retrieved October 29, 2019], https://data.worldbank.org.
5. Europe 2020. A strategy for smart sustainable and inclusive growth. [Online], [Retrieved December 14, 2019], http://ec.europa.eu/europe2020/index_en.htm.

Multi-Criteria Taxonomy as A Tool to Describe the Sustainable Development Structure in The European Union Countries

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Abstract

The purpose of the paper is to analyze changes in the internal structure of the area's most often considered within the scope of sustainable development. For this purpose the multi-criteria taxonomy was used. Data from 2008 and 2016 were analysed. The results of the research confirm the relatively high level of disparities between EU member states in the area of sustainable development, indicated also by other authors. A detailed analysis also confirmed that in the studied years the similarities of the countries due to the researched phenomenon have changed significantly. It should be noted, however, that the classification obtained in the future may be different if the final set of diagnostic indicators changes. According to the authors, further research should go towards verifying the impact of the choice of diagnostic features on the classification results.

Keywords: Sustainable Development, Multi-Criteria Taxonomy, Typological Groups

Introduction

The term of sustainable development was first formulated during the Third United Nations of Environment Program (UNEP) in 1975 and definied as "(…) such a course of inevitable and desorable development that would not materially and irrevisibly affect the human environment and would not lead to the dagradation of the biosphere and would not undermine the laws of nature, economics and culture" (UNEP, 1975). The most known and very often applied definition is this one from the Brundtl and Briefing Report of the World Commission on Environment and Development United Nations formulated in 1987, in which sustainable development was described as ;sustainable development to meet current needs without the risk that future generations will not be able to meet their needs" (WCED, 1987). Since then, the research and analysis related to sustainable development have been constantly developed on the basis of various types of scientific disciplines (eg. Vashisth, Kumar and Sharma, 2018; Ziolo et al., 2019) and research areas (eg. Scheurer, 2001; Kiba-Janiak, 2015; Pietrzak and Balcerzak, 2016a). The result is both a multitude of definitions of this term and of measurement proposals. The result of this abundance and the lack of agreement as to the most important elements distinguishing the proposed definitions, is also a significant diversity in the sugessted methods of its measurement. The existing definitions emphasize, for example, the static or the dynamic nature of sustainable development, defining this phenomenon as a state or a process and differentiating it in terms of various areas. Strategic documents usually measure the distance separating individual countries from the assumed quantitative goals (see eg. Agenda 2030). Numerous proposals base on various types of synthetic measures, which are determined equally for individual areas (dimensions) taken into account within the framework of sustainable development (eg economic, social and environmental dimensions), as well as for sustainable development described by means of one composite measure (Pietrzak and Balcerzak, 2016b). The issues regarding the relations between

various dimensions of this, after all, very diverse research area are less frequently addressed. This type of research approach based on the study of the internal structure of sustainable development will be presented in the paper.

The purpose of the paper is to analyze changes in the internal structure of the dimensions most often considered within the scope of sustainable development. In the case of research conducted at the macroeconomic level (in relation to countries), these are dimensions such as: economic, social and environmental and, in addition, an institutional and political one, which plays a special role at this level of analysis. Through political decisions regarding e.g. the amount of taxes and their use, permissible pollution standards, etc., the governments of the countries of the world can influence changes taking place also in other sustainable development dimensions. Environmental taxes can be used for activities in the area of environmental protection and income tax reliefs can stimulate the development of entrepreneurship, etc.

It is worth emphasizing that in the literature (Szopik-Depczynska et al., 2018a; Siche et al., 2008) dominates the approach within which sustainable development is described by one synthetic measure determined on the basis of variables characterizing individual dimensions of sustainable development. This creates a danger of averaging the results and overstating or underestimating the position of countries in comparative analyzes. However, previous research of the authors (Bak and Cheba, 2019), shows that in the economic area the results of the most developed EU countries are definitely higher than in the environmental area. This means a situation where the growing pressure of the economies of these countries on the natural environment is observed along with the economic growth. This situation applies primarily to countries located in Western Europe (Belgium, Germany, Luxemburg, Malta, and the Netherlands), to a lesser extent applies to economically developed countries located in Northern Europe. In contrast, the opposite regularities are observed in the case of the least economically developed countries located most often in Eastern Europe. Such large discrepancies are not observed in the studies of the other two dimensions, i.e. social and institutional-political ones. The differences in the development of EU countries within individual sustainable development areas observed by the authors are the starting point for considering the possibility of identifying similar countries due to all areas included in the study, as well as only in terms of several of them.

In the study, the multi-criteria taxonomy method was used to examine the changes taking place in the internal structure of sustainable development and to identify similar countries in terms of considered areas. This is a relatively new proposal in which, on the basis of the results of ordering countries (country rankings) similar countries are sought with regard to all the distinguished dimensions of sustainable development; analyzes in which only some of these areas are included are also possible. Therefore, the research results presented in the article focus on the search for groups of similar countries due to the level of development in all distinguished dimensions simultaneously and in the case of economic and environmental dimensions, between which, at the current level of development of EU countries, the most differences occur.

The indicators used by the European Commission to monitor progress in the implementation of the latest sustainable development strategy - the 2030 Agenda for Sustainable Development are the basis of the empirical research presented in the paper. The authors decided to conduct research at two moments in time, in 2008, i.e. immediately after the outbreak of the global economic crisis and due to the full availability of data for all analyzed indicators – in 2016. The study did not analyze the changes in the results obtained in dynamic terms. The goal was to analyze the changes taking place in the internal structure of the classification of countries in the analyzed areas. The analysis results presented in the work do not include Croatia, which became a member of the European Union only on July 1, 2013 and for which the deficiencies in data for years before its accession to the European Community were identified.

Research Procedure

Selection of diagnostic indicators

The basis of empirical analyzes presented in the work are indicators used by the European Commission to monitor the progress in the implementation of the „The 2030 Agenda for Sustainable Development" in the European Union. In the compilations provided by Eurostat (2018) there is currently 100 indicators describing 17 goals of 2030 Agenda (51 of them are a part of a global list of indicators of the United Nations – the UN, the remaining ones were chosen in such a way as to enable monitoring the direction of changes in accordance with the relevant policies and initiatives of the EU). Whereas in the paper, these indicators were assigned to four sustainable development dimensions: economic, social, environmental and institutional-political, which was separated from the indicators describing the social dimension of sustainable development. The decision to separate this dimension was influenced by its particular importance for the functioning, development and integration of European Union Member States.

It should be noted that not all features included in the Eurostat database are available for all EU countries. 36 of them need to be excluded from further analyzes, mainly due to their availability only at the level of the whole of Europe or the European Union and the lack of data e.g. for indicators describing the protection of the sea in the case of countries which do not have access thereto. The primary database included 64 indicators, 18 of which described the economic dimension, 26 features related to the social dimension, 11 to the environmental dimension and 9 features to the institutional and political dimension. The final selection of features for the study was carried out using the inverse correlation coefficient matrix method. In the literature the detailed information about this method and their application in research can be found in many papers: Malina and Zelias, 1998; Lira et al., 2002; Mlodak, 2006. Due to the fact that the study analyzed features describing changes occurring in individual dimensions of sustainable development of EU countries in two periods of time (years: 2008 and 2016), it was decided that the selection of diagnostic features should also be provided separately for each of these year. The final set was created by those features that were existed in both analyzed years.

The result of applying the proposed procedure for the selection of diagnostic features are four sets of diagnostic features. A detailed list of these indicators can be presented in the following form:

a) in the economic area: agricultural factor income per annual work unit (AWU), (according to prices from 2010, in Euro per annual unit of work) ($x_{1.1S}$), general government gross debt, % of GDP ($x_{1.2D}$), inactive population due to caring responsibilities, % of inactive population aged 20 to 64 ($x_{1.3D}$), young people neither in employment nor in education, (% of population aged 15 to 29) ($x_{1.4D}$), involuntary temporary employment, % of employees aged 20 to 64 ($x_{1.5D}$), people killed in accidents at work, number per 100 000 employees ($x_{1.7S}$), gross domestic expenditure on R&D, % of GDP ($x_{1.8S}$), volume of freight transport relative to GDP, index (2005 = 100) ($x_{1.9D}$), share of labour taxes in total tax revenues, % ($x_{1.10D}$), area under organic farming, % of utilised agricultural area ($x_{1.11S}$);
b) in the social area: people living in households with very low work intensity, % of persons under 60 living in households with very low work intensity, i.e. those in which adults (18-59 years old) have worked less than 20% of their total work potential in the past year ($x_{2.1D}$), housing cost overburden rate, % of population ($x_{2.2\ D}$), population living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames of floor, % of population ($x_{2.3\ D}$), population unable to keep home adequately warm, % of population ($x_{2.4\ D}$), long term unemployment rate, % of active population ($x_{2.5D}$), relative median at-risk-of-poverty gap, % distance to poverty threshold ($x_{2.6D}$), suicide rate, number per 100 000 persons ($x_{2.7\ D}$), early leavers from education and

training, % of population aged 18 to 24 ($x_{2.8\ D}$), tertiary educational attainment, % of population aged 30 to 34 ($x_{2.9S}$), adult participation in learning, % of population aged 25 to 64 ($x_{2.10S}$), population living in households considering that they suffer from noise, % of population ($x_{2.11\ D}$), death rate due to homicide, number per 100 000 persons (standardized death rates calculated on the basis of the standard European population) ($x_{2.12\ D}$), population reporting occurrence of crime, violence or vandalism, % of population ($x_{2.13\ D}$), people killed in road accidents, rate, number per 100 000 persons ($x_{2.14\ D;}$);

c) in the environmental area: primary energy consumption, million tonnes of oil equivalent (TOE) ($x_{3.1D}$), share of renewable energy in gross final energy consumption, % $x_{3.2S}$), energy dependence, % of imports in total energy consumption ($x_{3.3D}$), energy productivity, PPS – Purchasing Power Standard per kilogram of oil equivalent ($x_{3.4S}$), ammonia emissions from agriculture, kilograms per hectare ($x_{3.5D}$), greenhouse gas emissions – tonnes *per capita* ($x_{3.6D}$), recycling rate of municipal waste, % of total waste generated ($x_{3.7S}$), shares of environmental taxes in total tax revenues, % of total taxes ($x_{3.8D}$);

d) in the institutional and political area: seats held by women in national parliaments, % of seats ($x_{4.1S}$), seats held by women in national governments, % of seats ($x_{4.2\ S}$), positions held by women in senior management positions, board members, % of positions ($x_{4.3\ S}$), general government total expenditure on law courts, Euro per inhabitant ($x_{4.4\ S}$), population with confidence in EU institutions: European Parliament % of population ($x_{4.5\ S}$), population with confidence in EU institutions: European Central Bank, % of population ($x_{4.6\ S}$), official development assistance as share of gross national income, % ($x_{4.7\ S}$), EU imports from developing countries by country income groups, million EUR *per capita* ($x_{4.8\ S}$).

The statistical method

One of the assumptions adopted in the work is striving to achieve a high level of development in all dimensions of sustainable development as well as in these one of them whose are characterized by different results achieving by EU countries. This means the need to look for methods that will allow the separation of groups of similar countries due to the distinguished dimensions of this development. The solution in this case may be the use of the multi-criteria taxonomy method, the description of which was presented, among others in Malina (2004). The procedure used in this method involves several successive stages that can be represented as follows:

1. For each of the distinguished classification criteria, in this case, sustainable development dimensions, the normalization of diagnostic features is carried out. The work uses the following transformations (Kukula, 2000):

for stimulant $$z_{ij} = \frac{x_{ij} - \min\limits_i x_{ij}}{\max\limits_i x_{ij} - \min\limits_i x_{ij}}, \quad \max\limits_i x_{ij} \neq \min\limits_i x_{ij}\ ; (1)$$

for destimulant $$z_{ij} = \frac{\max\limits_i x_{ij} - x_{ij}}{\max\limits_i x_{ij} - \min\limits_i x_{ij}} \quad \max\limits_i x_{ij} \neq \min\limits_i x_{ij}\ .(2)$$

It should be emphasized that due to the purpose of the work - the analysis of the internal structure of sustainable development, the normalization of diagnostic features was made separately for each analyzed year (a static approach).

2. Next, distance matrices $\mathbf{D^K}$ are determined**.** In the paper, the median distance proposed by Mlodak (2006) was used to determine the distance between diagnostic features normalized according to formulas 1-7, whose measurement values belong to the range [0, 1]:

$$distance = \underset{j=1,2,\ldots,m}{\text{med}} \left| x_{ij} - x_{kj} \right| . \quad (3)$$

3. Next, the distance threshold d^* is determined, e.g. according to the formula:

$$d^* = \min_i \max_j \{d_{ij}\}; \quad (4)$$

4. For each classification criterion, the similarity matrix $\mathbf{C^K}$ with dimensions $(n \times n)$ is determined, whose elements $c_{ij}^K (i, j = 1,...,n)$ are equal to:

$$c_{ij}^K = 1 \text{ dla } d_{ij} \le d^* \quad (5)$$

$$c_{ij}^K = 0 \text{ dla } d_{ij} > d^* \quad (6)$$

If the inequality $d_{ij} \le d^*$ is met, then the objects with numbers *i* and *j* are considered similar due to the considered criterion, if the opposite condition occurs, then the corresponding objects are treated as dissimilar at the level of value d^*. In this case, the similarity measure c_{ij} will be zero.

5. The final similarity matrix $\mathbf{C}_{(n \times n)}$ between the analyzed units is determined.

The elements c_{ij} of matrix **C** are equal to the product of the corresponding elements of matrix $\mathbf{C^K}$ for all considered criteria. This means that $c_{ij} = 1 (i, j = 1,...,n)$, if each of the corresponding elements c_{ij}^K in matrices $\mathbf{C^K}$ is equal to one, and $c_{ij} = 0$ if at least one of the corresponding elements c_{ij}^K is zero. Accordingly, two objects are considered to be similar at the same time due to all criteria, if they are similar to each other separately according to individual criteria. However, two objects are considered dissimilar due to all the considered criteria, if they are not similar to each other even because of one of these criteria.

6. The classification and identification of groups of similar entities due to the considered criteria is carried out, using for this purpose, e.g. the *vector elimination method* (Malina, 2004).

At the beginning a replacement of the final similarity matrix $\mathbf{C}_{(n \times n)}$ in the non-similarity matrix $\mathbf{C^*}_{(n \times n)}$, according to the formula $\mathbf{C^*}_{(n \times n)} = 1_{(n \times n)} - \mathbf{C}_{(n \times n),}$ where $1_{(n \times n)}$ is a matrix of size *n* x *n* consisting of only ones, is provided. Objects corresponding to non-deleted rows and columns that remain in matrix **C*** form the first subgroup. Other groups are formulated in the same way.

Study Results

In accordance with the adopted assumptions, in the next step, based on the features describing individual sustainable development dimensions transformed in accordance with formulas (1 and 2), distance matrices were determined separately for each of the analyzed years: $\mathbf{D^G}$ - for economic dimension, $\mathbf{D^S}$ - for social dimension, $\mathbf{D^P}$ - for environmental dimension and $\mathbf{D^I}$ - for institutional and political dimension. To determine the distance matrix between the tested objects, a median distance measure with a minimum threshold value (formula 3) was used.

In the next step, these matrices were used to determine the similarity matrix of structures: $\mathbf{C^G}$, $\mathbf{C^S}$, $\mathbf{C^P}$ and $\mathbf{C^I}$. Matrix elements $\mathbf{C^G}$, $\mathbf{C^S}$, $\mathbf{C^P}$ and $\mathbf{C^I}$ determined for 2008 and 2016 were then used to determine the final similarity matrix. These matrices form the basis for the division of the EU Member States surveyed into groups containing similar objects due to two of distinguished dimensions (economic and environmental) as well as all sustainable development dimensions. The vector elimination method was used to isolate these groups. The effect of the application of the described procedure is the division of the studied EU countries into typological groups (Tables: 1 and 2).

When analyzing the received classifications, it is worth paying attention to the results of countries located in Eastern Europe, which are much less economically developed, but which achieve average results in the field of environmental dimension. In these countries, there are no clear disparities between the economic development and the environment. The similarity in the development is evident in view of the results regarding both studied years, where four out of six countries in the region (except for Bulgaria and Romania) were in the same typological group. The results of

countries located in Southern Europe can be interpreted in a similar way. In this case, to the same typological group in 2008 were classified: Greece, Portugal and Slovenia (group I), Spain (group II), Cyprus, Malta (group IV) and in group VIII - Italy, and in 2016 Spain, Portugal, Slovenia and Italy (group I).

Table 1: Comparison of results of EU countries within selected areas of sustainable development in 2008

Group	economic and environmental dimensions	Group	all dimensions
I	Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Portugal, Slovenia, Slovakia	I	Czech Republic, Estonia, Greece, Hungary, Poland, Portugal, Slovenia, Slovakia
II	Belgium, Germany, France, the Netherlands, Spain, United Kingdom	II	Belgium, France, Germany, Spain
III	Finland, Sweden	III	Finland, Sweden
IV	Bulgaria, Cyprus, Malta	IV	Bulgaria, Latvia, Romania
V	Ireland, Luxembourg	V	Denmark, Netherlands
VI	Denmark, Austria	VI	Ireland, United Kingdom
VII	Romania	VII	Austria, Lithuania
VIII	Italy	VIII	Cyprus, Italy
		IX	Luxembourg
		X	Malta

Source: own research

Table 2: Comparison of results of EU countries within selected areas of sustainable development in 2016

Group	economic and environmental dimensions	Group	all dimensions
I	Austria, Belgium, Czech Republic, Hungary, Italy, Lithuania, Poland, Slovenia, Slovakia, United Kingdom	I	Czech Republic, France, Italy, Ireland, Portugal, Slovakia, Slovenia, Spain, United Kingdom
II	Bulgaria, Greece, Latvia, Portugal	II	Austria, Finland, Hungary, Latvia, Poland, Romania,
III	Finland, France, Netherlands, Spain	III	Denmark, Netherlands, Sweden
IV	Cyprus, Malta, Romania	IV	Cyprus, Estonia, Lithuania
V	Denmark, Germany, Ireland	V	Belgium, Luxembourg
VI	Sweden	VI	Bulgaria, Greece,
VII	Luxembourg	VII	Germany
VIII	Estonia	VIII	Malta

Source: own research

In terms of economic and environmental dimensions, in 2016 these countries were classified into four typological groups, whereas to the same groups qualified: a) group: I - Slovenia and Italy, group II - Greece and Portugal, group III - Spain and group IV Cyprus and Malta.

Tables 1-2 contain the classifications of EU countries in terms of all examined dimensions. It should be noted that only in a few countries similar combinations are noted in typological groups when two dimensions (the economic and environmental ones) and four dimensions (the economic, environmental, social and institutional and political ones) are taken into account. This situation in 2008 concerns a total of fourteen countries: the eight from the first typological group, four from the second group and two from the third group. In 2016, the differences between typological groups are greater and similar results due to two and all dimensions concern ten countries, yet the most of them (five) are in the first group.

Considering all dimensions of sustainable development, the attention needs to be paid to relatively significant differences in the rankings for the examined years. The following groups of countries appeared to be similar:

- the Czech Republic, Portugal, Slovenia, Slovakia;
- Finland, Sweden;
- Denmark, the Netherlands;
- Ireland, the United Kingdom
- Romania, Latvia.

In addition, in both years Malta created independently one of the designated typological groups. The above list clearly indicates the geographical proximity of countries located in Europe, characterized by similar situation in terms of sustainable development.

Discussion and Conclusions

The work presents the division of EU countries into groups similar in terms of sustainable development. The research was carried out at two moments of time, thanks to which it was possible to analyze changes taking place in the internal structure of the area's most often considered within sustainable development. Similarities were sought in two variants, firstly analyzing only the two most different dimensions, i.e. related to economic growth and man-made pressure on the environment. Secondly, taking into account all sustainable development dimensions the indicators used by the European Commission to monitor progress in the implementation of the latest sustainable development strategy - the 2030 Agenda for Sustainable Development are the basis of the empirical research presented in the work.

The method used in the work, multi-criteria taxonomy, is a relatively new proposition, already successfully used by the authors (Zopounidis and Doumpos, 2000; Bartelt and Lamersdorf, 2001), in which, on the basis of the results of the rankings, similar countries are sought due to all distinguished dimensions of sustainable development or in terms of only some of them, which is included in this study. As a result of the applied method, one composite measure is obtained, the interpretation of which allowed the identification of objects (the EU countries) similar to each other due to the examined areas. Furthermore, conducting research in two research moments, allowed us to grasp whether the changes took place and how deep they were in the internal structure of sustainable development.

The obtained results show that the internal structure of the division into typological groups of EU countries due to their level of all four sustainable development dimensions, as well as the two distinguished ones (the economic and environmental ones) are significantly differentiated. Only in a few countries similar combinations are noted in typological groups when two dimensions (the economic and environmental ones) and four dimensions (the economic, environmental, social and institutional and political ones) are taken into account.

No clear disproportions between the economic development and the natural environment were found in countries located in Eastern Europe (except for Bulgaria and Romania). These countries are also similar in all areas of sustainable development. Having analyzed the countries located in Southern Europe bigger differences were observed. In this case, to the same typological group in 2008 were classified: Greece, Portugal and Slovenia (group I), Spain (group II), Cyprus, Malta (group IV) and to group VIII - Italy, whereas in 2016 Spain, Portugal, Slovenia and Italy (group I). However, in 2016 these countries were classified into three typological groups, yet to the same groups were classified: a) the group: I - Slovenia and Italy, group II - Greece and Portugal, group III - Spain and group IV Cyprus and Malta. Due to both analyzed (economic and environmental) dimensions, Romania and Italy turned out to be unlike all other analyzed countries and in 2016 separate groups were formed by: Sweden, Estonia and Luxembourg.

A detailed analysis of the countries in terms of all sustainable development dimensions indicates that in the studied years the similarities of the countries due to the researched phenomenon have changed significantly. This situation in 2008 concerns a total of fourteen countries: the eight from the first typological group, four from the second group and two from the third group. In 2016, the differences between typological groups are greater and similar results due to two and all dimensions concern ten countries, yet the most of them (five) are in the first group. Nevertheless, despite the differences in the classification of the studied EU countries in both years, the impact of the location of countries in the geographical regions of Europe and of direct neighborhood on the results achieved in the field of sustainable development is still visible. The similarities of the following groups of countries lead to such conclusions: the Czech Republic, Portugal, Slovenia, Slovakia; Finland, Sweden; Denmark, the Netherlands; Ireland, the United Kingdom; Romania, Latvia.

The advantage of the multi-criteria taxonomy approach used in the paper is the ability to simultaneously analyze changes due to the situation of individual EU member states. This method allows conducting multilateral analyzes and can be used to study development disparities occurring between EU Member States not only in the area of sustainable development.

The results of the research presented in this article confirm the relatively high level of disparities between EU member states in the area of sustainable development, indicated by other authors (Ariely, 2012; Szopik-Depczynska et al., 2018). It should be noted, however, that the classification obtained in the future may be different if the final set of diagnostic indicators changes. According to the authors, further research should go towards verifying the impact of the choice of diagnostic features on the classification results.

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References

- Ariely, G. (2012), 'Globalisation and the Decline of National identity? An Exploration across Sixty-Three Countries,' *Nations and nationalism*, 18 (3), 461-482

- Bartelt, A., and Lamersdorf, W. (2001), A Multi-criteria Taxonomy of Business Models in Electronic Commerce, Fiege L., Mühl G., and Wilhelm U. (eds) Electronic Commerce, WELCOM 2001, Lecture Notes in Computer Science, 2232. Springer, Berlin, Heidelberg.

- Bak, I., and Cheba, K. (2019), 'The Application of Multi-Criteria Taxonomy to Comparative Analysis of Structures of Sustainable Development,' *Acta Universitatis Lodziensis. Folia Oeconomica*, 5 (344), 29-47

- Cheba, K. (2019), Sustainable International Competitiveness of EU Countries – Theoretical and Empirical Study/ Zrównowazona Miedzynarodowa Konkurencyjnosc krajow Unii Europejskiej. Studium teoretyczno-empiryczne, CeDeWu, Warszawa.

- Szopik-Depczynska, K., Kedzierska-Szczepaniak, A., Szczepaniak, K., Cheba, K., Gajda, W. and Ioppolo, G., (2018a), 'Innovation in Sustainable Development: an Investigation of the EU Context Using 2030 Agenda Indicators, *Land Use Policy*, 79, 251-262

- Eurostat, (2018), [Online], [Retrived December 28, 2019], http://ec.europa.eu/eurostat.

- Kiba-Janiak, M., (2015), 'A Comparative Analysis of Sustainable City Logistics among Capital Cities in the EU,' *Applied Mechanics and Materials,* 708, 113-118

- Kukula, K. (2000), The Zero-Unitarization Method/ Metoda Unitaryzacji Zerowanej, PWN, Warszawa.

- Lira, J., Wagner, W. and Wysocki, F. (2002). Median in issues of ordering multi-feature objects/ Mediana w zagadnieniach porządkowania obiektów wielocechowych, Paradysz J. (ed.), Regional Statistics in the Service of Local Government and Business/ Statystyka Regionalna w Służbie Samorządu Lokalnego i Biznesu, Internetowa Oficyna Wydawnicza Centrum Statystyki Regionalnej, Akademia Ekonomiczna w Poznaniu, Poznan, 87-99.

- Malina, A., (2004), Multidimensional analysis of the spatial diversity of the structure of the Polish economy by voivodships/ Wielowymiarowa analiza przestrzennego zroznicowania struktury gospodarki Polski według wojewodztw, AE w Krakowie, Krakow.

- Malina, A., Zelias, A., (1998), 'Taxonomic analysis of the spatial diversity of the quality of life of the population in Poland in 1994/ Taksonomiczna analiza przestrzennego zroznicowania jakosci zycia ludnosci w Polsce w 1994 r,' *Przeglad Statystyczny*, 44 (1), 11-27

- Mlodak, A., (2006), Taxonomic analysis in regional statistics/ Analiza taksonomiczna w statystyce regionalnej, Centrum Doradztwa i Informacji DIFIN, Warszawa.

- Pietrzak, MB., and Balcerzak, AP. (2016a), Assessment of Socio-Economic Sustainability in New European Union Members States in the years 2004-2012, Papież M., and Smiech, S. (eds.), The 10th Professor Aleksander Zelias International Conference on Modelling and Forecasting of Socio-Economic Phenomena, Conference Proceedings. Cracow: Foundation of the Cracow University of Economics, 120-129

- Pietrzak, MB. and Balcerzak, AP (2016b), Quality of Human Capital and Total Factor Productivity in New EU Member States, Loster T., and Pavelka T. (eds.), The 10th International Days of Statistics and Economics. Conference Proceedings. September 8-10, 2016. Libuse Macakova, Melandrium, Prague, 1492-1501

- Siche, JR., Agostinho, F., Ortega, E. and Romeiro, A. (2008), 'Sustainability of Nations by Indices: Comparative Study between Environmental Sustainability Index, Ecological Footprint and the Emergy Performance Indices, ' *Ecological Economics*, 66(4), 628-637

- Scheurer, J. (2001), 'Urban Ecology, Innovations in Housing Policy and the Future of Cities: Towards Sustainability in Neighbourhood Communities, Murdoch University, 5*, Major Principles of Sustainable Transport System: A Literature Review*.

- Szopik-Depczynska, K., Cheba, K., Bak, I., Stajniak, M., Simboli, A. and Ioppolo, G. (2018), 'The Study of Relationship in a Hierarchical Structure of EU Sustainable Development Indicators,' *Ecological Indicators*, 90, 120-131

- United Nations Environment Programme (UNEP), (1975), 'Report of the Governing Council on the Work of this Third Session,' United Nations, New York, USA.

- WCED (World Commission on Environment and Development), (1987), Our Common Future, United Nations, New York, USA.

- Vashisth, A., Kumar, R and Sharma S. (2018), 'Major Principles of Sustainable Transport System: A Literature Review,' *International Journal for Research in Applied Science & Engineering Technology*, 6 (2), 1597-1605

- Zioło, M., Filipiak, MZ., Bak, K. and Cheba, K. (2019), 'How to Design More Sustainable Financial Systems: The Roles of Environmental, Social, and Governance Factors in the Decision-Making Process,' *Sustainability*, 11 (20), 56041, 1-34

- Zopounidis, C. and Doumpos, M. (2000), 'PREFDIS: A multicriteria decision support system for sorting decision problems,' *Computers and Operations Research*, 27 (7-8), 779–797

Examining Cultural Paradigms of Ethical Finance in Europe

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Abstract

Ethical finance does not have one uniform history. Depending on the geographical area and cultural background in which it is practiced, differences in its development can be observed. Taking this into account, the aim of this study is to examine the development of ethical finance in Europe from the perspective of cultural paradigms as proposed by M. Gallicani in the research project "Analytic Atlas of Ethical Finance in Europe". The authors' intention is not to undermine the paradigms, but to show the development of ethical finance in relation to these paradigms. We limited our research to a quantitative analysis of the value of socially responsible investments, some SDGs indicators, bank statistics, and others indicators that define the socio-cultural factors. In some cases, only general directions of the development of ethical finance were presented. To solve this problem, descriptive and multivariate statistics (correspondence analysis) were used. The research results show that contemporary ethical finance in European countries only partially corresponds to the cultural paradigms presented in the "Analytic Atlas of Ethical Finance in Europe".

Keywords: Socially Responsible Investments, Ethical Finance in Europe, Sustainability in Finance

Introduction

According to the definition given by the PRICE project (Promoting Responsible Investment and Commerce in Europe), ethical finance is "any activity that invests money in people and the environment, supporting actions for social and/or environmental enhancement. […] Ethical finance aims to develop a fairer and more equitable interaction between humanity and the environment through the global economy". Ethical financial institutions – be it banks, investments funds, cooperatives, consortia or microcredit cooperatives – are a part of the economic system in which they have developed and thus vary across the world, depending on its prevailing cultural, social and normative characteristics.

Taking into account socio-cultural, economic and ecological differences between the countries, we focus on finding similarities they share. The aim of this study is to examine the development of ethical finance in Europe from the perspective of cultural paradigms. When analyzing the culture of national groups, we also analyze regions which are not necessarily contained within the borders of one country.

What makes the cultural aspect so important? In the course of our research, we formulated the following hypothesis:

H: *Social and cultural differences between European countries determine the directions of ethical finance development.*

Cultural values directly or indirectly reflect shared abstract ideas about what is good, right and desirable for the society (Williams, 1970). Values such as freedom, prosperity and safety constitute the foundation for specific norms which guide people's behavior in different situations. We share essential cultural values, but the way we understand and implement them depends on numerous factors connected with history, law, religion, etc. The members of the society become acquainted with the accents characteristic of their culture by being exposed daily to the customs, laws, norms and organizational practices which express the dominating cultural values (Bourdieu, 1972). We could say that culture is a set of behaviors, values and habits instilled in us by our family and the society which differ depending on the country or region. According to S.P. Huntington (1997), it is precisely culture and cultural identity that shape coherent patterns and thus create a civilizational identity.

In the literature, we can also come across a view that the effect of macroeconomic factors, measured e.g. as the economic growth dynamics of a given political and administrative area, does not necessarily reflect the dynamics of the quality of life of its citizens. According to S. Kiełczewski (2004), assuming the existence of such a causal relationship is a serious methodological error.

The starting point for this research is the division of Europe proposed in the "Analytic Atlas of Ethical Finance in Europe", whose authors distinguish six regions with different approach to the concept of ethical finance based on six distinct cultural paradigms (PRICE, 2014):

1. Mediterranean area, influenced by the Catholic culture;
2. Central Europe, with a Steinerian influence;
3. Francophone area, in which there is a stronger mutualistic and cooperative matrix;
4. Northern Europe, with a clear focus on social and environmental responsibility;
5. Anglo-Saxon countries, characterized by the development of responsible investment fund management;
6. "Former Warsaw Pact" countries, where the economic and social necessities after the fall of the USSR have favored the diffusion of microfinance.

In principle, the concept of ethical finance arose from the modern approach to finance and the concept of ethical business. However, not all responsible financial activity emerged from this source. For instance, the concept of socially responsible investment is strongly rooted in religious movements (Kinder et al. 1994; Kinder, Domini, 1997; Kreander et al. 2003; Sparkes, 1995). An ethical approach is a part of many religions. A strong interpenetration of finance and religion can be observed in Islamic finance, whose central principles are a just division of wealth, care for the wellbeing of the community and economic stability. Moreover, Islamic finance promotes consumer protection and prevent investments into enterprises considered to be "harmful", i.e., in gambling, arms, alcohol and sex industries (Obaidullah, 2005). Enterprises are also forbidden from issuing interest-based loans or keeping their surplus in an interest-bearing account, since income from interest is considered "unclean". This is why enterprises that offer financial services (e.g. banks) that do not comply with these rules are usually excluded from investment portfolios in which the assets are selected in accordance with Sharia law. Nothing suggests that the Catholic religion has an equally strong influence on finance in Europe.

What is worth mentioning in this context is the approach centered around the thought of R. Steiner, founder of the movement called anthroposophy, which in its social aspect is characterized by prosocial individualism. At the base of this idea are two maxims: "I work for you, you work for me" and "to each according to his needs" (Prokopiuk, 2003).

The development of ethical finance in post-communist countries has a more social than cultural character (with political roots) resulting from the social policy of those times; it still, however, bears the mark of the long-held perception of the economy as a common good that thus belongs to no one, that no one needs to manage or look after. This is, of course, reversible, and today, nearly thirty years after the political, economic and social reformation, we notice an increase in civic awareness and civic attitudes (Czapliński, Panek, 2015), which is a natural process, but can take decades.

Research Method

The research is based on Eurostat and Eurosif data. The Eurosif data enabled the analysis of institutional assets from 13 different European markets (Italy, Finland, France, Switzerland, the United Kingdom, Spain, Germany, Belgium, the Netherlands, Sweden, Austria, Denmark and Poland). A set of variables for the analysis was selected based on Eurostat data; SDGs indicators and Europe 2020 indicators . The study applies descriptive statistics and multi-dimensional statistical analysis (MCA – Multiple Correspondence Analysis). The analysis of quantitative data with high dispersion often is hindered by the requirements and limitations of many common research tools. Correspondence analysis is a versatile analytical method that enhance research in detecting and explaining relationships among complex phenomena. In order to preliminarily assess the relations between Socially Responsible Investments and selected variables in the analyzed countries, the Spearman correlation coefficient was used.

The study attempted to find answers to the following research questions:

1. What values of the Catholic culture have had an influence of finance in Mediterranean countries?

2. In the context of ethical finance, what differentiates Central European countries from other European countries in the context of ethical finance?

3. Is the mutualistic and cooperative matrix strongest in the Francophone area?

4. Is environmental responsibility characteristic only of Northern European countries?

5. Are Anglo-Saxon countries characterized by strong development of socially responsible investment funds and SRI management?

6. What are the reasons of the marginal development of ethical finance in the “Former Warsaw Pact” countries?

The research results show a significant diversification of the countries from the socio-cultural and environmental perspective; not in all cases, however, in a way corresponding with the cultural paradigms presented in the “Analytic Atlas of Ethical Finance in Europe”.

References

- Bourdieu, P. (1972) ‘Outline of a theory of practice’, Cambridge: Cambridge University Press.

- Czapliński, J, Panek, T. (2015) ‘Diagnoza społeczna 2015 warunki i jakość życia Polaków’, [Online] [Retrieved December 27, 2020], http://www.diagnoza.com/pliki/raporty/Diagnoza_raport_2015.pdf

- Eurosif (2010) European SRI Study 2010 [Online], [Retrieved November 20, 2020], http://www.eurosif.org/sri-study-2010/

- Eurosif (2012) European SRI Study 2012 [Online], [Retrieved November 20, 2020], http://www.eurosif.org/sri-study-2012/

- Eurosif (2014) European SRI Study 2014 [Online], [Retrieved November 20, 2020], http://www.eurosif.org/sri-study-2014/

- Eurosif (2016) European SRI Study 2016 [Online], [Retrieved November 20, 2020], http://www.eurosif.org/sri-study-2016/
- Eurosif (2018) European SRI Study 2018 [Online], [Retrieved November 20, 2020], http://www.eurosif.org/eurosif-2018-sri-study-launch-event
- Gallicani, M. (2012) 'Analytic Atlas of Ethical Finance in Europe', UniPd.it, Dipartamento di Scienze Economiche
- Greenacre, M J. (1984) 'Theory and Applications of Correspondence Analysis', Academic Press, London
- Huntington, SP. (1997) 'The clash of civilisations', New York: Simon & Schuster
- Kiełczewski, S. (2004) 'Strategiczna ocena polskiej transformacji systemowej', Materiały pomocnicze do wykładu autorskiego
- Kinder, PD., Lydenberg S, and Domini, AL. (1994) 'Investing for good, making Money While Being Socially Responsible', New York: Happer Business
- Kinder, PH and Domini, A.L. (1997) 'Social screening: Paradigms old and new', *The Journal of Investing*, (6), 12-19
- Kreander, N., Molyneaux, D, and McPhail, K. (2003) 'An immanent critique of UK church ethical investment', University of Glasgow, Glasgow
- Obaidullah, M. (2005) 'Islamic financial services. Islamic Economics Research Centre', King Abdul Aziz University. Jeddah, Saudi Arabia
- Prokopiuk, J. (2003) 'Szkice Antropozoficzne', *Wydawnictwo Studio Astropsychologii, Białystok*
- PRICE (2014) 'Introduction to Ethical Finance and Responsible Investments', [online], [Retrieved December 22, 2019], https://ideasfactorybg.org/wp-content/uploads/2015/02/IntroFinanceIng.pdf?iframe=true&width=100%&height=100%%20-
- Sparkes, R. (1995) 'The ethical investor' London: Harper Collins 1995
- The UN '2030 Agenda for Sustainable Development', [Online] [Retrieved January 27, 2020], https://www.light-for-the-world.org/un-2030-agenda-sustainable-development
- Williams, R.M. Jr (1970) 'American society: A sociological interpretation' (3rd Edn.). New York: Knopf

Webcam Eye Tracking Platforms for Usability Testing

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Abstract

Eye tracking is very effective tool in usability testing and provides additional information on user behavior. It is also very expensive due to the cost of eye trackers and in many cases web application developers and/or web-site owners could not afford to use them. So in the recent year appeared several webcam eye tracing platforms. This paper presents the results of verification of two free versions of webcam eye tracking tools: RealEye and Gaze Recorder in usability testing of websites in comparison with standalone eye tracker Tobii TX300 used with Tobii Pro software.

Keywords: Eye Tracking, Webcam Eye Tracking Applications, Usability Testing

Introduction

In recent years, the importance of designing user-oriented interfaces has increased significantly. The research tools used in the design process allow examining the needs of potential users and verifying the correctness of designed user interfaces. Researches carried out by Schall, A. et al. (2014), Horsley et al. (2014) and Bojko (2006) present availability of eye tracking in usability testing of web pages as well as in comparison of web page designs at different maturity levels. User tests on prototypes or ready-made solutions allow us to verify the usability of the layout of individual interface elements. The use of eye tracking registration during user tests enables to gather objective, non-declarative data. Such an examination consists of tracking the fixation points of the examined person during a standard usability test. Rogos-Turek, B. et al. (2015) showed that fixation point determine user interface elements that attract attention and that are invisible or incomprehensible during the completion of the task on the tested web page.

In a book by Bojko (2013) it was shown that application of eye tracking in usability testing is very effective and provides additional information on user behavior. However, this is also very expensive due to the cost of eye trackers and in many cases, web application developers and/or web site owners could not afford to use them. Recently, it is also possible to use eye tracing in user test by means of webcams and special web applications, which are usually available in the subscription system. These applications tracks both the user face and the user eyeball position to determine the user gaze on the screen. This paper presents the results of verification of two webcam-based eye tracking tools: RealEye [RealEye, 2019] and Gaze Recorder [Gaze Recorder, 2019] in usability testing of websites in comparison with very precise standalone eye tracker Tobii TX300 used with Tobii Pro software [Tobii Pro, 2103].

An overview of webcam-based eye tracking applications

Nowadays there are at least dozen different webcam-based eye-tracking applications available over the Internet. They may be used in user testing without the need for installing any software on the computer and they do not require application of any specialized devices except standard webcam. This type of solution is cheaper than application of specialized eye trackers and dedicated software and also is quite easy to use and does not require IT skills to handle them. In this chapter, the following webcam-based eye tracking applications will be presented: RealEye, Gaze Recorder and Eyes Decide.

RealEye

RealEye is a product of RealEye developed in years 2017-2019 [RealEye, 2019]. The tool enables to create a user test (experiment) with additional text description. It enables examination of a photo or a page/webpage in the form of a screenshot. The test conducted using RealEye may be recorded. RealEye offers the ability to invite testers through the web. The test results are presented in the form of a heat map or a reverse heat map, as defined in book by Bojko (2013). Prices depend on the type of use (individual or within organization) and vary from $ 59 to $ 599 per month.

The creation of a new study with RealEye is divided into stages, in each of which you can adjust the settings to suit your preferences. First the name of a test is given and then a photo or a webpage that will be tested. The application will take a screenshot of the page provided. Such a projection, i.e. a static website, will be displayed to the user, which makes it impossible to perform full usability tests, because the respondents will not be able to click on the elements placed on the webpage.

To conduct the test the user must be in a good light and the user may not wear glasses, which is really a big constraint. During the test, users cannot move their heads. Then the test starts with eye tracking calibration, where users should follow the pulsing white dot. After calibration, the examined page or photo is displayed. After the test, along the test results it is possible to save the name, age and sex of the tester. The results are available in the form of a video and standard, or inverted heat map. The following stages of results analysis and completion of the project are available only after purchasing the subscription.

Gaze Recorder

Gaze Recorder is a product of GazeRecorder developed in year 2017 [Gaze Recorder, (2019)]. The tool enables to test photos and interactive webpages. The tool shows eye movements in real time. The test results are presented in the form of a heat map or a reverse heat map, however they could not be saved. The application is available for free. Gaze Recorder does not require any registration. The application requires camera sharing. Immediately after loading the webpage, a red box is displayed with a frame in which the user's face should be placed. There is no information regarding using the glasses, but during the test they may distort the image due to the reflection of light in the lenses. Calibration is based on tracking the red dot with the crosshair, it has two stages, first the screen is bright, and then the background turns black. In the next step, you can choose two types of research, upload a photo or browse the website.

In case the photo option was selected, it is possible to set the length of the recording, you can also stop the test at any time by clicking "stop recording". When browsing the page, the button “stop recording” should be used. After the examination, the result is available in the form of a heat map but it cannot be saved.

EyesDecide

EyesDecide is a product of xLabs developed in 2016 [EyeDecide, (2019)]. The tool enables to create an experiment with a description, a script and questions. It enables to test a photo, webpage in the form of a screenshot or a video on YouTube. With EyesDecide we can conduct test on the local computer, invite selected individuals to the test from the Internet or even hire EyesDecide testers. The test results are presented in the form of a heat map, and a mouse-tracking path [Sobecki, et al (2009)]. Prices depend on the number of tests and ranges from $ 750 to $ 1500.

EyesDecide requires registration prior to the use. The free version allows you to carry out one project and five tests. In order to do more the tool have to be paid. To facilitate the implementation of the own project it is possible to view other completed projects.

The project building is divided into several parts. First, the test (project) should be named, described and the scenario should be defined. In the next step, the object that will be examined should be added to the project. These can be photos, as well as websites that will be displayed in the form of a screenshot, however clickable elements could be also added. An additional option is to add questions to the tester, which may appear before and after the test.

Description of experimental comparison of webcam eye tracking platforms with specialized eye tracker

In this chapter an experimental comparison of the two webcam eye tracking platforms, i.e. RealEye and Gaze Recorder, with professional Tobii TX300 based platform will be presented. They were chosen because they were the only solutions found that allowed for simultaneous research, besides these webcam platforms were available for free.

Tobii TX300 eye tracker platform

Tobii TX300 eye tracker is a hardware equipment that has a very good quality cameras and additional an infrared light source. The application of infrared light enables to record eye movements using corneal reflection [Tobii Pro, 2016]. The recording quality depends on the sampling frequency, which for this eye tracker has a maximum value of 300 Hz and for webcams it is usually 30 Hz (30 fps frames per second) up to 60 Hz. Together with the hardware Tobii provides also specialized software Tobii Pro enabling conducting, recording tests and analyzing results data. There are many other manufacturers of eye tracking systems on the market, however Tobii is definitely the leader.

Tobii TX300 is a tool connected to the monitor screen, it has a camera and a speaker that allows you to record tests with sound. Tobii has built-in infrared LEDs that emit light during testing, which is reflected on the cornea of the eyes. With the help of image sensors and advanced algorithms, the tool can identify the movement of eyeballs with a frequency of 300 Hz. The device is very accurate and does not require a fixed position from the user, which increases the comfort of use [Tobii Pro, (2016)].

Tobii TX 300 does not excludes the participants wearing lenses or glasses, the tool copes in such conditions without much problem. Tobii Pro software allows you to generate different types of output data such as heat map, view path and video recording. It also allows you to generate quantitative data based on recorded eye tracking data using different metrics, e.g. time to first fixation or time spent on specified Area of Interest (AOI) [Tobii Pro, 2019].

Experiment Description

The aim of the study was to compare webcam eye tracking platforms RealEye and Gaze Recorder with Tobii platform, in terms of quality and accuracy of recordings and generated data, during the usability tests of webpages.

The hardware eyetracker used in the research was the Tobii TX300 eye tracker, which records data with a resolution of 300 Hz. Further solutions were free software available online, using a webcam, RealEye and Gaze Recorder. They were chosen because they were the only solutions found that allowed for simultaneous research. Tobii Pro software and RealEye web application were used for data analysis presented in the form of heat maps and video recordings. Gaze Recorder does not allow saving the generated recording, but thanks to the video recording from the Tobii Pro you can compare the results.

The research was carried out in two stages. The first on 29/10/2019 and the second on 13/01/2020, both at the Wrocław University of Science and Technology (WUST) in the research laboratory of Service Oriented Systems. In the first stage, Real Eye and Gaze Recorder were compared with Tobii platform. In the second stage, Gaze Recorder was compared with Tobii platform using chin rest device. Chin rest is a tool used also at optics laboratories for eye examination.

At the first stage participated eight people and at the second stage participated seven people. All the participants were the students of WUST. At the first stage the participants performed the following two tasks:

Task 1. You need to contact the head of the dean's office, find the information you need at the webpage of the Faculty of Computer Science and Management of WUST Content [Faculty of computer science, 2019].

Task 2. Find information about the training offer Website at the webpage of WUST library [Library of Wroclaw University of Science and Technology, 2019].

The Task 1 was recorded using Gaze Recorder and Tobii platform and the Task 2 was recorded using RealEye and Tobii platform. At the second stage only the Task 1 was done.

Experimental Comparison Results

In this section the results of the experiment comparing Gaze Recorder (Task 1) and RealEye (Task 2) with Tobii without application of the chin rest (stage 1) and results of the experiment comparing Gaze Recorder (Task 1) with Tobii with application of the chin rest (stage 2).

Results of the Task 1 – Stage 1

The Task 1 that was performed using Gaze Recorder and the Tobii platform. The results for eight participants are presented in fig. 1-3. The fixation path (fixations and saccades) was determined with the Tobii and the heat map was determined with Gaze Recorder. We can conclude that the areas marked by Gaze Recorder have a much wider range than the fixations from the fixation path determined by Tobii platform. The discrepancy is so large that the information provided by TestGazer is of little use. We can also noticed that the heat map for some participants (i.e. fig 3) is shifted from the fixation path determined by more accurate Tobii platform. We can also notice that only the results for two participants are satisfactory.

Results of the Task 2 – Stage 1

The Task 2 was performed using RealEye and Tobii platform. The experiment results is presented in fig. 2 in form of heat maps for selected four participants. The readability of the heat map generated by the examined RealEye application is very poor for all participants. The gaze areas are superimposed so that the image becomes illegible and it is not known where the respondent actually focused his eyes. The heat map is so inaccurate that reliable and useful information cannot be drawn. Such data cannot be used for effective usability analysis.

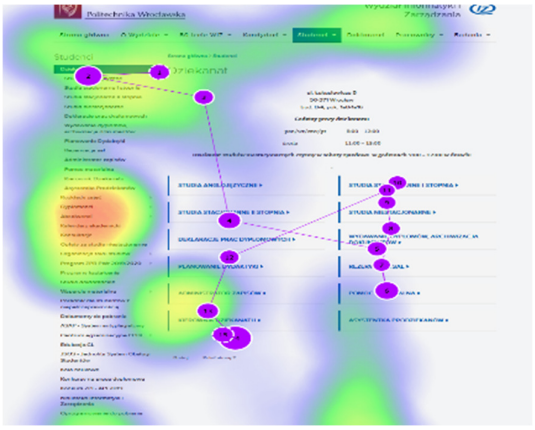

Fig. 1 Results of the Task 1

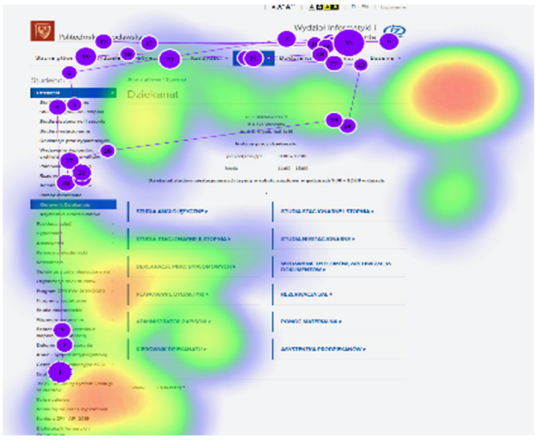

Fig. 2 Results of the Task 1

Fig. 3 Results of the Task 1

Fig. 4: Results of the Task 2 for four selected participants. Results from Tobii on the left and RralEye on the right.

Results of the Task 1 – Stage 2

In the second stage, experiment with Gaze Recorder and Tobii was repeated using the chin rest that immobilize the head. The results are shown in figures 5-7. The RealEye application was not retested due to the very low quality of the results in the first stage and unavailability of the free version at that time.

Because of the fact that between experiment at the stage 1 and 2 lasted almost three month so the Teat Gaze Recorder application version has changed. The results are presented in a different way than for the stage 1. The left column shows the results from Tobii, the right column from Gaze Recorder. The comparative analysis shows that the data from Gaze Recorder are more accurate than in the case of the study without application of chin rest, in most cases, they identify the same areas as Tobii, see fig. 5.

However, horizontal and vertical shifts also occur sporadically (see fig. 6) and with a longer look period at specific web page element, during the visit they become less accurate (see fig. 7).

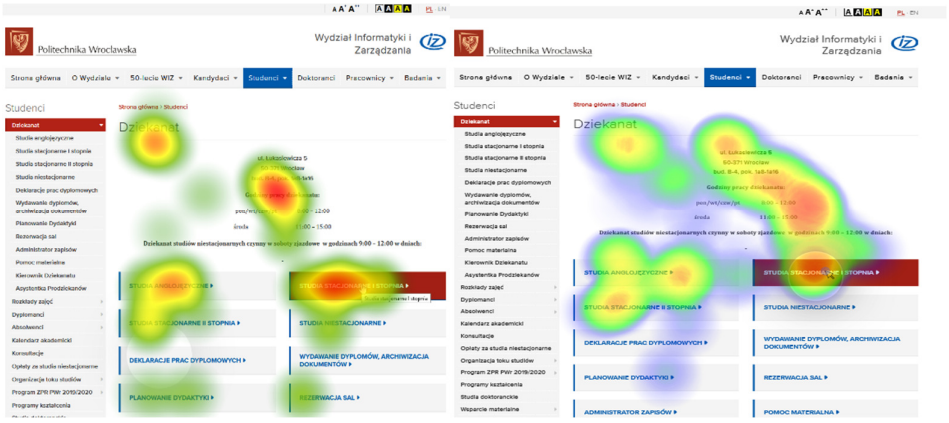

Fig. 5 : Results of the second stage of the Task 1. Results from Tobii on the left and Gaze Recorder on the right.

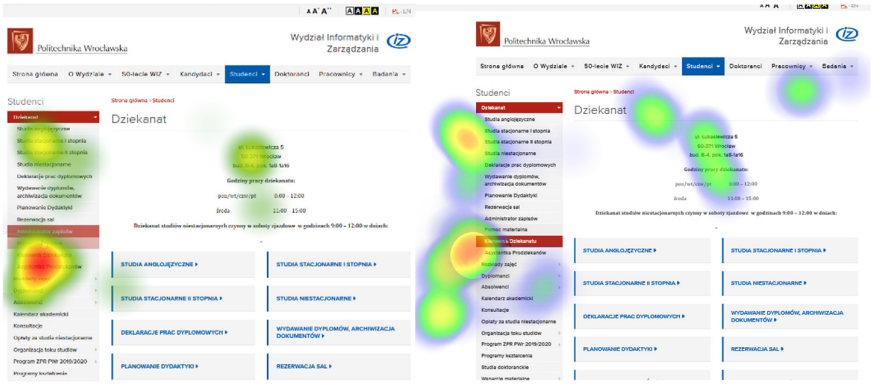

Fig. 6 : Results of the second stage of the Task 1. Results from Tobii on the left and Gaze Recorder on the right.

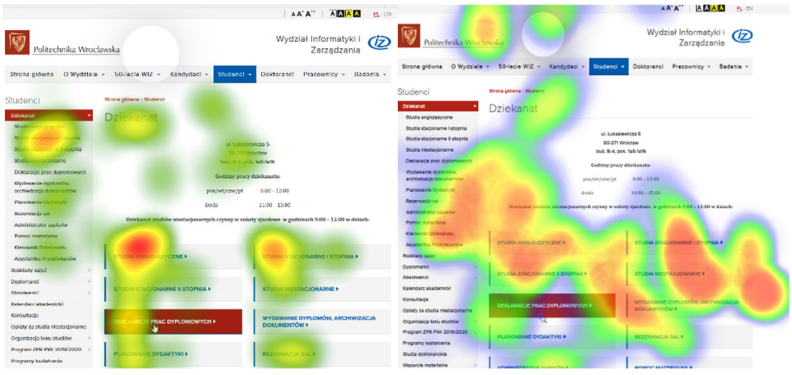

Fig. 7: Results of the second stage of the Task 1 for 7th participant. Results from Tobii on the left and Gaze Recorder on the right.

Summary

Based on the research that were performed at the first stage (without using the chin rest), it can be concluded that webcam eye tracking platforms are not as accurate and precise as hardware eye trackers. Quite often the area the user actually looked were quite distant from the one recognized by the webcam eye tracking platforms. Usually it was shifted to different sides or was not recognized at all.

The fields on the heat map from RealEye software were so large that it was impossible to check where the subject's gaze was concentrated. The generated data was illegible, making it difficult to analyze and extract useful information in the form of user behavior. Therefore, we can conclude that without using the chin rest, what is standard in the case of all webcam eye-tracking platforms, this type of eye trackers do not give satisfactory gaze paths and gaze areas and so could not be used in UX research with satisfactory effectiveness, as defined in work by Chynal, et al, (2018).

In the case when the chin rest is applied, the results are more accurate, but still not precise enough to determine which specific elements on the screen have been noticed and for how long. We must remember however, that professional chin rest could be more expensive than the cheap, but still quite accurate hardware eye trackers. It is also not realistic to hire testers from the internet that will have a chin rest at their disposal.

It also turned out that wearing glasses was a significant limitation that excluded many potential test participants. Webcams basing on visible light are not able to overcome light reflections from the glasses. Moreover, the test participants must have perfectly visible all the time, which is not the case of the specialized eye trackers. However, the biggest disadvantage was the ban on moving the head and torso, only eye movements were allowed, that reduced the participants comfort pretty much.

Using webcam eye trackers is risky, but it can be helpful at the initial design stage, when the prototype or the website is not ready for final acceptance usability tests. However, when deciding on such a step, it is necessary to take into account a large margin of error when analyzing data. The better decision is to apply professional eye trackers or test usability Without costly eye tracking data registration.

References

- Benedict, S., Hugo, S., Garen K., and Fabricio D. (2018), "The business value of design",[Online], McKinsey Quarterly, [26.11.2019], https://www.mckinsey.com/business-functions/mckinsey-design/our-insights/the-business-value-of-design
- Bojko, A., (2013), Eye tracking the user experience: A practical guide to research, Rosenfeld Media.
- Bojko, A., Using Eye Tracking to Compare Web Page Designs: A Case Study, Journal of usability studies, Issue 3, Vol. 1, May 2006, pp. 112-1202006
- Chynał P., Falkowska J., Sobecki J. (2018) Web Page Graphic Design Usability Testing Enhanced with Eye-Tracking. In: Karwowski W., Ahram T. (eds) Intelligent Human Systems Integration. IHSI 2018. Advances in Intelligent Systems and Computing, vol 722. Springer, Cham
- EyesDecide, [Online], https://www.eyesdecide.com/, [23.10.2019]
- Faculty of Computer Science, Wroclaw University of Science and Technology, [Online], https://wiz.pwr.edu.pl/studenci/1dziekanat, [03.12.2019]
- Gaze Recorder, [Online], https://test.gazerecorder.tk, [23.10.2019]
- Horsley, M., Eliot, M., Knight, B., A., (2014) Current Trends in Eye tracking Research, Springer
- Library of Wroclaw University of Science and Technology, [Online] http://biblioteka.pwr.edu.pl/, [03.12.2019]
- RealEye, [Online], https://www.realeye.io/, [23.10.2019]

- Rogos-Turek, B, Moscichowska, I., (2015), Badania jako podstawa projektowania User Experience, Warszawa, PWN.
- Schall, A., Bergstrom, J., (2014), Introduction to eye tracking,Chapter 1: Eye tracking in User Experience Design, Elsevier
- Sobecki, J., & Żatuchin, D. (2009). Knowledge and data processing in a process of website quality evaluation. In New challenges in computational collective intelligence (pp. 51-61). Springer, Berlin, Heidelberg.
- Tobii Pro (2019), Tobii Studio Manual, Tobii Pro
- Tobii Pro, (2016), Tobii TX300 Eye Tracker Manual, Tobii Pro

The Changes in Communication Patterns After Accrual Accounting Adoption – The Case of An Italian University

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Abstract

This paper explores the changes in the information presentation after the adoption of accrual accounting. The adoption of accrual accounting is an important institutional change that should lead to better communication of the performance and outcomes as well as resources that are at the disposal of the economic entity. The adoption of accrual accounting should lead to greater accountability reflected in the new approach to reporting. However, accrual accounting, especially in the public sector, is associated also with greater complexity of information. In this article, it is verified if the introduction of accrual accounting changed the communication patterns of the university in Italy. The case study methodology was adopted. The results obtained indicate that together with the reforms of the higher education institutions in Italy, including also the transformation of the accounting information presentation, the significant changes in the information presentation occurred. The university analyzed within this study reacted actively to the request of greater accountability and better communication and together with the adoption of accrual accounting, it changed the way of information presentation. The change in the visual forms of information presentation applied by the analyzed university deserves special attention. The new ways of communication via visual forms adopted by the university may be a confirmation for the standard-setters that their efforts concerning more accountability are reflected in the voluntary approaches to information presentation adopted by the analyzed university that can be a proof of a successful compilation of the formal request and voluntary acting towards better communication.

Keywords: Accrual Accounting, Communication, Stakeholders, Universities

Introduction

The last few decades have seen unprecedented pressures to reform universities worldwide geared mainly towards an outcry for better accountability of resources consumed by higher education. The most relevant reasons of the need to bring changes into the governance of the universities are a shift from an elite to a mass higher education system; cuts in state funding, rising costs, difficultly financing the institutions exclusively with public funds; and greater competition between universities for funding and students (De Boer et al., 2007; Ferlie et al., 2008). Moreover, since the early nineties universities in Europe have started to focus their activities on the so-called "third mission" (the first two are teaching and research), which is related to knowledge transfer, commercialization and innovation (Laredo, 2007, Secundo et al. 2017, Zomer and Benneworth, 2011). As a result, increasing cooperation among universities, industries, and territories may be observed. It is followed by the expectations for wider disclosure of value creation and universities' outcomes presentation that would follow the practices of the private sector (Bezhani, 2010; Secundo et al. 2015; Siboni et al., 2013; Ramírez et al., 2016; Rossi et al. 2018). These expectations are boosted also by the growing autonomy given to universities that is however connected also with the greater accountability requirements. Together with the changes in environment, structures, strategies and processes, universities have received more autonomy on the one hand, but on the other, the new model, which shifted the decision-making power towards universities management (Parker 2011), requires new management and reporting systems to lower information asymmetry between universities and their stakeholders (Secundo et al. 2015). Universities must communicate effectively with a wide range of their stakeholders also to compete for grants, funding, students, professors. Universities are also obliged to prove compliance with a growing array of national regulations and guidelines. One of the main tools that universities use to communicate with the stakeholders and therefore to execute these accountability expectations are the annual reports.

At the same time, the prevailing tendency of the past few years that may be observed, has been that of implementing in the public sector, therefore also in the universities, typical private sector management and accounting practices, among the most important – the accrual accounting concept (Chan, 2003; Broadbent and Guthrie, 2008). Already in the 1990s, the adoption of accrual accounting in the public sector was considered to be self-evident: it was viewed as a good tool to realize New Public Management (NPM) principles such as public sector efficiency, effectiveness, transparency and accountability (Lapsley et al., 2009).

In this study we focus on the impact of the transition of Italian universities from the cash to the accrual accounting on the communication with their stakeholders that is a principal theoretical idea of this accounting change. The scope of our research is to analyze how universities present their results in narrative parts of annual reports dedicated to stakeholders and whether there are some changes in communication patterns within time, that indicate the improvement of information quality in presenting a performance by universities' managers.

There are several issues, that motived our research. First of all, in line with the New Public Management approach, results of public administration activities and funds spending (including those of Higher Education Institutions) should be disclose with the efficient accounting information to deliver the highest level of transparency (Gigli et al 2018). Second, in the increased accountability requirements that are geared towards universities, we intend to analyze how the universities address this challenge and if together with the accrual accounting adoption they also introduce new ways of information presentation.

The main aim of this paper is to explore the changes in the information presentation after the adoption of accrual accounting. We choose an example of an Italian Public University as the Italian higher education sector deserves special attention due to the deep transformation from a completely centralized one to the autonomous at the management, organizational and partly at the funding level. Until the end of the 1980s, universities in Italy were managed by governmental administration, not delegating powers to lower levels. The decision-making processes were not related to the assessment of effectiveness and efficiency. From the mid-nineties, many changes have been introduced in Italy to move from the bureaucracy to the managerial system in higher education (Aversano et al. 2017).

Different reforms (like Brunetta and Gelmini Reforms) introduced also rules towards transparency reporting and understandable for stakeholders (Dal Molin et al. 2017) including a change from cash to accrual accounting.

In this paper, we analyze the part Summary of information of interest to citizens and external stakeholders (*Sintesi delle informazioni di interesse per i cittadini e gli stakeholder esterni*) of the Italian University disclosed in the Performance Reports (*Relazione sulla Performance)*. We use a case study approach in order to investigate what are the patterns of presenting a performance by universities. We focus mainly on the visualization methods included in the information presented to stakeholders with special attention to the innovative infographics included in the communication of the university with stakeholders.

This paper contributes to the broader research studying the effectiveness of the accounting transition in the public sector, from cash accounting to accrual accounting. The previous research focuses mainly on consequences of the transformation (Chan, 2003; Parker and Guthrie, 1990; Hood 1995, Mellett, 1997; Lapsley 1999; Lapsley and Oldfield, 2001) and difficulties in the implementation process (Guthrie, 1998; Carlin, 2005; Hodges and Mellett, 2003). There are however no studies that would empirically research the impact of the application of the new rules on the universities' communication with their stakeholders. The main contribution of this work, therefore, is the analysis of the changes in the communication patterns that are a result of the accounting rules transformation in universities.

The Third Mission, Accountability and Accounting in The Communication Of The Universities

As it is underlined by Secundo et al. (2017, p. 229): "since the 1990s, European universities have moved from focusing exclusively on the two core missions, teaching and research, to gaining a leading role in economic growth and regional development". This movement has been frequently described as the "third mission", that is concerned with the "generation, use, application and exploitation of knowledge and other university capabilities outside the academic environment" (Molas-Gallart et al., 2002, p. 2). This third mission is the role of the university that goes beyond teaching and research and centers specifically on the contribution to regional development (Charles and Benneworth, 2002; Chatterton and Goddard, 2000) and strengthening interrelations with the local community, business and society as a whole. This requires an effective dialog of universities with their stakeholders. Universities have a wide spectrum of stakeholders i.e. governors and legislators, funders (government, donators), internal governing bodies of universities, professors, researchers, the general public, the community in which the university is located, accrediting bodies, media, students, their parents, alumni, business representatives, sponsors, social and civic organizations. All of these stakeholders are potentially interested in the performance of universities, their outcomes, the effective money spending. They want to be informed, they request accountability and transparency. The intensified interrelations of universities with the society result in increased accountability requirements geared towards universities (Parker, 2011) e.g. concerning funds spending and university outcomes. In its broadest sense, accountability refers to the obligation to provide an account to a superior or least someone with a legitimate stake (Boven et al, 2014, p. 3). Stensaker and Harvey (2011, p. 1) focus on accountability at universities stating that "one of the most profound changes in higher education during the last couple of decades is the increasing interest in accountability". Universities, their faculty and staff increasingly held accountable to internal and external stakeholders with governments in many countries introducing rules to further enhance accountability (Melo et al., 2010, p. 237). The first area of interest is the use of public and private funds. Accountability and transparency regulation are to ensure the efficient allocation of funding and allow potential sponsors, cooperators, and students to make decisions concerning relations with universities. The second area of interest is assuring that stakeholders move towards their desired goals (Leville, 2005, p. 10). Consequently, accountability at universities comprises the systematic collections of input, process, and outcome data, their analysis and information dissemination, contributing to internal and external decision making by the policymaker, educational leaders, and other stakeholders in the higher education institution. Accounting is one of the key elements needed to assure accountability (Boven, 2006, p. 6). Accounting tools are seen as the

fundamental means through which managers or external agencies and bodies are made accountable for the results attained (Liguori et al, 2012, p. 906). To achieve that, accounting, which used to be focused on providing information to national budgetary and financial authorities, needed to integrate the notion of accountability to external stakeholders (Coy et al., 2001). This lead to the emergence of a new format of public reporting that increasingly took a shape similar to that found in companies (Christiaens et al., 2010; Bergmann, 2012). Accounting practices in the public sector have been undergoing some radical changes to adapt to the reforms in public management (Hood 1995; Lapsley 1999). Especially, public sector reporting has been undergoing significant reforms in the last few decades (Christiaens et al., 2010; Bergmann, 2012). Around the world, the most significant reforms concerning public sector accounting and reporting included proposals for the adoption of accrual-based accounting (Aucoin, 1990; Barzelay, 2001; Hood, 1995; Cohen and Karatzimas,2015). Financial reporting by public sector institutions traditionally centers on the receipts and disbursements of cash, while assets and liabilities are reported in separate systems and formats. The key product of such accounting is a cash-based financial statement that indicates whether an institution meets its budget, runs a deficit or achieves a surplus of cash during the accounting period (IFAC 2000, p. 47). In contrast, accrual-based accounting is built on conceptual frameworks developed for the private sector, which links the different types of accounts in one system (Hodges and Mellett, 2003, p.102). The transition from cash-based systems to accrual accounting is motivated by the need to improve public sector reporting, but the consequences of the switch are far-reaching (Cohen and Karatzimas, 2015). Accrual-based accounting offers benefits to organizations that need an accounting system that performs many roles, such as detecting errors or fraud, measuring performance, and accounting for the depletion of the capital stock. Grossi and Soverchia (2011) underline: "accrual accounting is expected to provide more useful information for long-term assessment of public policies' financial sustainability, both for internal use (for cost and price calculation, make-or-buy choices, outsourcing, etc.) and for external use, thus improving government's transparency, accountability and performance evaluation". However, accrual accounting is at the same time more complex, because of the various links between accounts and elements, which makes it difficult to understand (Diamond, 2002), especially when it comes to public organizations that do not aim to deliver business-like performance (Šević, 2006). Previous research confirms also that public managers also find it difficult to understand and use accrual-based financial reporting (Grossi and Soverchia, 2011). However, public sector reporting may overcome some of the difficulties associated with the complex nature of accrual-accounting by improving the manner of presenting information to the public.

The Adoption of Accrual Accounting by Italian Universities

New public management principles inspired Italian trajectories of reforms from the beginning of the 1990s, when the country started to implement the first tranche in three interconnected areas, namely organisation, finance and decision-making (Anessi Pessina, 2002). As it is underlined by Mussari and Sorrentino (2017, p. 146): "On the financial management side, all these initiatives translate into a small slow move from input-oriented to output-oriented budget procedures and adoption of accruals reporting as a means to achieve more effective decision-making, so as to enhance control over public expenditure and increase transparency and external accountability". These reforms referred also to Italian universities.

In Italy, research and teaching activities are delivered by state and non-state universities approved by the national Ministry of Education. In 2019 the university system comprised 89 universities, classified into 68 state with all together 1.495.561 students and 31 non-state universities with 195.273 students (Ministero dell'Istruzione dell'Università e della Ricerca, 2019). Even though universities are vested with some autonomy, all universities in Italy must comply with accounting rules set by the state; their teaching and research activities are firmly regulated by the Ministry of Education, and they are accountable to the Ministry of Economy for all their financial activity (Agasisti, et al., 2015; p. 495).

In 2010, the Italian Parliament approved a reform of public universities. As one of its important elements, the higher education system was compelled to introduce full accrual accounting and budgeting, following the approval of the Law n. 240/2010 in December 2010, with 2015 set as the

deadline for the adoption. This was further supported by Legislative Decree n. 18, dated 27 January 2012, which formulated precise implementation guidelines and indicated the deadline of 2015 for making the change and some subsequent regulatory provisions. Universities shifted to the accrual regime at different times, partly due to the five-year time span required to develop the overall regulation. Few universities made the switch before the deadline approached. The Association of University Managers formally asked Parliament for an extension of the deadline, arguing that legitimate technical issues arose and due to the lack of additional resources and competencies the reform cannot be effected in time (Agasisti et al., 2015, p. 496). In consequence, universities in Italy transitioned to accrual accounting in different years, depending on how quickly a university tackled the problem.

Empirical Research

Methodology

In this research, as the main methodology, the case study has been applied (Yin, 1989). Case studies are widely used in organizational studies in the social science disciplines (Hartley 1994). A case study is expected to capture the complexity of a single case, which should be a functioning unit, be investigated in its natural context with a multitude of methods, and be contemporary (Johansson, 2007). Case studies are tailor-made for exploring new processes or behaviors or ones that are little understood (Hartley 1994). In this research, we follow the design of case study choices proposed by Meyer (2001). The university that was chosen is Tor Vergata Univeristy of Rome. Sampling time follows the change from cash to accrual accounting in this institution, therefore 2014 and 2015. Data was collected from the annual performance report, with a focus on the syntactical part dedicated to stakeholders that is included in the performance relation called Relazione sulla Performance. This is a special part designed to present the most important performance data in a numerical and descriptive way that the university publishes every year presenting in it the range of information on a voluntary base, however with a focus to be accountable towards stakeholders.

Case Study Description

Tor Vergata University of Rome was established in 1982 and is a public research University located in Rome. It is structured in 6 Schools (Economics; Law; Engineering; Humanities and Philosophy; Medicine and Surgery; Mathematics, Physics and Natural Sciences) which are organized in 18 Departments. Tor Vergata currently offers 106 graduate programmes (Bachelordegree, Master degree, One-cycle degree) and 32 PhD courses, with the total number of students close to 34,000 and 1,694 academic faculty staff members (en.uniroma2.it).

Tor Vergata University of Rome changed from cash to accrual accounting in 2015. *Relazione sulla Performance* 2014 was the last annual report published following cash accounting principle and 2015 was the first one after the accrual accounting system implementation. In both reports, their first parts consist of information for external stakeholders (*Sintesi delle Informazioni di Interesse per i Cittadini e gli atri Stakeholders Esterni*).

In *Relazione sulla Performance* 2014 there are:

- 1 table with numbers with the information about staff distribution from 2011 until 2014 (Picture 1),
- 1 table with numbers with the information about staff distribution in 2014 regarding age and sex,
- 1 table with numbers with the information about the cost of labour from 2011 until 2014.

In *Relazione sulla Performance* 2015 there are:

- 5 visualized number iconographic with the information about: (1) students distribution, (2) research projects, (3) internationalization, (4) services for students and (5) academic staff (Picture 2),
- 6 lists with iconographic, where information about achievements of improvements in six different areas where disclosed: internationalization of research projects, the attractiveness of the programs offer, development of services supporting didactics (3 achievements), development of customers services, elimination of corruption,
- list with S.W.O.T. analysis.

As it can be noticed in the *Relazione sulla Perfomance* of 2015, together with implementing accrual accounting system, Tor Vergata University of Rome changed the way of communication towards stakeholders. First of all, more visual forms were presented in 2015 comparing to 2014 (3 visual forms in 2014 and 12 visual forms in 2015). Second, in 2015 the University eliminated the traditional visual forms of presenting information and focused on iconographic. Third, in 2014 only one type of visual form was used, while in 2015 three types of visual forms were presented (in 2014 tables and in 2015 visualized number iconographic, lists with iconographic, list). Finally, in 2015 more types of information were presented within visual forms: in 2014 the infographic related only to the information about staff distribution and labour costs, whereas in 2015 the colorful and more user-friendly visual forms were applied to information about: students distribution, research projects, internationalization, services for students and academic staff; about achievements of improvements in six different areas (internationalization of research projects, attractiveness of the programs offer, development of services supporting didactics (3 achievements), development of customers services, elimination of corruption) and S.W.O.T. analysis. The pictures below present some examples of infographics used in 2014 and 2015 documents.

Personale a tempo indeterminato al 31.12	2011	2012	2013	2014
PROFESSORI	716	687	694	691
RICERCATORI	721	695	662	630
DIRETTORE GENERALE	1	1	1	1
DIRIGENTI di 2° FASCIA	5	4	4	4
CEL	15	15	14	15
CATEGORIA EP	49	48	47	45
CATEGORIA D	432	424	419	417
CATEGORIA C	463	455	454	449
CATEGORIA B	67	65	65	64
Totale	2469	2394	2360	2316

Picture 1: Table regarding stuff distribution from Relazione sulla Performance 2014.

Source: Relazione sulla Performance 2014, Universita degli Studi di Roma "Tor Vergata", amministrazionetrasparente.uniroma2.it

Internazionalizzazione
855 studenti in uscita
495 studenti in entrata
5 corsi di studio con Doppio Titolo
101 accordi di scambio con università internazionali nella Global Top 500

Servizi agli studenti
350 Aule
29 Laboratori informatici
865 Postazioni PC
6 Biblioteche
7500 risorse bibliografiche digitali

Personale
693 Professori
676 Ricercatori
5 Dirigenti
15 Collaboratori ed Esperti linguistici
975 Tecnici Amministrativi e Bibliotecari

Picture 2: Three lists with iconographic regarding internationalization, services for students and academic staff from Relazione sulla Performance 2015.

Source: Relazione sulla Performance 2015, Universita degli Studi di Roma "Tor Vergata", amministrazionetrasparente.uniroma2.it

Discussion and conclusions

It can be clearly observed that the implementation of accrual accounting changed not only the accounting information presented in the annual reports of the analyzed case but also introduced other important changes in the way the information is presented to the stakeholders. It may be observed that together with the accounting rules also the change in the reporting policy was altered. The results of this study suggest that after the accrual accounting adoption, the university analyzed engaged actively in communication with the users, rather than limit itself to reporting the minimum required. The results may support the arguments concerning a negative effect of accrual accounting on communication performance since the researched university appear to respond to this reform with increased efforts in a textual section of the annual statement. This suggests, it finds more issues need explaining than under the previous system, which was familiar to the users. The implementation of accruals in the public sector is generally expected not only to increase the information content of communication but also its complexity. Therefore, what was observed is that the university analyzed tried to make the information presentation more user-friendly, introducing visual forms and infographics. The communication with stakeholders via performance report, a part of the reporting that is not subject to strict regulation, allowing organizations to freely combine the various dimensions of performance presentation to become more colorful and more intelligible. The approach of visual forms introduction follows the notion that human brains are hard-wired for processing visual information. Since ancient times, human brains have stored memories visually and worked creatively through mental maps, patterns and images. The very architecture of the visual cortex provides direct access to human consciousness (Clark & Mayer, 2011). People learn and remember more efficiently and effectively through the use of text and visuals than through text alone (Dunlap and Lowentha 2016). With the developments in internet technologies, organizational communication with and between stakeholders must become far more

sophisticated. In an era of data overload, however, visual forms offer to the audience of the information a format that is easy to consume and share (Smiciklas, 2012). Therefore, the visual forms that the universities, or other institutions adopting accrual accounting, may be a perfect way to overcome difficulties concerning the accrual accounting information complexity as they make the information more comprehensive, understandable and user-friendly. With the changes in accounting that increase the complexity of reports, public institutions may benefit from using visual forms more extensively. The practices of the analyzed universities may be used as an answer to all the opponents of the accrual accounting implementation. It could serve as a benchmark to other institutions in adhering to the communication with stakeholders after the adoption of the more powerful but also more complex and therefore also for some more difficult to understand accounting approach.

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References

- Agasisti, T., Catalano, G., Di Carlo, F., Erbacci, A., (2015),"Accrual accounting in Italian universities: a technical perspective", International Journal of Public Sector Management, Vol. 28 Iss. 6 pp. 494 - 508 Permanent
- Anessi Pessina, E. (2002). Principles of public management. Milano: Egea.
- Aucoin, P. (1990). Administrative reform in public management: Paradigms, principles, paradoxes and pendulums. Governance, 3(2), 115–137
- Aversano, N., Rossi, F. M., & Polcini, P. T. (2017). I sistemi di misurazione della performance nelle università: considerazioni critiche sul sistema italiano. Management Control.
- Ball, I. (2012). New development: Transparency in the public sector. Public Money & Management, 32(1), 35–40.
- Barzelay, M. (2001). The new public management: Improving research and policy dialogue. Berkeley, CA: University of California Press.
- Bergmann, A. (2012), "The influence of the nature of government accounting and reporting in decision-making: evidence from Switzerland", Public Money and Management, Vol. 32 No. 1, pp. 15-20.
- Bezhani, I. (2010). Intellectual capital reporting at UK universities. Journal of Intellectual Capital, 11(2), 179-207.
- Boven M., Goodin R., Scillemans T., (ed.) (2014), The Oxford Handbook of Public Accountability, Oxford University Press.
- Boven, M., (2006), "Analysing and Assessing Public Accountability. A Conceptual Framework", European Governance Papers, (EUROGOV), No. C-06-01, www.connex-network.org/eurogov/pdf/egp-connex-C-06-01.pdf.
- Broadbent, J., and J. Guthrie, 'Public Sector to Public Services: 20 Years of "Contextual" Accounting Research', Accounting, Auditing and Accountability Journal, Vol. 21, No. 2, 2008.
- Burritt, R.L. and Welch, S. (1997), Accountability for Environmental Performance of the Australian Commonwealth Public Sector. *Accounting, Auditing and Accountability Journa*l, 10, pp. 532-561
- Carlin, T. M. (2005). Debating the impact of accrual accounting and reporting in the public sector. Financial Accountability & Management, 21(3), 309-336.
- Chan J.L. (2003), Government accounting: an assessment of theory, purposes and standards, *Public Money & Management*, 23(1), pp. 13-20.

- Charles, D. & Benneworth, P. (2002). Evaluating the Regional Contribution of an HEI: A Benchmarking Approach. Bristol: Good Practice.
- Chatterton, P. & Goddard, J. (2000). The response of higher education institutions to regional needs. European Journal of Education, 35(4), 475–496.
- Christiaens, J., Reyniers, B. and Rolle, C. (2010), "Impact of IPSAS on reforming governmental financial information systems: a comparative study", International Review of Administrative Sciences, Vol. 76 No. 3, pp. 537-554.
- Clark, R. C, & Mayer, R. E. (2011). e-Learning and the science of instruction: Proven guidelines for consumers (3rd ed.). San Francisco, CA: John Wiley & Sons.
- Cohen, S., Karatzimas, S. (2015) "Tracing the future of reporting in the public sector: introducing integrated popular reporting", International Journal of Public Sector Management, Vol. 28 Issue: 6, pp.449-460
- Coy, D., Fischer, M. and Gordon, T. (2001), "Public accountability: a new paradigm for college and university annual reports", Critical Perspectives in Accounting, Vol. 12, No. 1, pp. 1-31
- Dal Molin, M., Turri, M., & Agasisti, T. (2017). New Public Management Reforms in the Italian Universities: Managerial Tools, Accountability Mechanisms or Simply Compliance?. International journal of public administration, 40(3), 256-269.
- De Boer, H. F., Enders, J., & Leysite, L. (2007). Public sector reform in Dutch higher education: The organizational transformation of the university. Public Administration, 85(1), 27–46.
- Diamond, J. (2002), "Performance budgeting: is accrual accounting required?", IMF Working Paper Nos 02/240, IMF, Washington, DC.
- Dunlap, J. C., & Lowenthal, P. R. (2016). Getting graphic about infographics: design lessons learned from popular infographics. *Journal of Visual Literacy*, *35*(1), 42-59.
- Ferlie, E., Musselin, C. and Andresani, G. (2008) The Steering of Higher Education Systems: A Public Management Perspective. Higher Education, 56 pp325–348.
- Grossi, G. and Soverchia, M. (2011), "European commission adoption of IPSAS to reform financial reporting", Abacus, Vol. 47 No. 4, pp. 525-552.
- Guthrie J. (1998), Application of accrual accounting in the Australian public sector: rhetoric or reality?, *Financial Accountability & Management*, 14(1), pp. 1-19.
- Hartley, J. F. 1994. Case studies in organizational research. In *Qualitative methods in organizational research: A practical guide*, edited by C. Cassell and G. Symon, 209–29. London: Sage.
- Hodges R., Mellett H. (2003), Reporting public sector financial results, *Public Management Review*, 5(1), pp. 99-113.
- Hood, C. (1995). The New Public Management in the 1980s: Variations on a theme. Accounting, Organizations and Society, 20(2), 93–109.
- IFAC (2000) Governmental Financial Reporting:Accounting Issues and Practices,New York: IFAC Public Sector Committee
- Johansson, R. (2007). On case study methodology. *Open house international*, *32*(3), 48.
- Lapsley I. (1999), Accounting and the new public management: instrument of substantive efficiency or a rationalizing modernity? *Financial Accountabilty and Management*, 15(3/4), pp. 201-207.
- Lapsley, I., R. Mussari and G. Paulsson, 'On the Adoption of Accrual Accounting in the Public Sector: A Self-Evident and Problematic Reform', European Accounting Review, Vol. 18, No. 4, 2009.
- Lapsley, I., & Oldfield, R. (2001). Transforming the public sector: management consultants as agents of change. European Accounting Review, 10(3), 523-543.

- Laredo, P. (2007). Revisiting the third mission of universities: Toward a renewed categorization of university activities? Higher Education Policy, 20(4), 441–456.
- Leveille, D.E., (2005), "An Emerging View on Accountability in American Higher Education", Research and Occasional Papers Series, Center for Studies in Higher Education, UC Berkeley www.escholarship.org/uc/item/89b2b1zt
- Liguori, M., Sicilia, M. and Steccolini, I. (2012), "Some Like it Non-Financial ...", Public Management Review, Vol. 14, No. 7, pp. 903-922. DOI: 10.1080/14719037.2011.650054
- Mellett H. (1997), The role of resource accounting in the UK government's quest for better accounting. *Accounting and Business Research*; 27, pp.157–68.
- Melo, A. I., Sarrico, C. S., & Radnor, Z. (2010). The influence of performance management systems on key actors in universities: the case of an English university. Public Management Review, 12(2), 233-254.
- Meyer, C.B. (2001), A Case in Case Study Methodology, *Field Methods*, Vol. 13, No. 4, November, 329–352
- Mussari, R., & Sorrentino, D. (2017). Italian public sector accounting reform: A step towards European public sector accounting harmonisation. *Accounting, Economics, and Law: A Convivium*, *7*(2), 137-153.
- Molas-Gallart, J. et al. (2002). Measuring Third Stream Activities. Final Report to the Russell Group of Universities. Brighton: SPRU, University of Sussex.
- Otten, J. J., Cheng, K., & Drewnowski, A. (2015). Infographics and public policy: using data visualization to
- Parker, L. (2011). University corporatisation: Driving redefinition. Critical Perspectives on Accounting, 22(4), 434–450.
- Parker L., Guthrie J. (1990), *Public sector accounting and the challenge of managerialism,* in Foster J., Wanna J., (eds.), Budget Management and Control, Melbourne, Macmillan, pp. 114-127.
- Ramirez, Y., Tejada, A., & Manzaneque, M. (2016). The value of disclosing intellectual capital in Spanish universities: A new challenge of our days. Journal of Organizational Change Management, 29(2), 176-198.
- Rossi, F., Nicolò, G., & Tartaglia Polcini, P. (2018). New trends in intellectual capital reporting: Exploring online intellectual capital disclosure in Italian universities. Journal of Intellectual Capital, 19(4), 814-835.
- Secundo, G., Elena-Perez, S., Martinaitis, Ž., & Leitner, K. H. (2015). An intellectual capital maturity model (ICMM) to improve strategic management in European universities: A dynamic approach. Journal of Intellectual Capital, 16(2), 419-442.
- Secundo, G., Perez, S. E., Martinaitis, Ž., & Leitner, K. H. (2017). An Intellectual Capital framework to measure universities' third mission activities. Technological Forecasting and Social Change, 123, 229-239.
- Šević, Ž. (2006), "Accounting aspects of 'new public management': accrual accounting in the public sector", Journal of Finance and Management in Public Services, Vol. 4 No. 1, pp. 11.
- Siboni, B., del Sordo, C., & Pazzi, S. (2013). Sustainability reporting in state universities: an investigation of Italian pioneering practices. International Journal of Social Ecology and Sustainable Development (IJSESD), 4(2), 1-15.
- Stensaker, B., Harvey, L., (2011), "Accountability in Higher Education. Global Perspective on Trust and Power", Routledge, New York and London
- Yin, R. K. 1989. *Case study research: Design and methods*. Applied Social Research Series, Vol. 5. London: Sage.
- Zomer, A., & Benneworth, P. (2011). The rise of the university's third mission. In Reform of higher education in Europe (pp. 81-101). SensePublishers.

Integrated Territorial Investments as An Instrument for The Development of Polish Functional Areas

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Abstract

Integrated Territorial Investments (ITI) is an instrument introduced by the European Union, which is intended to support spatial cohesion and territorial development. Particular importance is attached to planning development processes based on the principle of an integrated territorial approach in the EU financial perspective 2014-2020. The main task of ITI is to reduce differences in the level of socio-economic development of individual regions of the Member States by stimulating the potential of a given region in strategic areas. The aim of the article is to define the functions and principles of functioning of Integrated Territorial Investments and their use in Polish regional policy. ITI facilitate the development of urban functional areas through the cooperation of local government units comprising these areas and the implementation of joint integrated projects included in the ITI strategy. In Poland, the largest number of ITI projects pertains to the increase in energy efficiency of public infrastructure as well as improvement of education, urban transport, the labour market and access to public services. An undeniable benefit of the introduction of ITI is the increase in the diversity and availability of financial resources for the implementation of operational programmes in a cross-cutting manner. Among the advantages of the integrated territorial approach, one can also mention the possibility of using the local and regional development potential, as well as favouring the development of cooperation and integration of local governments with other entities.

Keywords: Integrated Investments, Regional Operational Programmes, Territorially Oriented Development, Urban Functional Area.

Introduction

Integrated Territorial Investments (ITI) are an instrument introduced by European Union to boost territorial cohesion and development. Their main task is to bridge the gap between the levels of socio-economic development of the different regions of the member states by boosting the potential of a region in a number of strategic areas. Investment in particular regions of the member states of the European Union is a huge driving force behind the development not only of the economy, but also of innovation, new technologies and education. ITI are to have an impact on the development of the region, and thus raise the standard of living of the inhabitants. ITI projects are aimed primarily at creating a competitive economy by dynamizing the functioning of enterprises, social capital, educational entities and the broadly understood research and development area.

Integrated Territorial Investments are an opportunity for more effective growth of competitiveness and attractiveness of regions. ITI's main task is to increase the development effectiveness by implementing integrated investments not only territorially, but also thematically. Drawing on the ideas of partnership, the cities, the surrounding municipalities and voivodeship authorities set objectives and investments to enable exceeding the administrative boundaries of local governments, which will strengthen the impact of collaboratively implemented projects.

The aim of the article is to define the functions and principles of functioning of Integrated Territorial Investments and their use in Polish regional strategy. The article also compares the amount of allocation for Integrated Territorial Investment implementation within regional operational programmes of individual voivodeships and indicates the actual directions of intervention. Was based on literature studies, a descriptive method and comparative analysis. The time span of the research covers the years 2014-2018. The analysis was carried out on secondary data.

Integrated Territorial Investments as an instrument for the development of urban functional areas

Integrated Territorial Investments are an instrument which enables the implementation of territorial strategies in an integrated way. For the years 2014-2020 European Union has attached particular importance is attached to planning development processes based on the principle of an integrated territorial approach. It entails the adaptation of interventions and activities to the needs of geographically defined areas, whose boundaries are determined by common development conditions as well as strong and multifaceted functional links. Territorially oriented policy takes into account social, economic and spatial changes that occur in the regions and growing expectations towards the effectiveness of undertaken measures and disbursement of public funds (*Strategie*..., 2015). Such approach necessitates the design of the so-called integrated investment package, which should be based primarily on the use of endogenous resources specific for each region. The aim of a territorially-oriented strategy is to support external development through actions tailored to the specific situation and the particular territory. Territorially targeted policies aim to reduce persistent development inefficiencies and inequalities in a given area. Such policies mean a long-term development-oriented strategy aiming at overcoming underutilisation of development potential as well as reducing social exclusion in certain regions through external intervention and the application of multi-level public management (Barca, 2009).

This approach has been more broadly defined in the premises and objectives of the regional policy in Poland included in the National Strategy for Regional Development 2010-2020 (KSRR 2010-2020). The provisions of the document regarding territorially oriented development imply, among other things, the need to achieve development objectives related to cohesion, as well as a multi-sectoral, multi-annual and decentralized approach to development problems that takes into account the diversity of individual areas (Krajowa..., 2010). This model of managing regional development is conducive to improving the effectiveness of cohesion policy in terms of both inputs and outputs. It requires coordination and complementarity of support from various sources, but also refers to the specificity of the area, in particular to its natural growth factors, which are both certain resources and strong functional links. Directive provisions of the document refer to the use and development of internal growth factors of specific territories (the so-called endogenous resources), supporting the spread of development processes from growth centers to other areas, as well as the introduction of new instruments of partnership and coordination of actions between different levels of public authorities. Integrated Territorial Investments are one of the available instruments for the implementation of the territorial dimension of development policy and at the same time they are the platform for cooperation between local governments. According to the European Commission proposal, by increasing their involvement in the management of EU fund ITI should be of particular use in the development of cities and their functional areas (Słodowa-Hełpa, 2014).

Integrated Territorial Investments are a new form of cooperation of territorial local government units from the area which is characterized by functional links, common potential and willingness to engage for the benefit of implementation of coherent and complementary development projects.

It is an EU instrument for promoting regional cohesion. It aims to bridge the gap between the levels of socio-economic development of the different regions of the member states by boosting the potential of a region in a number of strategic areas[1]. It aims to bridge the gap between the levels of socio-economic

[1] The implementation of ITI in Poland was regulated by the provisions of the Act of 11 July 2014 on the principles of implementation of programmes in the field of cohesion policy which have been financed in the 2014-2020. Dz.U. 2014 entry 1146

development of the different regions of the member states by boosting the potential of a region in a number of strategic areas. This instrument can significantly affect the scale and pace of development in the spatial structure of the economy in regional terms, contributing to the improvement of competitiveness and socio-economic development (Sikora-Gaca, Kosowska, 2014).

The most important aims of ITI include (*Zasady*…, 2013):

- promoting a partnership model of cooperation between different administrative units in urban areas;
- increasing the effectiveness of undertaken actions through the implementation of integrated projects which comprehensively respond to the needs and problems of cities and areas functionally related to them;
- increasing the influence of cities and functionally linked areas on the design and implementation of actions supported by cohesion policy in their territories.

Integrated Territorial Investments can be considered to be a territorial development instrument based on the cooperation of local government units. ITI constitute a new model of cooperation between units of local government (Chrisidu-Budnik, 2016).The main function of ITI is the cooperation of local governments in order to make the most of the advantages of local governments and to jointly solve problems. Therefore, the co-financed projects should be integrated and influence the development of the whole area.

ITI is a new form of support for urban areas, which perform key functions in the settlement system of Polish voivodeships (Kisielewicz, 2016). The formal separation and establishment of functional areas in the functional and spatial structure is one of the conditions for the implementation of the territorial dimension of the development policy. ITI were dedicated to functional areas, especially urban ones. Under the current approach to development policy the functional area has become the unit to which development funds are to be allocated. Functional area is a compact system of spatial arrangement consisting of functionally related areas, characterized by common conditions and uniform development goals. It is separated for the use of its geographical potential for the developmental purposes of the country and regions. In line with the principles of the municipal policy, cities and areas subject to urbanisation processes are the particular recipients of territorially oriented development (*Krajowa*…, 2010). In the National Spatial Planning Concept 2030 (KPZK 2030), urban functional areas (MOF) are defined as spatially continuous settlement systems composed of administratively separate units. An urban functional area comprises a compact urban area and a functionally related urbanised area. The strength of internal links between the core city and its functional area plays an important role. This strength can be shown particularly in: commuting to work, intensity of development, volume of goods and services flow of a diversified nature, interconnection of the labor market and the housing market, technical infrastructure and natural habitats. Administratively, urban functional areas may include both urban, rural and urban-rural municipalities. The MOF typology refers to the function of urban centres in the settlement system of the country and is based mainly on the size of the centres. In Poland, 4 types of urban functional areas have been identified, which have been shaped around centres (*Koncepcja*..., 2012):

- voivodeships, including metropolitan ones;
- regional - i.e. cities not fulfilling the function of voivodship centres, but performing important administrative, economic and social functions, as well as having a great potential for development from the point of view of the objectives of the country's spatial development policy;
- subregional - i.e. cities with a population between 50,000 and 100,000, performing important functions in the socio-economic and spatial development of voivodships;
- local - i.e. cities of less than 50,000 inhabitants, concentrating economic functions and serving rural areas with their service facilities.

Central units, which link and integrate functional areas, comprise cities of different sizes of the human potential and various levels of development of various degrees of functional hierarchy. Practically, ITI

regional policy is implemented in the case of functional areas shaped around voivodship and regional cities. This results from the privileged method of financing ITI tasks by reserving funds for this purpose in regional operational programmes for 2014-2020 (RPO). Two most important conditions for ITI implementation are preparation of ITI strategy for established functional areas and allocation of funds from the basic allocation of RPO (as a supplement to funds from the programme reserve) for ITI implementation in the region. Such assumptions lead to the fact that ITI supports primarily the largest cities and their functional areas. It can therefore be expected that by 2020 they will become real poles of regional development (Szafranek, 2015).

In the 2014-2020 financial perspective, Integrated Territorial Investments are implemented in Poland by 17 voivodship cities and areas functionally related to them (urban functional areas of voivodship centres) and by 7 subregions (urban functional areas). In total, in Poland ITI will be implemented in 24 functional areas which have been granted ITI funding under RPO *(Monitorowanie…*, 2016). The largest number of functional areas financed under RPO funds was observed in Silesian (4) and Lower Silesian (3) voivodships. These are simultaneously the voivodships with the highest level of urbanisation in the country – the urbanisation index in 2016 for Silesian was 77.6%, and for Lower Silesian - 69.4% (Table 1). The demographic potential of urban functional areas is strongly differentiated in the regional structure. The largest part of the population (more than half of the region's population) living in functional areas is located in the following voivodships: Silesian, Western Pomerania, Pomerania, Mazowieckie and Lower Silesian. Voivodeships in which functional areas gather a lower share of the population of the region are the areas of eastern Poland (Podkarpackie, Świętokrzyskie, Warmińsko-Mazurskie, Podlaskie), as well as the Kujawy and Pomerania Voivodeship. The diversity of the areas covered by the ITI, both in terms of population and size, results in different needs and challenges for their development as well as the scale of funding.

Table1: Functional areas implementing ITI in Poland

Voivodeship	Name of the functional area	Population of functional areas	Population of the voivodship	Rate of urbanisation of the voivodship (%)
Lower Silesian	Wrocław Functional Area Jeleniogórska Agglomeration Wałbrzyska Agglomeration	1394020	2903710	69,4
Kujawy and Pomerania	Bydgosko-Toruński Functional Area	313885	2083927	61,1
Lubelskie	Lubelski Functional Area	548525	2133340	46,5
Lubuskie	Gorzów Wielkopolski Municipial Functional Area Zielona Góra Municipial Functional Area	119001	1017376	63,5
Łódzkie	Łódzki Metropolitan Area	1098222	2485323	63,8
Małopolskie	Krakowski Functional Area	1034051	3382260	49,4
Mazowieckie	Warszawski Functional Area	2699891	5365898	64,7
Opolskie	Opolska Agglomeration	337383	993036	63,5
Podkarpackie	Rzeszowski Functional Area	356231	2127656	41,6
Podlaskie	Białostocki Functional Area	412741	1186625	60,3
Pomeranian	Gdańsk-Gdynia-Sopot Metropolitan Area	1267288	2315611	65,0
Silesian	Central Subregion of the Silesian Voivodeship South Subregion of the Silesian Voivodeship North Subregion of the Silesian Voivodeship West Subregion of the Silesian Voivodeship	3093128	4559164	77,6

Świętokrzyskie	Kielecki Functional Area	332486	1252900	44,8
Warmia and Mazury	Olsztyn Municipial Functional Area	447589	1436367	59,3
Wielkopolskie	Poznań Municipial Functional Area Kalisko-Ostrowska Agglomeration	1372694	3481625	55,2
West Pomeranian	Szczeciński Metropolitan Area Koszalińsko-Kołobrzesko-Białogardzki Functional Area	986826	1708174	68,9

Source: Based on: Ministry of Investment and Development and Local Data Bank.

The basic objective of ITI is to promote the development of the urban functional area through the facilitation of cooperation between the administrative units comprising its composition and the implementation of joint integrated projects responding in a comprehensive way to the needs and problems of a given area. The implementation of ITI consists primarily of the cooperation between local government units that are part of the functional areas and the implementation of joint integrated projects included in the ITI strategy. In line with the assumption adopted by the EU for the implementation of regional policy, ITI should be applied in situations where urban development strategies or other territorial strategies require an integrated approach involving investments in more than one priority area, one or more operational programmes (*Zasady*..., 2013, p. 8). With the help of this tool, partnerships between local government units, cities and functionally related municipalities and voivodeship authorities establish common development goals and then identify integrated projects necessary to achieve them. It is estimated that ITI will lead to increased cooperation and integration in the functional areas of the largest cities in Poland. ITI can help in the implementation of integrated projects and increase the participation of cities and their functional areas in the management of operational programmes.

In Poland, ITI deploys resources from two funds - the European Regional Development Fund (ERDF) and the European Social Fund (ESF). ITI is implemented within a specially separated allocation in each of the 16 regional programmes and indirectly within the Infrastructure and Environment Operational Programme and Eastern Poland Operational Programme. This will allow the implementation of integrated projects which are financed from various sources. The provision of diversified streams of funds provides a better opportunity to finance integrated actions. This would enable more effective handling of issues affecting individual urban centres and functional areas. This formula makes it possible to go beyond the rigid administrative boundaries of local governments. It will lead to greater impact of collaborative initiatives.

Usage of ITI in Polish Regional Policy

Mobilization of funds needed for ITI depends on fulfillment of certain factors. Local governments wishing to implement ITI are obligated to establish an institutionalized form of partnership (*Zasady...,* 2013). It means that, apart from spatial processes which were fundamental for establishing of municipal functional areas, willingness to join that organizational structure expressed by governments of each city and municipality (gminas) creating this specific form of partnership is necessary. To implement ITI territorial units which are creating municipal functional area have to implement institutionalized form of partnership – have to create so-called ITI union, which could be association, municipality union or it could take form of intercommunal agreement.

Second requirement which have to be fulfilled is creation of ITI strategy. A cross-sectoral strategy for integrated development is needed, which covers the development needs of a given area. In this strategy principles of cooperation, directions of development, analysis of potentials and barriers for the area as a whole and the most important planned joint investments, have to be established (Zakrzewska-Półtorak, 2013). ITI strategy in particular should (Programowanie…, 2015):

- be consistent with national and EU strategic and planning documents,
- indicate the area of support and contain diagnosis for that area
- indicate territorial boundaries of support,

- indicate development objectives and investment priorities to be achieved by ITI,
- define the rules of project selection and a list of projects to be implemented in the ITI formula, as well as a list of strategic projects of complementary nature possible to be implemented outside ITI,
- contain financial plan,
- describe the implementation system,
- contain a report on the progress of work and the involvement of partners from the functional area in the implementation of the strategy.

Another requirement for realization of projects contained in ITI strategy is an agreement between the entity representing communities (gminas) and voivodeship self-government, in which a detailed scope of tasks to be performed in connection with the implementation of ITI is established. It is also necessary to include relevant provisions in the RPO (regional operational programme), meeting the requirements of the European Commission and in accordance with the provisions of the Partnership Agreement. At the same time it is worth noting that ITI are implemented in Poland as part of Regional Operational Programmes. It should be noted that all ROPs have planned the implementation of measures in the ITI formula.

The allocation from the EU funds for the implementation of ITI under the 16th ROP amounted in total to PLN 13 117 million. Support for ITI implementation in individual voivodeships is very uneven - from PLN 3460 million in the Silesian Voivodeship (which accounts for 22.8% of the ROP implementation funds) to PLN 256 million for ITI in the Warmińsko-Mazurskie Voivodeship (3.4% of the ROP implementation funds). In comparison with all the voivodships, apart from Silesian, three more voivodships stand out - the Lower Silesian, Pomeranian and Małopolskie (Table 2). Different scale of funding for Integrated Territorial Investments projects in individual voivodships is primarily due to the high diversity of areas covered by the ITI, which results in their needs being different.

Table 2: Value of allocation to ITI under the ROP - as of 30 June 2018

Voivodeship	ROP allocation amount in million PLN	ITI allocation amount in million PLN
Lower Silesian	9 828	1 212
Kujawy-Pomerania	8 305	728
Lubelskie	9 734	460
Lubuskie	3 957	472
Łódzkie	9 843	986
Małopolskie	12 558	1 032
Mazowieckie	9 118	729
Opolskie	4 123	313
Podkarpackie	9 225	365
Podlaskie	5 295	332
Pomeranian	8 136	1 076
Silesian	15 170	3 460
Świętokrzyskie	5 954	362
Warmińsko-mazurskie	7 541	256
Wielkopolskie	10 690	858
Western Pomeranian	6 986	476

Source: Own study based on data from the Supreme Chamber of Control (2019).

Territorial measures implemented within ITI should take place in three basic dimensions (Szafranek, 2015):

- intelligent economic growth (e.g. strengthening of functional dependencies, benefits of agglomeration, increase in importance of social capital, networking);
- sustainable economic growth (use of space resources for renewable energy sources, shaping of compact, sustainable cities, development of pro-ecological transport, ecological corridors);
- economic growth conducive to social inclusion (activation of the population and facilitation of access to jobs and services).

These dimensions are indicative of the possibilities of financing the tasks to be carried out in specific areas. Moreover, in the Polish regional policy it is recommended that ITI be focused in particular on (*Zasady...,* 2013):

- development of sustainable, efficient transport connecting the city and its functional area (implementation of strategies of public transport that are both environmentally friendly and low-carbon as well as common to the whole functional area – thematic objectives 4, 7);
- restoring socio-economic functions of the degraded areas of the urban functional area (implementation of a common functional revitalisation plan for the entire functional area in an integrated manner, which takes into account the infrastructural, economic, social and environmental aspects of the functional area – thematic objectives 6, 8, 9, 10);
- improvement of the condition of the natural environment in the functional area of the city (among others, waste management measures, waste water treatment, protection of both biodiversity and existing green public places in urban areas – thematic objectives 4, 6);
- supporting energy efficiency and promoting low-carbon strategies (initiatives related to the measures for energy efficiency in both the public buildings and the housing sector as well as public infrastructure – thematic objectives 4);
- strengthening the development of symbolic functions that build the international character and supra-regional rank of the urban functional area and improving the accessibility and quality of public services in the whole functional area (projects should use the common features/potential of the functional area and contribute to strengthening of its character and adaptation and expansion of the range of available services in the entire functional space of the city – thematic objectives 2, 6, 8, 9);
- strengthening research, technological development and innovation (implementation of projects related to the increase in innovativeness of enterprises, implementation of research results and development of services offered by Business Environment Institutions – thematic objectives 1, 3).

Every ITI Union should choose at least two of the following intervention directions. Furthermore, in justified cases, there is an opportunity for an extension of the following list of actions. Actions taken within each of the following ITI are the result of actual needs of functional area and also determined by catalogue of available actions defined in general principles.

Table 3: Quantity and value of contracts under ITI instrument – as for 31st January 2018.

Thematic objective	Number of projects	Value of projects in PLN million
01 Strengthening of scientific research, technological development and innovation	13	3,1
02 Improving access, usage and quality of information and communication technologies	51	158,4
03 Strengthening of competitiveness of small- and medium-sized business	133	415,2
04 Supporting the transition to a low-carbon economy in all sectors.	691	6764,3

05 Promoting adaptation to climate change, risk prevention and management	4	36,4
06 Conservation of natural environment and support for effective resource management	152	850,6
07 Promoting sustainable transport and removing bottlenecks in the operation of key network infrastructures	31	730,5
08 Promoting quality and sustainable employment and supporting labor mobility	228	565,5
09 Promotion of social integration, combating poverty and all forms of discrimination	316	1613,7
10 Investments in education, training and vocational training for skills acquisition and constant learning	566	1485,7

Source: own study based on: Ministry of Investment and Development.

Actual thematic distribution of interventions can be estimated with quantity and value of signed contracts. Majority of projects (32%) and at the same time the most valuable ones (53% of the total value of projects) are concerning thematic target no. 4: Supporting the transition to a low-carbon economy in all sectors. Projects in this theme are mostly concerning public transport, bicycle infrastructure, energy efficiency and air quality. Numerous and valuable projects also are connected to theme no. 9: Promotion of social integration, combating poverty and all forms of discrimination (14% of all projects and 13% of their value) and also theme no. 10: Investments in education, training and vocational training for skills acquisition and constant learning (26% of quantity, 12% of value). 28% of the total number of projects and about 20% of their total value accrue to other seven thematic targets (Table 3).

Considering thematic area of investments we can determined that the most of ITI projects are concerning recovery of public infrastructure for energy efficiency (notably thermal insulation of buildings), education from preschool to high school level, public transport, labor market and public services access (including healthcare). Value-wise the most predominant theme is public transport and in lesser way energy efficiency of public infrastructure (*Ewaluacja…,* 2018). It is worth noticing that the most relevant areas of support are those in which cooperation is necessity and where there is opportunity for synergy effect – it is especially apparent in public transport, natural environment quality and supralocal public services.

Conclusions

The EU definition of investment priorities financially supported under the ITI has imposed certain restrictions. Despite that, in each of urban functional areas there are activities addressing both their developmental needs and challenges posed by the national and EU economies.

An undoubted benefit of implementing ITI is an increase in the diversity and availability of financial resources for integrated activities. ITI promote the integrated use of European funds and has the potential of achieving better results with the same costs of public investment. Moreover, the advantages of an integrated territorial approach include the opportunity to apply the local and regional development potential, as well as fostering the development of cooperation and integration of local governments with other entities. Another element worth of notice is the positive impact of the body in terms of activating a number of relations between partners of ITI unions (local government units in urban functional areas).These include, among others, increasing integration, building trust between partners, limiting unnecessary rivalry and competition, defining and attempting to solve common problems. In creating cooperation, it is very important to notice and understand the challenges that the partners face and to jointly develop a coherent vision, create a strategy and set priorities.

ITI should contribute to an increase in the effectiveness of regional development policy by integrating different instruments that are managed at national and regional level. ITI allow the implementation of operational programmes in a cross-sectoral manner and combining funding from different programmes

and priority axes. It ensures the implementation of an integrated strategy for a specific territory and thus the translation of strategic thinking into the operational level by the implemented projects. Effective cooperation of territorial self-government units in the implementation of joint undertakings should enable the implementation of all planned investments under particular ITI. It will undoubtedly contribute to the balanced development and improvement of spatial cohesion of a given functional area, at the same time having a positive impact on the implementation of regional development policy. According to their premise, ITI should become an instrument for the implementation of the voivodeship development strategy in terms of supporting the areas of intervention defined in it (including the areas of strategic state intervention), as well as an instrument created for a territorial approach to development, which can help unlock unused potential at the regional level.

References

- Barca, F. (2009) An Agenda for a Regional Cohesion Policy. A place based approach to meeting European Union challenges and expectations. Independent Report prepared at the request of D. Huebner, Commissioner for Regional Policy, Brussels.
- Chrisidu-Budnik, A. (2016) Koncepcja zaufania w optyce zintegrowanych inwestycji terytorialnych, *Samorząd Terytorialny,* 9, 43-53.
- Ewaluacja systemu realizacji instrumentu ZIT w perspektywie finansowej UE na lata 2014-2020. Raport końcowy. (2018) [Online], [Retrieved September 10, 2019], http://www.ewaluacja.gov.pl/media/59155/RK_ewaluacja_ZIT.pdf.
- Kisielewicz, B. (2016) Miejsce wojewódzkich zintegrowanych inwestycji terytorialnych w regionalnych programach operacyjnych 2014-2020, *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 443*,* 115-123.
- Koncepcja Przestrzennego Zagospodarowania Kraju 2030. (2012), Ministerstwo Rozwoju Regionalnego, Warszawa.
- Krajowa Strategia Rozwoju Regionalnego 2010–2020: Regiony, Miasta, Obszary wiejskie. (2010), Ministerstwo Rozwoju Regionalnego, Warszawa.
- Monitorowanie strategiczne miejskich obszarów funkcjonalnych realizujących Zintegrowane Inwestycje Terytorialne w Polsce. Raport 1. Wskaźniki strategiczne na poziomie województw. (2016), Stowarzyszenie Białostockiego Obszaru Funkcjonalnego, Białystok.
- Programowanie perspektywy finansowej 2014–2020. Umowa Partnerstwa. (2015), Ministerstwo Rozwoju, Warszawa.
- Sikora-Gaca, M., Kosowska, U. (2014) Fundusze europejskie w teorii i praktyce: edukacja, gospodarka, kultura, społeczeństwo, Difin, Warszawa.
- Słodowa-Hełpa, M. (2014) Dokąd zmierzamy – odnowa czy od nowa...? Nadzieje, obawy i dylematy związane z instytucjonalnym stymulowaniem zintegrowanego rozwoju w Polsce, *Nierówności Społeczne a Wzrost Gospodarczy,* 37(1)*,* 20-42.
- Strategie ponadregionalne – wymiar terytorialny polityki rozwoju. (2015), Ministerstwo Infrastruktury i Rozwoju: Warszawa.
- Szafranek, E. (2015) Zintegrowane Inwestycje Terytorialne jako narzędzie wspierające kształtowanie centrów rozwoju regionalnego, *Rozwój Regionalny i Polityka Regionalna,* 32, 81-94.
- Zakrzewska-Półtorak, A. (2013) Zintegrowane Inwestycje Terytorialne jako nowe narzędzie wspierania współpracy jednostek samorządu terytorialnego – przypadek Wrocławskiego Obszaru Funkcjonalnego, *Biblioteka Regionalisty,* 13*,* 267-276.

- Zasady realizacji Zintegrowanych Inwestycji Terytorialnych w Polsce. (2013), Ministerstwo Rozwoju Regionalnego, Warszawa.
- Zintegrowane Inwestycje Terytorialne w Perspektywie Finansowej 2014-2020. (2019), Najwyższa Izba Kontroli, [Online], [Retrieved January 20, 2020], http://www.nik.gov.pl/plik/id,20652,vp,23281.pdf

Adaptive Network-Based Fuzzy Inference System for The Operational Planning at The Enterprise

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Abstract

Information flows within the organization are often characterized by a low degree of formalization and different kinds of uncertainties. Fuzzy expert systems are widely used for the processing of expert opinions under condition of uncertainty but have a significant disadvantage – high level of subjectivity. Models of adaptive neuro-fuzzy expert system may be effectively used to decrease the level of subjectivity. Subject of research is the construction of expert system, which allows to optimize the planning of the labor intensity and scheduling and also has the ability to further training and adaptation in accordance with the newly emerging actual results of production activity of the company.

Keywords: Neuro-fuzzy systems, fuzzy expert systems, operational planning

Introduction

The presence of a corporate information system is an essential condition for the successful development of the modern organization. Business activities, including the implementation of strategic planning, operational control and interaction with partners contributes to the development of the complex information system within the company.

Inside the company appear various information flows which have different characteristics, directions and end users. Flows which correspond to the decision making process in the organization, are characterized by a low degree of formalization and a different kinds of uncertainties.

Choosing the best solution among the alternatives is a key task of management and the quality of the solution determine the success of the company. That is why within the enterprise can be created the specialized decision support systems, whose main aim is to help the decision-maker in making reasonable managerial decisions.

The data mining methods correspond to the principles and purposes of the systems which support managerial decisions under conditions of high uncertainty which is inherent to the business activities. These methods allow to process inaccurate and non-formalizable information, to identify patterns and to generalize knowledge, to simulate expert activities.

To solve management problems encountered in the real world, very often is not enough to take into account only classic models, based on the use of precise values and a detail description of the domain objects. Human thinking process has a deal with imprecise, vague, qualitative categories which are necessary to carry out generalization function, to identify the most relevant information and knowledge from the large amount data sets. There are a lot of works devoted to the methodological basis of the fuzzy set theory, artificial neural networks such as Cheng and Titterington (1994), Hagan et al (1996), Haykin (1999), Jamshidi (2003), Lin and Lee (1991) and practical application of neuro-

fuzzy approaches to enterprise planning issues, for example, Juang et al (2007), Ren et al (2019), Rodrigues and Carpinetti (2020), Sabah et al (2019).

The Neuro-Fuzzy Networks

The main areas, where for many years have already effectively applied data mining methods based on hybrid systems (artificial neural networks, fuzzy set theory, genetic algorithms), are first of all such directions as engineering science, medicine, automatic control. However, in recent years these methods of data analysis have been quickly implemented into the social sciences, including the economics. Methods based on the of fuzzy sets theory, are widely used for the processing of expert opinions and creating of management decision-making systems. The methodology of artificial neural networks is used in the banking business for the segmentation of borrowers. More and more attention of researchers attract approaches to the analysis of the behavior of the stock markets on the basis of a synthesis of the theory of chaos and neuromathematics whose practical application is possible in the portfolio risk management as mentioned in Botvin et al (2009).

The current research presents an example of the practical implementation of one of the approaches to the use of soft computing in the economic analysis, which consists in the construction and training of a neuro-fuzzy network. Neuro-fuzzy networks - one of the possible types of hybrid systems, the use of which allows, on the one hand to reduce the role of the expert in the development of the system, on the other - to create a neural network architecture, each component of which is possible to precise interpretation. In this case, the parameters of fuzzy inference system is automatically modified during the training process, and also in the structure of the neural network, each layer of neurons performs its predetermined role, and as a consequence parameters of network acquire a clear sense for the researcher.

Indeed, the creation of the rule base is built on expert opinions which can be more properly expressed in a natural language, rather than in a numeric, strictly mathematical form. This phenomenon is due to peculiarities of human thinking process. In this case tools of the fuzzy sets theory can be used within the hybrid system and allow to construct an expert systems, which are based on fuzzy logic methodology.

In addition, requirement of the high level of automation of decision making process is implemented within the framework of building a computing system based on artificial neural networks, which are capable to self-learning, adjusting parameters, taking into account new available statistical information without the participation of experts.

Example of practical application of the neuro-fuzzy system for the operational planning at the enterprise

Statement of the problem

The subject of study is the process of managing the operational activities of the industrial enterprise, whose purpose is the optimal resource planning and more efficient use of production capacity.

The main objective of the research is to construct a model of an expert system with the architecture which is able to automate expert reasoning in a particular subject area and to take into account the statistical data.

Considered company produces and implements the hardware-software systems which consist of different modules. The systems require complex installation, and adjustment works on the territory of the customer object. The most precisely planning of the laboriousness of these works is an important

task, allowing to maximize production and to carry out scheduling of the occupation level of specialists.

An expert group identified the following main factors that determine the laboriousness of the works:

– the scale of the installed system;
– the type of the operations;
– the level of technological complexity of modules (indirectly expressed through the cost of the hardware-software system).

All three factors at the stage of technical design are inherently fuzzy values, because of during the process of negotiation of the final features of the delivered system specification of equipment and a detailed list of works are not exactly determined. Thus, to obtain an estimate of the value of laboriousness effectively to apply approaches based on fuzzy logic and fuzzy inference systems. It is assumed that each of the three factors and the estimated laboriousness are the linguistic variables and as a result can be characterized using fuzzy sets and membership functions. There are five membership functions for the second factor and the estimated "laboriousness of the works" at the same time for a description of the first and third factors – there are three membership functions; also assumed that experts defined the type of the membership functions based on a Gaussian function. Parameters of the linguistic variables are shown in Table 1.

Table 1: Parameters of the linguistic variables

Linguistic variables	**Values of the linguistic variables (fuzzy sets)**	**Type of the membership functions**	**Parameters of the membership functions**
the scale of the installed system (modules, pcs)	separate modules small complex standard complex large complex automated system	Gaussian membership function	[2 5] [3 10] [6 20] [6 35] [8 65]
the type of the operations (score)	modernization extension new system		[1 3] [2 5] [2 7]
the level of technological complexity of modules (RUR)	low below the average average high very high		[2000000 4000000] [2000000 7000000] [5000000 20000000] [1000000 30000000] [1000000 50000000]
laboriousness of the works (man-day)	small average big		[3 10] [15 50] [20 170]

To form the base of fuzzy rules in this situation, experts can formulate vague statements, like the one shown below which corresponds to Mamdani algorithm of fuzzy inference:

IF	the scale of the system	***small complex***
AND	the type of the operations	***modernization***
AND	the level of technological complexity	***below the average***
THEN	laboriousness of the works	***small***

The maximum number of the rules within above mentioned fuzzy expert system - 225, but in practice as a result of a survey of employees the rules base can be decreased and consists of a much smaller number of rules, because of in this base will not be included rare or obviously unrealistic

combinations of the values of input factors and dependent variable. The main parameters of the fuzzy inference algorithm are the following: aggregation of fuzzy premises is implemented by using the minimum function, accumulation of conclusions of fuzzy rules represents by the maximum function, defazzification is carried out using the center of gravity method.

The use of neuro-fuzzy system

The process of implementation of fuzzy inference systems often connected with difficulties in creation of the rule base and the determination of the parameters of membership functions of fuzzy sets. The rules are formed by specialist in a particular sphere, but it is not always possible to organize the work of a highly qualified expert group, and it is very hard to avoid the negative impact of the subjective opinions. However, more difficult problem is to construct membership functions which reflect the specificity of the parameters of fuzzy system enough accurately. Often the membership functions can be distributed only uniformly within the variables domains. Even more hard for experts to design a system of fuzzy inference based on Sugeno algorithm where the output variables must be determined not in the form of fuzzy sets but as functional dependencies or constants.
There are various methods of constructing membership functions described in Khalin (2016):

- direct method - an expert directly determines the membership function;
- indirect - often presented by the methods of pair comparisons;
- the use of standard forms of curves to create the membership functions;
- statistical methods.

However, these methods have significant disadvantages, consisting either in the expert's inability to adequately estimation of the membership function's parameters or the lack of the statistical database. In case when the developers of expert system have a training set of examples with the values of the input variables and the corresponding output values, then this knowledge can be used to train the fuzzy neural network with a special structure, which parameters will allow to generate the rule base and fine-tune the membership functions.

As a tool of construction of neuro-fuzzy systems can be chosen software environment Matlab and its application Fuzzy Logic Toolbox and editor ANFIS (Adaptive Network-based Fuzzy Inference System), described in the book by Yarushkina (2004), which allows both using the graphical user interface or from the command line to create a fuzzy inference system and configure it to get value of unknown variable "laboriousness of the works" in fuzzy or in numerical form.

The process of fine-tuning of the parameters of membership functions is based on the neural network training using the back-propagation algorithm or its modifications.

An example of fine-tuning of membership functions presented in Fig. 1, where compares the graphics of functions for the first factor – "the scale of the installed system". As a result of training of neural network parameters of membership functions of variable optimally adjusted and differ from the original values which by default have been distributed uniformly.

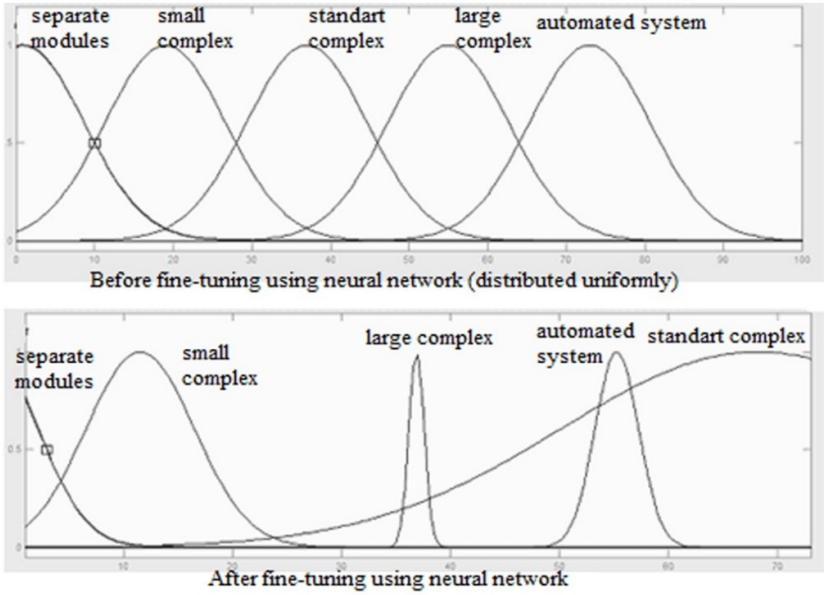

Fig. 1: Fine-tuning of membership functions

Fuzzy inference system, modified by using neural network modeling, shows better results both relatively training set of examples and for examples from the test sample.
The structure of the obtained neuro-fuzzy network is presented in Fig. 2.

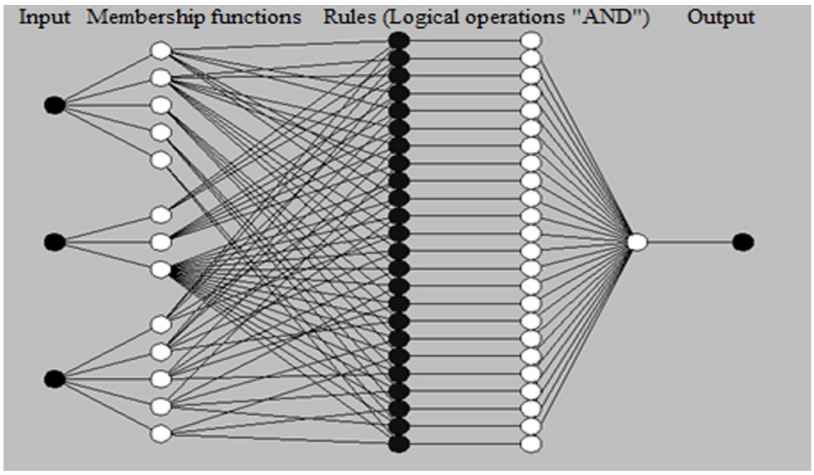

Fig. 2: Architecture of the neuro-fuzzy network

In this architecture the first layer of neurons transmits the input signal, performing transit function. The second layer of neurons carries out fuzzification, i.e. it simulates the membership function, so it contains the number of neurons equal to the total number of fuzzy sets describing the possible values of the input variables. The third layer is responsible for determining the degree of truth of the rule and consists of 24 neurons (24 rules were determined by experts), each of which receives input signals from neurons of the second layer and implements a logical bunch “AND”. The neuron of output layer with the vector of weights, connecting it with the outputs of the previous layer, acts as an adder, to determine the exact value of the output variable.

Conclusion

The above-described automated system allows quickly obtain the desired estimate of laboriousness, at the same time having the ability to further learning and adaptation options in accordance with the newly emerging actual results of operational activities of company. Advantages of modern automated decision support systems are obvious. The use of the maximum amount of available information (not only documented or numerical information, but also expert's opinions, inaccurate preliminary data, assumptions, etc.) and modern tools of analysis are necessary for sustainable economic development of companies in the face of high level of competition and high uncertainty of the external environment. However, even perfect information system should not be overestimated, it must be remembered that the final decision should belong to decision-makers - high qualified specialists.

References

- Botvin G.A., Zaboev M.V., Zavyalov O.V. and Chernyshev V.V. (2009) Modeli i metody ekspress-analiza investicionnyh proektov [Models and methods of express-analysis of the investment projects], St. Petersburg, *Publishing house of the St. Petersburg State Polytechnic University*.

- Botvin, G.A. and Zaboev M.V. (2012) 'Ispol'zovanie adaptivnoj seti nejro-nechetkogo vyvoda dlya operativnogo planirovaniya na predpriyatii' [The use of adaptive network of neuro-fuzzy inference for operational planning at the enterprise], *XV International Conference on Soft Computing and Measurements*, Vol. 1, 255-258.

- Cheng, B. and Titterington D.N. (1994) 'Neural Networks: A Review from a Statistical Perspective', *Statistical Science*, vol. 9, No. 1, 2-30.

- Khalin V.G. (ed) (2016) Teoriya prinyatiya reshenij [Decision theory], in 2 vol., Tutorial and Workshop-M.: Publishing LLC "Publishing Urayt".

- Hagan, M.T., Demuth, H.B. and Beale, M.H. (1996) 'Neural Network Design', Boston, MA: PWS Publishing.

- Haykin, S. (1999) Neural Networks. A comprehensive foundation, Prentice-Hall, Inc. Canada.

- Jamshidi, M. (2003) 'Tools for Intelligent Control: Fuzzy Controllers, Neural Networks and Genetic Algorithms,' *Philosophical Transactions: Mathematical, Physical and Engineering Sciences*, vol. 361, No 1809, 1781-1808.

- Juang Y.S, Lin S.S. and Kao H.P. (2007) 'Design and implementation of a fuzzy inference system for supporting customer requirements,' *Expert Systems with Applications*, Volume 32, Issue 3, 868-878.

- Lin, C.T. and Lee, S.C. (1991) 'Neural-network-based fuzzy logic control and decision system,' *IEEE Transactions on Computers*. vol. 40, 1320-1336.

- Ren W., Wu K., Gu Q. and Hu Y. (2019) 'Intelligent decision making for service providers selection in maintenance service network: An adaptive fuzzy-neuro approach,' Knowledge-Based Systems.

- Rodrigues F. L. and Carpinetti L.R. (2020) 'An adaptive network-based fuzzy inference system to supply chain performance evaluation based on SCOR® metrics', *Computers & Industrial Engineering*, Volume 139.

- Sabah M., Talebkeikhah M., Agin F., Talebkeikhah F. and Hasheminasab E. (2019) 'Application of decision tree, artificial neural networks, and adaptive neuro-fuzzy inference system on predicting lost circulation: A case study from Marun oil field,' *Journal of Petroleum Science and Engineering*, Volume 177, 236-249.

- Yarushkina N.G. (2004) Osnovy nechetkih i gibridnyh sistem [Fundamental of fuzzy and hybrid systems], Moscow, Finance and Statistics.

Modelamiento De Ecuaciones Estructurales Aplicado Al Ámbito De Los Sistemas De Información Y El Rendimiento Organizativo En Establecimientos Educativos

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Resumen

Este estudio explora la relación entre el éxito de los sistemas de información, la satisfacción y compromiso laboral, y el rendimiento organizativo en establecimientos educativos de nivel primario y secundario, utilizando modelamiento de ecuaciones estructurales. A partir de encuestas aplicadas a directivos, administrativos y profesores con conocimientos y experiencia en gestión de establecimientos educativos, se evaluó un modelo de comportamiento. Los resultados muestran que el éxito de los sistemas de información incide en el compromiso laboral, presentándose un efecto en el rendimiento de la organización, pero la satisfacción laboral no muestra efectos significativos.

Palabras Clave: Modelamiento, Sistemas De Información, Comportamiento.

Introducción

Los Sistemas de Información (SI) son utilizados por personas de distintas organizaciones, como las entidades educativas, las que esperan que satisfagan sus requerimientos, traduciéndose en una satisfacción del usuario, constituyendo un factor clave para el éxito de los SI, contribuyendo al logro del rendimiento de la organización (Calderón y Rodríguez, 2010).

Este estudio busca establecer si el éxito de los sistemas de información afecta a la satisfacción y compromiso laboral, incidiendo en el rendimiento organizativo de establecimientos educativos de enseñanza primaria y secundaria.

Antecedentes E Hipótesis

El modelo de DeLone y McLean (2003) mide el éxito de los sistemas de información por medio de seis variables relacionadas con el efecto que estos sistemas pueden tener en el desarrollo de las actividades de sus usuarios, afectando la percepción de estos sobre aspectos relacionados con su trabajo, los que se relacionan con la satisfacción y compromiso laboral de las personas, lo que puede tener un efecto en el rendimiento de la organización (Sánchez et al., 2013).

Chiang y San Martín (2015) consideran la satisfacción laboral (SL) como “un concepto globalizador con el que se hace referencia a las actitudes de las personas hacia diversos aspectos de su trabajo”, mientras que el compromiso laboral (CL) puede entenderse como “la fuerza con la que un individuo se

siente vinculado a una organización y que implica el seguimiento de un curso de acción relevante para la organización" (Juaneda y González, 2007).

El rendimiento organizativo (RO) ha interesado permanentemente a las organizaciones, donde las entidades educativas no se encuentran ajenas. De acuerdo a Hepp et al. (2017), en Chile el uso de sistemas y tecnologías de información para apoyar la gestión en el sistema escolar es diverso, identificándose herramientas de este tipo que buscan colaborar con aspectos relacionados con la gestión de los establecimientos en distintos ámbitos.

Sobre la base de los planteamientos anteriores, se proponen las hipótesis:

H1: El EXSI incide en la SL de las personas, en establecimientos educativos.
H2: El EXSI incide en el CL de las personas, en establecimientos educativos.
H3: La SL de las personas incide en el RO, en establecimientos educativos.
H4: El CL de las personas incide en el RO, en establecimientos educativos.

Metodología

Se aplicaron encuestas a directivos, administrativos y/o profesores que utilizan y/o conocen SI para apoyar la gestión de establecimientos educativos de enseñanza primaria y secundaria, en Chile.

Siendo el éxito de los SI un aspecto que presenta cierta complejidad social dadas las variables involucradas, resulta conveniente la utilización de modelos de ecuaciones estructurales (SEM), ya que permite incorporar variables no observables medidas indirectamente por variables observables (Hair et al., 2014). PLS-SEM es principalmente utilizado en el desarrollo de teorías en investigaciones exploratorias, enfocándose en explicar la varianza de las variables dependientes que examina el modelo de investigación, de manera de probar las relaciones entre variables latentes en el nivel teórico, constituyendo una herramienta de utilidad en investigaciones en el campo de las ciencias sociales (Hair et al., 2014), ajustándose a las características de este estudio. El análisis estadístico de los datos utilizó SEM basado en PLS-SEM y el software SmartPLS.

Resultados

Los resultados presentados corresponden a 50 encuestas válidas. Los datos obtenidos validan satisfactoriamente el modelo de medida, cumpliéndose las condiciones exigidas según la literatura. La evaluación del modelo estructural se presenta en la figura 1, soportándose las hipótesis H1, H2 y H4. Los resultados señalan que la variación del Rendimiento Organizativo es explicada en un 58,5% por el Compromiso Laboral, mientras que el Éxito de los Sistemas de Información explica en un 44,4% la variación de la Satisfacción Laboral y en un 54% la variación del Compromiso Laboral.

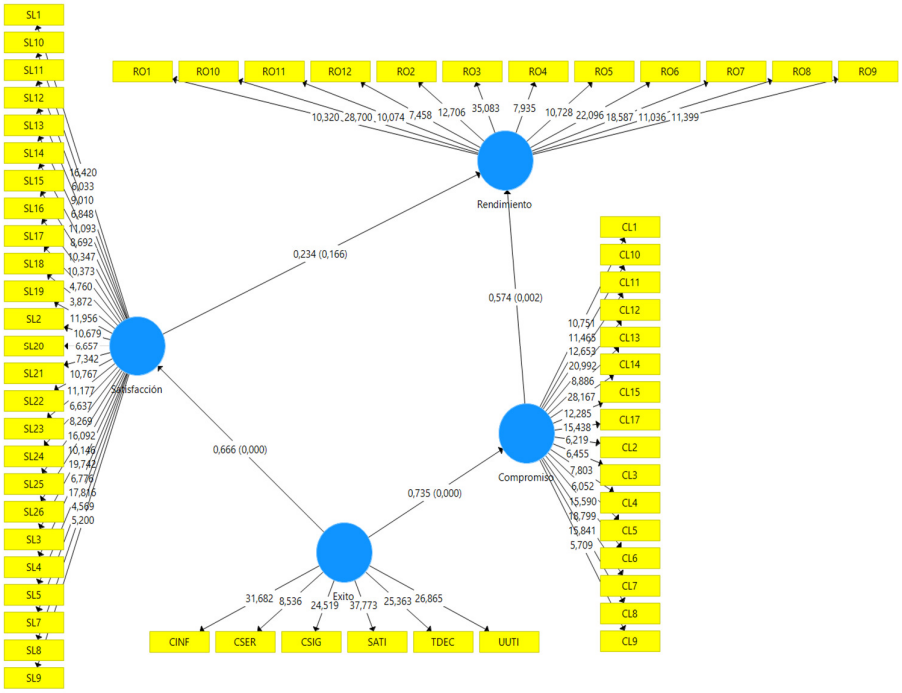

Figura 1: Modelo Estructural

(Fuente: Elaboración propia)

Conclusiones

Los resultados muestran que, en establecimientos educativos de nivel primario y secundario, el éxito de los sistemas de información incide positivamente en la satisfacción y compromiso laboral, existiendo una fuerte relación positiva entre el compromiso laboral y el rendimiento organizativo, mientras que la satisfacción laboral no presenta una incidencia significativa en dicho rendimiento.

La utilización de PLS-SEM ratifica lo señalado por diversos autores, como Cepeda et al. (2017), ya que constituye un medio útil para efectuar análisis de variables en un contexto complejo, facilitando el desarrollo de estudios en distintas áreas de las ciencias sociales.

Referencias

- Calderón,J., and Rodríguez,C.(2010). Un enfoque gerencial de factores críticos para el éxito de los SI en la Pyme metalmecánica venezolana.Contaduría y Administración,57(1),79-102.

- Cepeda,G.C.,Nitzl, C. and Roldán,J.L.(2017). Mediation analyses in partial least squares structural equation modeling:guidelines and empirical examples.In Partial Least Squares Path Modeling (pp.173-195).Springer,Cham.

- Chiang,M. y San Martín,N.(2015).Análisis de la satisfacción y el desempeño laboral en los funcionarios de la Municipalidad de Talcahuano.Ciencia & Trabajo,17(54),159-165.

- Delone,W. and Mclean,E.(2003).The DeLone and McLean Model of Information System Success:a Ten-Year Update.Journal of Management Information Systems/Spring,19(4),9-30.

- Hair Jr,J.F., Hult,G.T.M., Ringle,C. and Sarstedt,M.(2014).A primer on partial least squares structural equation modeling (PLS-SEM).Sage publications.

- Hepp,P., Pérez,M., Aravena,F. y Zoro,B.(2017).Desafíos para la integración de las TIC en las escuelas:implicaciones para el liderazgo educativo.Informe Técnico No.2-2017.LIDERES EDUCATIVOS,Centro de Liderazgo para la Mejora Escolar:Chile.

- Juaneda,E. y González,L.(2007).Definición,Antecedentes y Consecuencias del Compromiso Organizativo.Conferencia Conocimiento, innovación y emprendedores:camino al futuro,editado por Universidad de La Rioja,España.

- Sánchez,D., Reyes,R., Sekeres,M. y Ortiz,J.(2013).Satisfacción laboral y compromiso en las organizaciones de Rio Verde,S.L.P.Revista de Psicología y Ciencias del Comportamiento de la U.A.C.J.S.,4(1),59-76.

Post-Marketing
(Creating Reliable Information About A Product)

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Abstract

Stimulated by development of information technology, numerous changes taking place in the public space result in the fact that customers more and more often search for some reliable information about the goods they purchase. They do not expect enhanced advertisement any longer but they want some reliable presentation. New forms of market behaviour have been identified during the research carried out with the method of the grounded theory and they have been referred to as post-marketing.

Keywords: marketing, needs, expectations, perception, information, fiction, reality

Aim: presentation of a concept increasing reliability and efficiency of marketing in the future

Research Method: The Grounded Theory, Focus and Elements of Ethno-Methodological Research

Introduction

The current methods of product promotion based on copied ideas and emulation of other companies are slowly being abandoned. Stereotypical advertisement is not appreciated by customers any longer because, most frequently, they search for reliable information about products. At present, it is also possible to observe that the amount of various manipulation with buyers' emotions based on presupposition (Batko, 2005), implicature (Puczyłowski, 2014) and rhetoric has been considerably decreased. Furthermore, it is also possible to observe the following trends in the current marketing operations:

- abandoning the primacy of needs (Maslow, 2006) over expectations (Foster, 2003). The variety of products and services allows customers to satisfy their needs in any way they wish; however, it does not equal to meeting customers' expectations, which will be of the key significance to the further development of companies in the future (Lachiewicz and Matejun, 2007);
- replacing *have*-oriented behaviour patterns with *be*-oriented behaviour patterns (Fromm, 2007). *Have*-oriented advertisement encourages customers to have things, most of which will find their final destination in a lumber room, together with pieces of some old equipment, clothes and publications. *Be*-oriented behaviour implies activity, fertility, transformation, openness, spontaneity in expressing one's feelings (Fromm, 2010). It is also associated with creative processes, expressed with the following phrases: to be responsible, to be reliable and to be honest. *Be*-oriented marketing puts customers' belongings aside, which is usually expressed with the following phrases: to live in healthy environment, to be satisfied with the purchase, to feel safe during the exploitation of particular equipment;
- minimising the power of the dead over the living (Kaczmarek, 2007). It means limitation in references made to tradition in various situations because tradition often deactivates logical thinking and replaces it with stereotypical perception of the world, in a way which has been imposed on the living by previous generations[1]. It also refers to burdening customers with all the trauma related to the characters

who endorse some particular products[2]. In many cases, following traditional ways results in the purchase of disposable products which are of little or no use at all in our everyday life;

- abandoning the primacy of fiction over reality (Marquard, 2007). Based on a more or less credible vision presented in literature, movies, which are constantly interrupted with advertising spots offering very little reliable information about products, do not provide entertainment and they contribute to viewers' apathy, actually discouraging them from any purchase. The modern, educated and well-organised society does not expect any abstract slogans or celebrities' opinions. The society expects reliable knowledge which can be helpful in making rational choices in wide ranges of products of the same assortments;
- excluding domination of time over space in marketing (Buczyńska-Garewicz, 2006). It means minimisation of time during which goods are consumed at the cost of increased amounts of various waste and used packaging which end up at rubbish dumps and landfill sites but also in seas and oceans. As responsible citizens, we can actually spend more time to consume goods which are easily recyclable or biodegradable after the use;
- reversing a distressing phenomenon of the primacy of gain over ethics. Printed in a tiny font on packaging, product ingredients can surely contribute to a short increase in the revenues from sales, however after a longer time they discourage customers from buying particular products again. Being aware of problems which senior citizens may have with their eyesight, producers do not make it easy for them to obtain reliable information. Nevertheless, such practice is legal, even if it is highly questionable in terms of ethics;
- abandoning the primacy of a monologue over a dialogue. Advertisement besets all of us. Producers send their messages to potential clients who do not need them and who often ignore them. This fact turns customers into mere addressees who must have such messages imprinted into their awareness and who must remember that there are advertised goods on the market which should be bought;
- abandoning the primacy of the paradigm over emergence. The paradigm is an accepted way of perceiving the reality in a particular field; it is a pattern, a stereotype or a model of behaviour. Emergence is defined as completeness which is more than just a sum of its parts; intuitively it refers to the emergence of new qualities, forms and behaviour referring to interaction between simpler elements (Poczobut, 2006). Information about products can be defined as emergent when it "forces" customers to look for some additional knowledge about how to recycle particular goods and it contributes to the decision about purchasing products provided by particular manufacturers.

Characteristics of Post-Marketing

Content marketing (Sękowski, 2018) can be viewed as a premise of the advent of post-marketing. It refers to constantly improved, reliable and scientific content presenting products with the use of manuals, articles, webinars, blogs, expert opinions, models, drawings, photographs, films, charts, graphs, schemes, projections, cross-sections, projects, plans, tables and other forms of spatial visualisations. Also, it is possible to observe some other innovative market operations focused on expectations expressed by buyers towards products, physicians towards patients, academic teachers towards students, politicians towards voters, priests towards their congregation members and, first of all, the society towards corporations.

In order to obtain as many prompts how to increase credibility in post-marketing operations as possible, the grounded theory has been used because due to its procedures, we are able to search for phenomena we did not look for at the beginning of the research (Konecki, 2000). The authors of the grounded theory indicate that systematic and consistent quality analysis can become a source of new ideas (Glaser and Strauss, 2009). The research carried out among a group of students (200 respondents, approximately) sensitised us to some questions which were worth asking about the subject of the research (Charmaz, 2009) and it allowed the research team to identify the characteristics of good product presentation in order to meet expectations of local communities.

The respondents of the research survey observed that in the future, it would be possible to provide product presentations in social, political, ecological, religious, professional and family contexts, with consideration of the following:

- **anticipation**, which is a capability of pre-empting, early performing or assuming some opinions in advance. In post-marketing, anticipation refers to activities which prepare customers to buy som□ d□sig□□d products which hav□□ot b□□ ma□ufactur□d y□t;
- **perception**, which is the way of thinking based on logic and on one's own emotions. It forces customers to evaluate products with the use of comparison by various criteria. This process is acquired and trained in everybody's life and, as a result, it is possible to control customers with the use of the criteria passed o□ th□m b□for□;
- **attitude** which results from the cultivation of stereotypes – in other words, acting in a "simplified" reality based on the knowledge which refers to things, people, social groups or institutions – an attitude has been reinforced by experience and tradition. Thanks to a change in one's attitude, a decision which has been impossible to accept, can be diametrically changed because a customer will b□abl□ to □valuat□products from a diff□r□□t p□rsp□ctiv□;
- **associations** which result from a customer's individual experience that can be a reflection of their previous experience from various stages of their life. Patriotic and religious symbols which will be associated by a customer with particular products are also significant. They result from the meanings which go b□yo□d th□physical f□atur□s of particular products;
- **sensitivity** which is defined as a capability of quick response to external stimuli. It is closely related to empathy which is a capability of establishing and maintaining various partner relationships (Goleman, 1999). Thanks to such features, customers may adjust their behaviour to any situation which ca□guara□t□□th□m satisfactory r□sults;
- **customer segmentation** – if based only on some demographic features, it has ceased to be a sufficient condition for making marketing decisions. Similarly, behaviouristic criteria do not provide an unambiguous answer to the following question: why do buyers purchase a particular product? In post-marketing sensory differences are important as they divide consumers into visual, auditory and kinaesthetic types of people.

Furthermore, development of various forms of information about products will also require (as the respondents observed) consideration of ethno-methodological aspects of communication in groups (Garfinkel, 2007). It will involve adjustment to the universal ways of communication based on:

- **inter-subjectivity**, in other words, searching for ways of communication which are common for all communities, regardless of their culture, religion, social status and beliefs (Gard□□fors, 2007);
- **indexicality**, in other words, unambiguous understanding information which is sent and received in a particular time. It means that if we want to grasp the meaning of a message, it should undergo not only the processes of conceptualisation and operationalisation but it should be also given i□a situatio□al co□t□xt, d□p□□di□g o□th□□□ds;
- **typicality** which r□f□rs to th□r□curr□□c□of som□activiti□s; it m□a□s impl□m□□tatio□of som□ patterns, standards, models reinforced in a series of similar behaviour patterns, attitudes or events. This feature is related to the presentation of things which are representative and characteristic for a particular tim□p□riod, plac□a□d □viro□m□□t;
- **uncertainty**, in other words, a situation in which activities performed under the same conditions can bring about various results. The source of uncertainty is the fact that the occurrence of singular events is determined by numerous factors and only some of them are known and possible to be taken into consideration while making purchase decisions.

Conclusions

In order to plan the improvement in the efficiency of various presentations provided by a company in post-marketing, the following integrated model of action has been proposed (Table 1).

Table 1: Integrated activities in post-marketing

Process of providing customers with significant information in post-marketing
Step 1. In marketing operations, it is necessary to minimise the primacy of needs over expectations, to have over to be, the power of the dead over the living, fiction over reality, time over space, gain over ethics, a monologue over a dialogue, a paradigm over emergence.
Step 2. It is necessary to consider the following determinants which can increase customers' interest in particular products: anticipation, perception, attitude, associations, sensitivity and sensory segmentation.
Step 3. While developing the method of product presentation in media, it is necessary to consider the following factors: inter-subjectivity, indexicality and uncertainty, because thanks to them it is possible to develop a credible image of a company and its products.
Step 4. In post-marketing, all activities related to pricing policy, designing and using products, presenting products in media and distributing should meet requirements which are set for entrepreneurs by the modern society and which include broadly understood recycling and disposal.

Source: the author's own study

Conclusions

To sum up, it is possible to state that the on-coming time of establishing relations between producers and consumers, or even between corporations and the society, will be referred to as post-marketing. It will reverse primacies which have already been articulated and which characterise contemporary operations undertaken by companies on the market. The above-mentioned process will allow companies to adjust themselves better to changes taking place in the environment which has been heavily polluted by vast amounts of used packaging and thoughtless consumption of goods.

Marketing methods which have been applied so far to affect customers have also resulted in numerous adverse changes. Now the time has come to change the forms of pricing, producing packaging materials and ways of distributing goods not only from producers to consumers but also packaging and used-up and worn-out products from consumers to disposal and recycling centres. This is a challenge that must be faced by post-marketing, the significant features of which have been identified during the research carried out with the use of the grounded theory.

Endnotes

[1] The problem also refers to the names of streets, squares and districts.

[2] It particularly refers to streets and schools which are often named after famous but traumatic characters or events.

References

- Batko, A. (2005) *Sztuka perswazji czyli język wpływu i manipulacji*. Gliwice: Wydawnictwo Helion.
- Buczyńska-Garewicz, H. (2006) *Miejsca, strony, okolice: przyczynek do fenomenologii przestrzeni*. Kraków: Towarzystwo Autorów i Wydawców Prac Naukowych „Universitas".
- Charmaz, K. (2009) *Teoria ugruntowana. Praktyczny przewodnik po analizie jakościowej*. Warszawa: Wydawnictwo Naukowe PWN.
- Coleman, S. and Ross, K. (2010) *The Media and the Public. "Them" and "Us" in Media Discourse*, Chichester: Wiley-Blackwell.

- Foster, J. (2003) Motywacja w miejscu pracy. In: N. Chmiel, ed. *Psychologia pracy i organizacji*. Gdańsk: GWP.
- Fromm, E. (2007) *Mieć czy być?* Poznań: Rebis.
- Gardenfors, P. (2007) Evolutionary and Developmental Aspects of Intersubjectivity. In: H. Liljenström, P. Århem, eds. *Consciousness Transitions: Phylogenetic, Ontogenetic and Physiological Aspects*. Amsterdam–London: Elsevier.
- Garfinkel, H. (2007) *Studia z etnometodologii*. Warszawa: Wydawnictwo naukowe PWN.
- Glaser, B. G. and Strauss, A. L. (2009) *Odkrywanie teorii ugruntowanej. Strategie badania jakościowego*. Kraków: Zakład Wydawniczy Nomos.
- Goleman, D. (1999) *Inteligencja emocjonalna w praktyce*. Poznań: Media Rodzina.
- Maslow, A. H. (2006) *Motywacja i osobowość*. Warszawa: Wydawnictwo Naukowe PWN.
- Kaczmarek, K. (2007) *Herbert Spencer a problemy socjologii religii*. Seria Socjologia, 51. Poznań: Wydawnictwo Naukowe Uniwersytu im. Adama Mickiewicza w Poznaniu.
- Konecki, K. T. (2000) *Studia z metodologii badań jakościowych. Teoria ugruntowana*. Warszawa: Wydawnictwo Naukowe PWN.
- Lachiewicz, S. and Matejun, M. (2007) *Problemy współczesnej praktyki zarządzania*. Vol. 2. Łódź: Wydawnictwo Politechniki Łódzkiej.
- Marquard, O. (2007) *Aesthetica i anaesthetica. Rozważania filozoficzne*. Warszawa: Oficyna Naukowa.
- Poczobut, R. (2016) System – struktura – emergencja. In: M. Heller and J. Mączka, eds. *Struktura i emergencja*, Kraków–Tarnów: PAU–OBI–Biblos.
- Puczyłowski, T. A. (2014) *Argument z implikatury konwersacyjnej w polemikach filozoficznych*. Warszawa: Wydawnictwo Uniwersytetu Warszawskiego.
- Sękowski, M. (2018) Wszystko co musisz wiedzieć o content marketingu – kompendium wiedzy Marketer+. *Marketer+*. 2020.02,02. Available at: https://marketerplus.pl/teksty/artykuly/content-marketing/.

Robotic Process Automation: Mapping the Emerging Research Field

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Abstract

The aim of the paper is to map the emerging research field focused on robotic process automation. The study employs bibliometric methods of research profiling and keywords co-occurrence analysis. Data for analysis are retrieved from the Scopus database. VOSviewer software is used to support analysis and visualize the findings. First of all, the leading contributors to the development of the research field are identified, including the most productive countries, research institutions, source titles, authors, and core references. Secondly, the leading research topics and thematic areas in the field are discovered and explored. The study shows that discourse in the field focuses around four issues that are related to information management systems, cognitive automation, productivity oriented automation and business model innovations.

Keywords: Robotic Process Automation, Bibliometrics, Research Profiling, Keywords Co-Occurrence Analysis.

Introduction

Robotic process automation (RPA) as an intelligent form of automation is designed to transform processes through partial or comprehensive replacement of traditional solutions with digital ones. In particular, it refers to redirecting repetitive and mass tasks performed by humans (Agostinelli, 2019) to programmed robots imitating their work (Cewe et al., 2018). Many organizations and researchers consider RPA as a new technological solution that increases efficiency (Fernandez & Aman, 2018) and flexibility of operation (Burgess, 2018), improves quality (Vanmali, 2017; Kokina & Blanchette, 2019), and also reduces costs (Hallikainen et al., 2018) and risk (Deloitte, 2018). However, the effects of implementing RPA in business practice can significantly extend beyond the area of functioning of a given process or specific organization and have a global dimension. Therefore, their impact on sustainable development (Owen et al., 2013), the labor market (Frey & Osborne, 2017) and security (Cearley et al., 2019) is not without significance. The popularity of various automation tools, including RPA, has been increasing (Deloitte, 2018). Its advantages in terms of flexibility (IRPA, 2015), ease of configuration (Anagnoste, 2017; Agaton & Swedberg, 2018) and short implementation time (Asatiani & Penttinen, 2016) are pointed out in literature. Therefore, RPA and its various contexts - conceptual, methodological, behavioral, technological, business, organizational or macroeconomic - appear as an important and interesting research field.

The issue of RPA is considered to be an emerging field of scientific inquiry. This thesis is confirmed by scanning high quality bibliometric databases. As of 19 January 2020, in Scopus, there are found are only 104 publications including such a phrase in their titles, keywords and abstract (topic search). The same query in Web of Science Core Collection brings only 41 items. The earliest publication dates back to 2009, while the vast majority of the scientific output has been amassed since 2018. What is more, so far, research productivity in the field has not been mapped with the use of bibliometric methods. The topic search for the following conjunction of phrases: (‘robotic process automation’)

AND ('bibliometric' OR 'bibliometrics' OR 'scientometrics' OR 'informetrics') brings no results either in Scopus or Web of Science Core Collection databases. Such an observation indicates a gap in the body of knowledge related to the research on RPA. Therefore, the aim of this study is to map, from the bibliometric perspective, the emerging research field focused on RPA. The following research questions are set in order to organize the research process: (1) who are the main contributors (countries, research institutions, source titles, authors, core references) to the development of the research field? (2) what are the leading research topics and thematic areas in the field?

Method of study

Research sample

We collected bibliometric data for analysis from the Scopus database. As of 19 January 2020, we queried for the phrase 'robotic process automation' in the titles, keywords and abstracts (i.e. topic search) of Scopus-indexed research publications. As the topic under the study is very up-to-date, we refrained from any limitations regarding the dates of publications and the subject areas they belong to. We retrieved 104 records (publications) distributed over 16 subject areas. Publications in Scopus are categorized on the non-exclusive basis i.e. one publication may be assigned to two or even more subject areas. Among the subject areas represented in the field, those including the highest number of publications are: Computer Science (71), Engineering (36), Business, Management and Accounting (32), Decision Sciences (23), and Mathematics (21). Conference papers (46) constitute the leading type of documents. They are followed by journal articles (38). This should be considered as a distinctive feature of the sample, as journal articles usually make up the majority of Scopus-indexed publications. For instance, as of 19 January 2020, among more than 77 million records in Scopus, 72% are journal papers, while conference papers (the second top category) constitute 13%. All the papers comprising the research sample are written in English. The detailed parameters of the sample are displayed in Table 1.

Table 1: Parameters of the research sample

Category	Items (occurrences)
Date (year) of publication	2020 (6); 2019 (55); 2018 (31); 2017 (6); 2016 (5); 2009 (1)
Subject areas (overlapping)	Computer Science (71); Engineering (36); Business, Management and Accounting (32); Decision Sciences (23); Mathematics (21); Economics, Econometrics and Finance (10); Social Sciences (9); Environmental Science (3); Medicine (3); Arts and Humanities (2); Energy (2); Health Professions (2); Materials Science (2); Pharmacology, Toxicology and Pharmaceutics (2); Physics and Astronomy (2); Agricultural and Biological Sciences (1)
Document type	Conference Paper (46); Article (38); Conference Review (9); Book Chapter (4); Review (4); Editorial (2); Undefined (1)
Language	English (104)

Source: Own study based on data retrieved from Scopus (19 January 2020).

Scanning the publications in the research sample brings 632 keywords. Among them, 9 expressions achieved 10 occurrences, while 18 of them are reported for the threshold of 5 occurrences. There are 533 keywords which occurred only once. We calculated the number of high-frequency keywords in the sample (32) using the formula provided by Donohue (1974; as cited in: Guo et al., 2017, p. 7). Then, we established the minimum number of occurrences (3) corresponding to the identified number of high frequency keywords. Within the research sample, there are 47 keywords with at least 3 occurrences. Among them, we excluded generic expressions related to the writing process such as: 'article' and 'teaching case'. Finally, we included 45 high-frequency keywords in co-occurrence analysis.

Research Methods and Instruments

We applied bibliometric methodology in order to explore research questions and achieve the aim of the study. Firstly, we identified leading contributors to the research field with the technique of general publication profiling, which is a component of the research profiling method (Porter, et al., 2002). Secondly, we scanned the leading thematic areas within the research field with the use of co-occurrence analysis (cf. He, 1999) of high-frequency keywords included in the publications comprising the research sample. This part of the study was supported with VOSviewer software (van Eck & Waltman, 2010, 2018). In the process of analysis, we identified high-frequency keywords in the research field, categorized them into thematic clusters and visualized them (van Eck & Waltman, 2014). We used item density visualization and network visualization functions of VOSviewer. The parameters used for analysis are displayed in Table 2.

Table 2: VOSviewer parameters used for analysis

Item	Characteristic/ value
Type of analysis	Co-occurrence analysis
Unit of analysis	All keywords
Counting method	Full counting
Method of normalization of strength of the links between items	Association strength method
Layout	
Attraction	2 (default setting)
Repulsion	0 (default setting)
Clustering	
Resolution parameter (detail of clustering)	1 (default setting)
Minimum cluster size [N]	5
Merging small clusters	Switched on
Visualization	
Scale	1.00
Weights	occurrences
Labels size	0.50
Maximum number of lines	1000
High frequency keywords used for analysis [N]	45
Minimum occurrences of a keyword used for analysis [N]	3

Source: Own study based the use of VOSiewer (19 January 2020).

Results Presentation

Publication Profiling

The research field focused on RPA is profiled from the perspective of the most productive countries, research institutions, source titles, authors and core references. The data for publication profiling of the RPA research field are presented in Table 3. In all the categories, with the exception of core references, the threshold of 3 publications was used to select relevant contributors. Among core references, there are listed the research papers which received at least 10 citations in other Scopus-indexed publications.

Table 3: General publication profiling of the RPA research field

Category	Top Items (number of publications)
Country	United States (17); Germany (13); India (13); United Kingdom (9); Australia (8); Netherlands (6); Canada (5); Japan (5); Finland (4); Czech Republic (3); Estonia (3); France (3); Poland (3); Portugal (3); Taiwan (3)
Research Institution	Nagasaki University, Japan (3); University of Melbourne, Australia (3); University of Missouri-St. Louis, United States (3); University of Tartu, Estonia (3); Aalto University, Finland (3)
Source Title	CEUR Workshop Proceedings (12); Lecture Notes in Business Information Processing (11); ACM International Conference Proceeding Series (4); Journal of Information Technology Teaching Cases (4); Advances in Intelligent Systems and Computing (3); International Journal of Engineering and Advanced Technology (3); International Journal of Innovative Technology and Exploring Engineering (3)
Author	Reijers, H.A., Utrecht University, Netherlands (4); Arai, K., Nagasaki University, Japan (3), Dumas, M., University of Tartu, Estonia (3); La Rosa, M., University of Melbourne, Australia (3)
Core references	Aguirre and Rodriquez (2017) (22); Lacity and Willcocks (2016) (22); van der Aalst et al. (2018) (19); Asatiani & Penttinen (2016) (15); Ljungholm (2018) (11)

Source: Own study based on data retrieved from Scopus (19 January 2020).

The United States, with 17 publications, is found to be the leader among the most productive countries. Germany and India, each of them contributing with 13 papers, are the runner-up nations. Other followers represent Anglo-Saxon countries (the United Kingdom, Australia, Canada), Asian economies (India, Taiwan) and the EU countries, including both West European as well as Central and East European countries. The most productive research institutions in the field are: Nagasaki University, the University of Melbourne, the University of Missouri-St. Louis, the University of Tartu, and Aalto University. *CEUR Workshop Proceeding*s and *Lecture Notes in Business Information Processing* are recognized as leading source titles giving focus to the issues of RPA. Together, these two source titles published around 20% of scientific production in the field. H.A. Reijers from Utrecht University, Netherlands is found to be the most prolific author in regard to the number of publications. The followers are: K. Arai representing Nagasaki University, Japan, M. Dumas from the University of Tartu, Estonia, and M. La Rosa affiliated at the University of Melbourne, Australia. The catalogue of core references includes the works of Aguirre and Rodriquez (2017), Lacity and Willcocks (2016), van der Aalst et al. (2018), Asatiani & Penttinen (2016) and Ljungholm (2018).

Leading Topics and Thematic Areas

The number of occurrences received by a keyword may be considered as an indication of the interest of researchers in a given topic. The prominence of high-frequency keywords in the RPA research field is presented in Figure 1 with the use of item density visualization function of VOSviewer. Top 10 high-frequency keywords in the research field and their bibliometric characteristics are enumerated in Table 4.

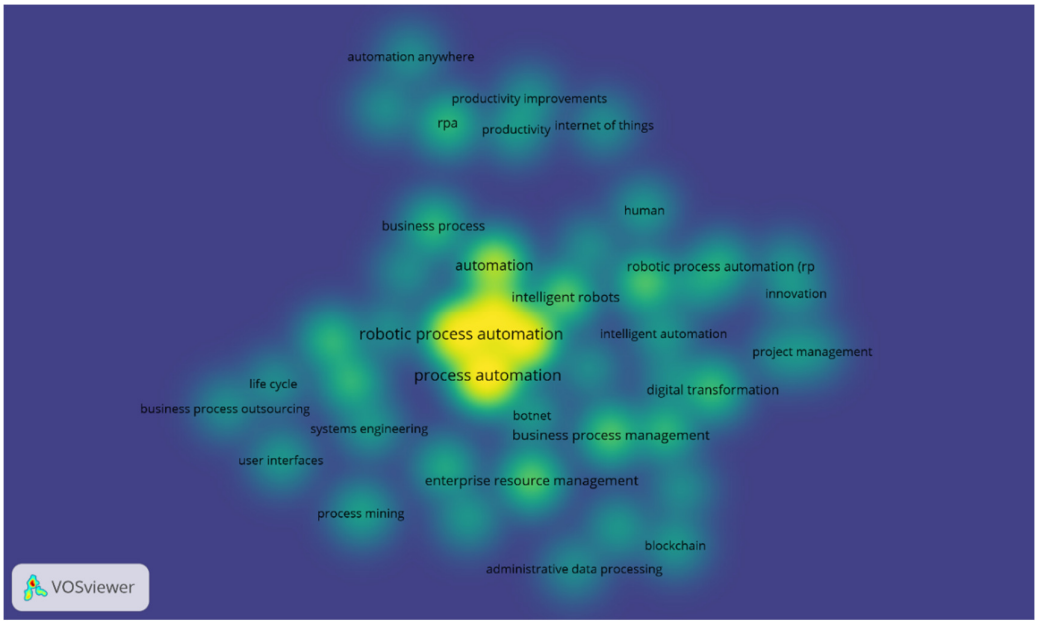

Figure 1: High-frequency keywords in the RPA research field

Source: Own study based on data retrieved from Scopus and analyzed in VOSviewer (19 January 2020).

Table 4: Top 10 high frequency keywords in the RPA research field

Keywords	Occurrences	Links	Total links strength	Average publication year
process automation	48	42	257	2018.33
robotic process automation	43	38	200	2018.44
robotics	40	42	239	2018.55
process control	36	42	240	2018.64
automation	22	35	129	2018.18
enterprise resource management	12	27	84	2018.75
intelligent robots	12	34	85	2018.83
artificial intelligence	11	25	58	2018.36
business process management	11	25	64	2018.82
digital transformation	9	19	34	2018.78

Source: Own study based on data retrieved from Scopus and analyzed in VOSviewer (19 January 2020).

In order to identify the leading thematic areas in the field, we conducted the co-occurrence analysis of high-frequency keywords. Thematic clusters presented in Figure 2 are the outcome of this analysis. The list of keywords assigned to each of the clusters is provided in Table 5 (top 10 high-frequency keywords, enumerated in Table 4, are bolded).

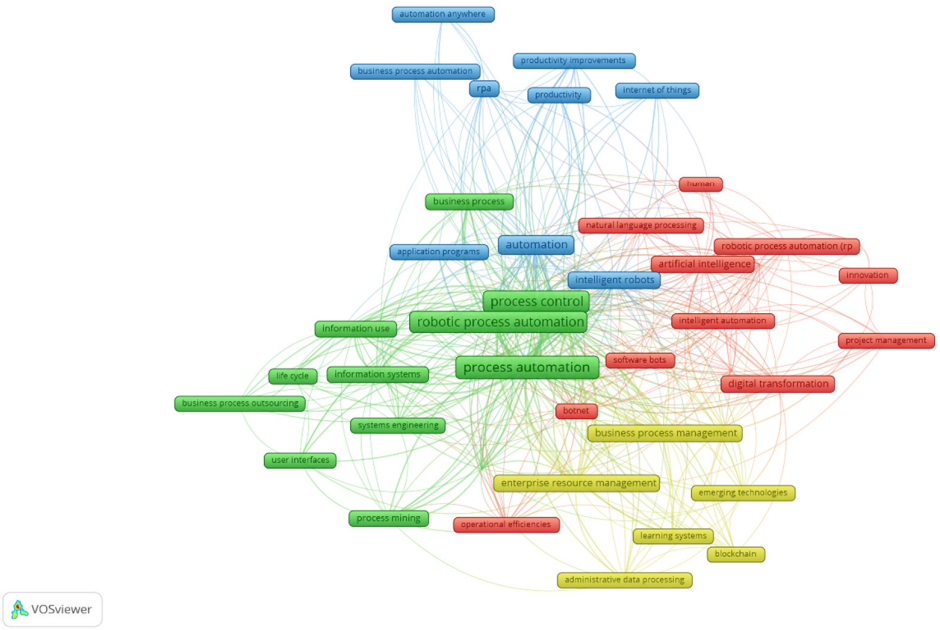

Figure 2: High-frequency keywords clusters in the RPA research field

Source: Own study based on data retrieved from Scopus and analyzed in VOSviewer (19 January 2020).

Table 5: Composition of high-frequency keywords clusters in the RPA research field

Cluster label /color	Items (N)	Keywords
information management systems /green	14	business process, business process outsourcing, data mining, decision making, information systems, information use, life cycle, **process automation**, **process control**, process mining, **robotic process automation**, **robotics**, systems engineering, user interfaces
cognitive automation/ red	15	**artificial intelligence**, artificial intelligence (AI), big data, botnet, **digital transformation**, human, innovation, intelligent automation, natural language processing, operational efficiencies, project management, robotic process automation (RPA), robotics process automation, software bots, technology
productivity oriented automation /blue	9	application programs, **automation**, automation anywhere, business process automation, **intelligent robots**, internet of things, productivity, productivity improvement, RPA
business model innovations /yellow	7	administrative data processing, blokchain, **business process management**, emerging technologies, **enterprise resource management**, learning systems, machine learning

Source: Own study based on data retrieved from Scopus and analyzed in VOSiewer (19 January 2020).

Discussion

The previous literature reviews in the field of RPA focused primarily on conceptual and implementation analysis. Ivančić and associates (2019) reviewed the definitions and effects of implementing RPA in practice. They also explained the difference between RPA and business process management. Syed et al. (2020) identified current scientific achievements and to indicated gaps and research challenges in the field of RPA: starting from conceptual aspects (definitions and

methodology), through the stage of designing RPA solutions, determining the preconditions for implementing RPA, organization of the implementation process and its effects. Our analysis presents the main directions of authors' interests from a cluster perspective. We have identified key research contexts defined by the objectives and areas of RPA application. We have determined that discourse focuses around four issues that are related to information management systems, cognitive automation, productivity oriented automation and business model innovations.

An important area of interest of the authors turned out to be the use of RPA for obtaining, processing, analyzing and interpreting information. Organizations are currently struggling to efficiently manage databases (Vilminko-Heikkinen & Pekkola, 2017), and informational needs of management exceed the capabilities of traditional technology. By accessing one or more non-integrated systems, RPA allows to conduct multidimensional data analysis, enabling managers to make decisions. Therefore, RPA supports the organization's development and improvement of its results through comprehensive and critical business process engineering (Aguirre & Rodriguez, 2017; van der Aalst et al., 2018). Kattepur (2019) presents the possibilities of using RPA to analyze and improve resource efficiency based on the example of the use of automation in Industry 4.0 workflows. It simulates throughput, response time, utilization and operational costs using average value analysis algorithms (MVA). Other authors describe the system approach to information systems, examining the optimal configuration of performance systems and hybridization of information system technologies to increase the flexibility of the enterprise (Williams et al., 2020). It should be noted that the increasing amount and complexity of data creates the need for new methods of the business process analysis to assess process optimization options. Methods for analyzing processes using routine, semi-cognitive and cognitive levels of decision logic are proposed in the subject literature (Rizun et al., 2019). In addition, to improve decision-making processes, solutions for visualizing business processes on the basis of data downloaded from a computer are also proposed (Urabe et al., 2019).

Agostinelli (2019) noticed that the current generation of software robots is guided by procedural rules rather than artificial intelligence. The inclusion of cognitive methods makes it possible to use RPA more extensively. Our analyses show that this aspect of research is most often undertaken by authors. Algorithms derived from artificial intelligence, and used by cognitive automation, allow to analyze large sets and interpret data in real time. Thanks to data mining, the use of machine learning or natural language processing, RPA can support and develop analytical or predictive processes (Davenport & Kirby, 2016; Galusha, 2018) that are increasingly based on artificial intelligence. The forecast directions of technology development include hyperautomation, which, in turn, includes a combination of such tools as RPA, intelligent enterprise management software (iBPMS) and artificial intelligence (Cearley et al., 2019). The implementation of digital innovations and their impact on humans has been studied in literature primarily in the organizational, technical and behavioral context in various industries (e.g., health care (Wiljer & Hakim, 2019), banking (Romao et al., 2019), shared services (Naga Lakshmi et al., 2019)), pointing to their extensive applications and yet unidentified consequences. The aspects of RPA impact on humans are also discussed. Key challenges requiring in-depth analysis relate in particular to employment, ethics, acceptance of technology, customer experience, work planning, social integration and regulation (Mendling et al., 2018). The issues of risk management created by new technologies and building trust in new technologies in the community also seem to be interesting (Owen et al., 2013).

As a result of research, it was established that there is a clearly separated area of considerations devoted to the phenomenon of using RPA to improve productivity. Radke et al. (2020) note that manufacturing companies now have to deal with the increasing speed and complexity of change to manage their global supply chains. The significance of this context of RPA is also indicated by empirical studies, whose authors signal that the main reason for automation is not cost pressure but the need for a specific process efficiency (e.g. production volume) that people are unable to achieve (Deloitte, 2018).

The next issue undertaken by researchers is the use of RPA in creating process innovations and managing an organization's resources. Researchers focus on the issues related to the importance of technological innovations, such as e.g. blockchain, learning systems, machine learning, and other emerging technologies, for managing company resources and processes. The implementation of these

innovations in the RPA ecosystem (as an integral part of RPA or as complementary solutions) can create resource and process innovations in the business model. Digital transformation and closer integration progressing in both vertical and horizontal value chains (cooperation with suppliers, customers, partners) have a significant impact on changes in business models. High potential is indicated primarily in back-office processes. Mishra et al. (2019a, 2019b) studied the technological aspects that affect automation initiatives from a deployment perspective as well as people and process dimensions of automation in the business process management industry. The importance of robotization and artificial intelligence for changes introduced in business models was highlighted by Met et al. (2020). First of all, they emphasized the impact of new technologies on the transformation of the customer service model and internal operational processes in the financial sector. Syed et al. (2020) raised the issue of 'an organization's readiness' for RPA implementation. They indicated that effective automation depends on business drivers, the nature of existing technology and degree of maturity, as well as on the appropriate selection of processes for the implementation of robots. Hartley and Sawaya (2019) listed the need to identify a technology visionary and develop a digital technology road map for processes in addition to the need to update information systems and among the important conditions for the adoption and effective use of RPA. Literature review by Syed et al. (2020) also revealed that there was no universal research-based successful implementation methodology for RPA, although attempts to develop it based on the experience of specific industries or companies were made. One of the first attempts to define the methodological framework for the implementation of RPA was made by Sönmez and Börekçi (2020). They presented RPA in a broader context - from an industrial engineering perspective, taking into account the ecosystem and the RPA life cycle for the extended automation process.

As a result of our analyses, we find that the following contexts of RPA considerations can be distinguished in the literature: analytical and management, cognitive, productivity, and resource and process. The findings add yet another perspective to the considerations by Syed et al. (2020). Therefore, these studies can be considered as mutually complementary.

Conclusions

The study has mapped the research field focused on the issues of robotic process automation. First of all, the leading contributors to the development of the research field have been identified, including the most productive countries, research institutions, source titles, authors, and core references. Secondly, the leading research topics and thematic areas in the field have been discovered and explored.

The study contributes to management theory through mapping the RPA research field. It creates the added value for researchers interested in this emerging area of scientific inquiry. Its originality and novelty results from describing the research landscape in the field with bibliometric methods, which has not been done before.

The findings of the study should be considered in the context of its research limitations. First of all, the sample used for bibliometric analysis is very small due to the fact that the research field is within its emergence phase. As the topic is very 'hot', we expect a very dynamic increase in the number of publications. Therefore, in the future, bibliometric studies should be replicated in order to map the development of research in RPA. Secondly, the study employs the perspective of the whole research field, neglecting the differences among subject areas. Following the amassing research output, it seems to be interesting to explore the differences in the approaches typical of leading subject areas. In particular, comparing and contrasting between the computer and technical perspective versus the business, management and accounting perspective could be an interesting and inspiring piece of research. Thirdly, formal limitations regarding the length of the paper forced us to focus only on major trends and tendencies and refrain from a 'deep dive' in the research field. Therefore, we recommend to extend our project, to develop a full-scale research profiling study, and to confront its findings with comprehensive literature reviews (e.g. Syed et al., 2020).

References

- Agaton, B., and Swedberg, G. (2018), *Evaluating and Developing Methods to Assess Business Process Suitability for Robotic Process Automation*, Chalmers University of Technology, University of Gothenburg, Gothenburg.
- Agostinelli, S. (2019), 'Synthesis of strategies for robotic process automation,' *CEUR Workshop Proceedings*, 2400, art. 53.
- Aguirre, S., and Rodriguez, A. (2017), 'Automation of a business process using robotic process automation (RPA): A case study,' *Communications in Computer and Information Science*, 742, 65–71.
- Anagnoste, S. (2017), 'Robotic automation process - The next major revolution in terms of back office operations improvement,' *Proceedings of the International Conference on Business Excellence*, 11, 676–686.
- Asatiani, A., and Penttinen, E. (2016), 'Turning robotic process automation into commercial success - Case OpusCapita,' *Journal of Information Technology Teaching Cases*, *6*(2), 67–74.
- Burgess, A. (2018), *The Executive Guide to Artificial Intelligence: How to Identify and Implement Applications for AI in Your Organization*. *The Executive Guide to Artificial Intelligence*, Palgrave Macmillan, Cham.
- Cearley, D., Burke, B., Smith, D., Jones, N., and Chandrasekaran, A. (2019). 'Gartner Top 10 strategic technology trends for 2020'. [Online] [Retrieved February 4, 2020] https://www.gartner.com/en/doc/432920-top-10-strategic-technology-trends-for-2020
- Cewe, C., Koch, D., and Mertens, R. (2018), 'Minimal effort requirements engineering for robotic process automation with test driven development and screen recording,' *Lecture Notes in Business Information Processing*, 308, 642–648.
- Davenport, TH., and Kirby, J. (2016), 'Just how smart are smart machines?,' *MIT Sloan Management Review*, *57*(3), 21–25.
- Deloitte (2018), 'The robots are waiting: Are you ready to reap the benefits?' [Online] [Retrieved February 4, 2020] https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/consultancy/deloitte-uk-the-robots-are-waiting.pdf
- Donohue, JC. (1974), *Understanding Scientific Literature: A Bibliometric Approach*, MIT Press, Cambridge.
- Fernandez, D., and Aman, A. (2018), 'Impacts of robotic process automation on global accounting services,' *Asian Journal of Accounting and Governance*, *9*, 123–132.
- Frey, CB., and Osborne, MA. (2017), 'The future of employment: How susceptible are jobs to computerisation?,' *Technological Forecasting and Social Change*, *114*, 254–280.
- Galusha, B. (2018), 'Considering robotic process automation?,' *Database Trends and Applications*, *31*(6), 44–45.
- Guo, D., Chen, H., Long, R., Lu, H., and Long, Q. (2017), 'A co-word analysis of organizational constraints for maintaining sustainability,' *Sustainability*, *9*(11), art. 1928.
- Hallikainen, P., Bekkhus, R., and Pan, SL. (2018), 'How OpusCapita used internal RPA capabilities to offer services to clients,' *MIS Quarterly Executive*, *17*(1), 41–52.
- Hartley, JL., and Sawaya, WJ. (2019), 'Tortoise, not the hare: Digital transformation of supply chain business processes,' *Business Horizons*, *62*(6), 707–715.
- He, Q. (1999), 'Knowledge discovery through co-word analysis,' *Library Trends*, *48*(1), 133–159.
- IRPA (2015), *Introduction to Robotic Process Automation: A Primer*. [Online] [Retrieved February 4, 2020] https://irpaai.com/wp-content/uploads/2015/05/Robotic-Process-Automation-June2015.pdf
- Ivančić, L., Suša Vugec, D., and Bosilj Vukšić, V. (2019), 'Robotic process automation: Systematic literature review,' *Lecture Notes in Business Information Processing*, 361, 280–295.
- Kattepur, A. (2019), 'Towards structured performance analysis of industry 4.0 workflow automation resources,' *ICPE 2019, 10th ACM/SPEC International Conference on Performance Engineering*, 7-11 April 2019, Mumbai, India, 189–196.
- Kokina, J., and Blanchette, S. (2019), 'Initial evidence of digital labor in accounting: Innovation

with robotic process automation,' *International Journal of Accounting Information Systems*, *35*, art. 100431.

- Lacity, MC., and Willcocks, LP. (2016), 'Robotic process automation at telefónica O2,' *MIS Quarterly Executive*, *15*(1), 21–35.
- Ljungholm, DP. (2018), 'Reality-construction processes in information societies: Algorithmic regulation, automated decision-making, and networked governance,' *Review of Contemporary Philosophy*, *17*, 107–113.
- Mendling, J., Decker, G., Reijers, HA., Hull, R., and Weber, I. (2018), 'How do machine learning, robotic process automation, and blockchains affect the human factor in business process management?,' *Communications of the Association for Information Systems*, *43*(1), 297–320.
- Met, İ., Kabukçu, D., Uzunoğulları, G., Soyalp, Ü., and Dakdevir, T. (2020), Transformation of business model in finance sector with artificial intelligence and robotic process automation, *Digital Business Strategies in Blockchain Ecosystems: Transformational Design and Future of Global Business*, Hacioglu, U. (ed.), Springer, Cham.
- Mishra, S., Sree Devi, KK., and Badri Narayanan, MK. (2019a), 'People & process dimensions of automation in business process management industry,' *International Journal of Engineering and Advanced Technology*, *8*(6), 2465–2472.
- Mishra, S., Sree Devi, KK., and Badri Narayanan, MK. (2019b), 'Technology dimensions of automation in business process management industry,' *International Journal of Engineering and Advanced Technology*, *8*(6), 1919–1926.
- Naga Lakshmi, MVN., Vijayakumar, T., and Sai Sricharan, YVN. (2019), 'Robotic process automation, an enabler for shared services transformation,' *International Journal of Innovative Technology and Exploring Engineering*, *8*(6), 1882–1890.
- Owen, R., Stilgoe, J., Macnaghten, P., Gorman, M., Fisher, E., and Guston, D. (2013), A framework for responsible innovation, *Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society*, Owen, R., Bessant, J., and Heintz M. (eds.), Wiley, Chichester.
- Porter, AL., Kongthon, A., and Lu, J-CC. (2002), 'Research profiling: Improving the literature review,' *Scientometrics*, *53*(3), 351–370.
- Radke, AM., Dang, MT., and Tan, A. (2020), 'Using robotic process automation (RPA) to enhance item master data maintenance process,' *LogForum*, *16*(1), 129–140.
- Rizun, N., Revina, A., and Meister, V. (2019), 'Method of decision-making logic discovery in the business process textual data,' *Lecture Notes in Business Information Processing*, 353, 70–84.
- Romao, M., Costa, J., and Costa, CJ. (2019), 'Robotic process automation: A case study in the banking industry,' *14th Iberian Conference on Information Systems and Technologies, CISTI*,' 19-22 June 2019, Coimbra, Portugal, art. 8760733.
- Sönmez, ÖE., and Börekçi, DY. (2020), 'A conceptual study on RPAs as of intelligent automation,' *Advances in Intelligent Systems and Computing*, 1029, 65–72.
- Syed, R., Suriadi, S., Adams, M., Bandara, W., Leemans, SJJ., Ouyang, C., ter Hofstede, AHM, van De Weerd, I., Thandar Wynn, M., and Reijers, HA. (2020), 'Robotic Process Automation: Contemporary themes and challenges,' *Computers in Industry*, *115*, art. 103162.
- Urabe, Y., Yagi, S., Tsuchikawa, K., and Masuda, T. (2019), 'Visualizing user action data to discover business process, *20th Asia-Pacific Network Operations and Management Symposium: Management in a Cyber-Physical World, APNOMS 2019*,' 18-20 September 2019, Matsue, Japan, art. 8893024.
- van der Aalst, WMP., Bichler, M., and Heinzl, A. (2018), 'Robotic process automation,' *Business and Information Systems Engineering*, *60*(4), 269–272.
- van Eck, NJ., and Waltman, L. (2010), 'Software survey: VOSviewer, a computer program for bibliometric mapping,' *Scientometrics*, *84*(2), 523–538.
- van Eck, NJ., and Waltman, L. (2014), Visualizing bibliometric networks, *Measuring Scholarly Impact: Methods and Practice*, Ding, Y., Rousseau, R. and Wolfram D. (eds.), Springer International Publishing, Cham.
- van Eck, NJ., and Waltman, L. (2018), *VOSviewer Manual*, Universiteit Leiden.
- Vanmali, K. (2017), 'Robotic software will help CFOs to play a more strategic role,' *Accountancy SA*, 16–17.

- Vilminko-Heikkinen, R., and Pekkola, S. (2017), 'Master data management and its organizational implementation: An ethnographical study within the public sector,' *Journal of Enterprise Information Management*, *30*(3), 454–475.
- Wiljer, D., and Hakim, Z. (2019), 'Developing an artificial intelligence-enabled health care practice: Rewiring health care professions for better care,' *Journal of Medical Imaging and Radiation Sciences*, *40*(4), S8–S14.
- Williams, O., Olajide, F., Al-Hadhrami, T., and Lotfi, A. (2020), Exploring process of information systems and information technology for enterprise agility, *Emerging Trends in Intelligent Computing and Informatics. IRICT 2019: Advances in Intelligent Systems and Computing*, Saeed, F., Mohammed, F., and Gazem, N. (eds.), Springer, Cham.

Selected Aspects of Internet Marketing Processes Automation in Enterprise Management

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Abstract

The paper presents the issues related to automation of selected internet marketing processes. A vital aspect of contemporary enterprises functioning is a properly defined and selected marketing theory implemented within the virtual information space. This is a component of communication between potential customers and the enterprise. This space requires that marketing processes are automated. This is carried out based on the mechanisms available in such solutions as: Marketing Automation and Programmatic Marketing. An important role here play: artificial intelligence, machine learning and software bots. The underlying objective of the paper is the investigate the interest of commercial enterprises that operate based on the traditional-internet business model in implementing solutions in the scope of e-marketing processes automation. The pilot research was conducted with the use of a survey questionnaire and additional phone conversations as a free-form interviews among the enterprises of the gardening industry in the selected EU countries. Within the research the authors have distinguished three components of solutions applied in optimising marketing processes: Marketing Automation, Programmatic Marketing and chat bots. The results demonstrate a significant interest in the discussed solutions, in particular in implementing them on social media portals, communication with clients as well as customer behaviour analysis and monitoring. The results of the research also include opinions of entreprenuers, which indicted the potential benefits of the presented solutions pertaining to marketing processes optimisation, such as: reduced cost of service, a possibility of acquiring additional data indispensable to segment and analyse loyalty of customers.

Keywords: Marketing Automation, Programmatic Marketing, Online Marketing, Chat Bots.

Introduction

Development of Information Technologies has become one of the fundamental factors of economic growth and appearance, both in the scientific discourse as well as business practice, terms such as: digital economy, digitisation and automation of business processes. The present state of knowledge indicates that the concept of cyberspace has actually begun to function, which in turn has created a demand for developing new approaches to entities, which can dwell and operate in this space, and also methods of creating them. The literature on the subject frequently indicates in this context solutions termed as software robots, chat bots, software agents – and in more general terms: solutions that allow to automate processes and apply, among others, agent technologies to reach this goal. Simultaneously, it has been

stressed that human beings are replaced by robots not only in "routine" tasks, but also in "predictable" ones.

The areas of enterprise functioning, which – as numerous publications indicate – are particularly susceptible to proces digitisation and automation include: online marketing (e-marketing) and customer service and consultation. Additionally, simulation of the human factor in software solutions of this type is of vital importance, an important function of which is to strengthen the relationships with customers.

The objective of the paper is to evaluate the interest of gardening industry enterprises in the solutions in the scope of e-marketing processes automation, including application of chat bots. In order to achieve the set objective the authors have conducted a pilot research. It concerned the analysis and evaluation of marketing strategies regarding e-marketing processes automation, carried out by economic entities in the member countries of the European Union. The research was conducted in commercial enterprises operating based on the traditional-online business model with the use of a survey questionnaire and additional phone conversations as free-form interviews.

Realising the significance of e-marketing processes and their automation for commercial enterprises, and also considering the strength of the competition on the market the authors have formulated the following research questions:
1. *Are the commercial enterprises that operate based in the traditional-internet business model interested in implementing solutions in the scope of e-marketing processes automation?*
2. *What benefits are expected as a result of applying chat bots in online marketing?*

The paper constitutes a contribution to the literature in implementing solutions in the scope of automating online marketing processes.

Online Marketing

The specificity of the contemporary marketing and strategies applied within its confines have been subject to constant evolution. This situation has been determined by a dynamically changing expectations of consumers, Big Data phenomenon (expansively growing amount of information) and emerging on the market innovative technologies that condition evolution of processes with regard to their digitization and automation. Ever newer, alternative forms of communication (content marketing, native advertising, etc.) are appearing alongside the traditional forms of advertising (e.g. banner one) (Rowley, 2008). An important reason behind the intensification of the latter is crisis of banner advertising (among others, a phenomenon of so called "banner blindness") (Benway, 1998). It should be stressed here that there exists a global trend to minimise the participation of the human factor in the area of brand advertising and promotion. Such a trend determines the implementation of new domain solutions. A wide range of automation regarding undergoing processes can be indicated in the area of marketing, both in the context of optimising sales and purchases of advertisements on the Internet (Programmatic Marketing), as well as analysing and monitoring the behaviours of Internet users with regard to the course and implementation of these processes.

Programmatic Marketing defines a certain scope of technologies as well as forms of their adoption in the processes of automating sales and purchases of advertisements, allowing for delivering the message to a properly personalized group, and in a more detailed form even to a specific, precisely determined customer (Busch, 2016). The philosophy of an approach of this type presents the ecosystem structure (*Programmatic Buying* ..., 2014). It consists of the following components, representing the process of automated sales and purchases of advertising space (including the nature of purchasing models) (*What is Programmatic Advertising...*, 2020):

- Advertiser/Media Agency – a customer directly involved in the campaign, who participates in the purchasing processes of advertising space.
- Adserver – a dedicated IT system that supports emission and management of online advertising campaigns.
- Trading desk – a media agency or a specialist unit in the agency whose task is to optimise and purchase a campaign based on Programmatic assumptions.
- DSP (Demand Side Platform) – a platform within the confines of which the advertiser (or agency) makes the purchase of advertising space. The undergoing processes are also directed at comprehensive actions regarding parameterizing the campaigns being carried out, defining the form of targeting, monitoring and reporting their course. Examples of such solutions are platforms evaluated in the report of the Forrester research company: - Adform, Adobe, AOL, AppNexus, DataXu, Google, MediaMath.
- AdExchange – an agreggated set of tools and techniques dedicated to publishers, by means of which they execute processes of advertising space sales in the RTB (Real Time Bidding) protocol. Within this element of the ecosystem integration of characteristic components of advertisements sales and purchases processes occurs – that is a connection of demand (DSP) and supply (SSP – Supply Side Platform).
- SSP – a technology addressed at publishers. It allows for execution of sales processes regarding advertising space in the programmatic model.
- AdNetwork/Sales, Affiliate Network, Network/Publisher – these are affiliating, advertising networks, publishers, which make advertising space available in the ecosystem.
- DMP – Data Management Platform – aggregating, processing, analysing and consolidating personal data on the users. The DMP platform utilises various types of data on users (information related to actions that have been performed by users, conversion, demographic data, buying intentions, etc.)
- RTB (Real Time Bidding) – carried out in real time auction model of advertising space sales.
- Metrics – tools applied to measure the output.

The popularity and growing importance of Programmatic in the marketing area can be confirmed for instance by the research of the marketing agency Zenith presented in the report „Programmatic Marketing Forecasts 2019". According to this research the value of advertising in the programmatic model in 2020 will amount to USD 98 billion. This will account for 68% of total expenditures for advertising in digital media (Khandelwal, 2019). The report also indicates the technologies that intensify the development of programmatic advertising. Artificial Intelligence, machine learning and 5G technologies implemented within the Programmatic influence its efficiency. Yet, introduction of new advertising channels and media such as Digital Out Of Home (DOOH), podcasts, audio programme advertisements, intelligent devices and AR/VR ensure freedom of personalising this form of marketing communication.

Another example of proces automation in the presented area is Marketing Automation (LeSueur, 2007). It allows to improve and optimise marketing actions (with a stress on sales processes), thanks to monitoring users and their behaviour on websites. This is done through implementation of web applications, artificial intelligence methods, software bots. Complex behavioural profiles are created with the use of proper aggregation of data acquired from the Internet. These structures allow for segmentation of network users in any manner, beneficial with regard to the assumed goals of an advertising campaign or marketing actions – e.g. with respect to: identifying buying preferences, individual interests, etc. (Heimbach, Kostyra and Hinz, 2015).

The Marketing Automation technology is widely applied in various areas of digital marketing, supporting the efficiency of the achieved results. An example can be **e-mail marketing**. Personalisation of sent contents increases its added value, which can be represented by coefficients that define triggering actions by potential recipients. A vital attribute is adjustment of displayed contents to the preferences of adequately profiled groups of recipients, which increases the attractiveness of provided in the

communication process key information. These processes can be parallelly (in real time) accompanied by tests of particular creations, which are also a component of strengthening the relations with potential recipients. Marketing Automation is also utilised in the area of content presentation on web portals. Mechanisms aimed at content adjustment are implemented on them (contents – advertising banners), which convergent with the buying history of users, therefore reducing unnecessary or redundant information. Other examples of automated marketing application include also the following areas:

- Advertisements in RTB networks and a possibility to personalise retargeting.
- Social media and application of tools for monitoring interactions between customers and the brand so as to adjust a proper offer.
- Monitoring behaviours of mobile applications users. The objective of such actions may include, among others, personalisation of push messages and email messages.
- Analytics and reports so as to determine the efficiency of actions. The tools applied in this area allow to identify in detail the outputs of the implemented solutions, campaigns and automation rules, which provides an opportunity for optimising the costs of operations.

Marketing automation more and more frequently employs the solutions based on artificial intelligence and machine learning (Sterne, 2017). These tools support the processes of customer data exploration. Based on their results it is possible to create, for example, optimised recommendations of communication channels with potential customers. Artificial intelligence also effectively fits into the area of automated marketing through supporting segmentation processes. An example here may be Netflix (virtual rental of DVD movies), which presently applies machine learning in the system of recommending movie titles to its users (Tien, 2017). Such recommendations are formed based on the previous habits and individual preferences (segmentation of user groups) (Gomez-Uribe and Hunt, 2016). Results of this solution's application have been confirmed by the fact that 75% of all the movies are selected by users of the portal thanks to the intelligent recommendation system (Roetzer, 2014).

Chat bots in the Virtual Environment

Information Technologies allow to transfer a number of business activity areas into the cyberspace. This, in turn, is a natural, virtual environment for functioning of various types of software robots, including solutions developed based on agent technology. Such a technology is defined as computer software for independent operations in the specific environment and achieving set goals.

The main area of agent technology application is the area of information management – most frequently in the context of supporting managers in the decision-making process. Popularity enjoy applications of software agents in the form of so-called chat bots. The primary motives behind their implementation in enterprises include reducing the cost of customer service and increasing the stickiness of websites. Chatbots on social networking sites are a recent innovation in computer-mediated marketing communication (Van den Broeck at al., 2019, p. 150). From the managerial point of view chat bots are treated as tools facilitating the use of websites and contribute to an increase in the number of positive opinions about their usefulness, building trust and growth of customer satisfaction (Mimoun and Poncin, 2015, p. 70; Przegalinska at al., 2019, p. 785). Chat bots as also calle lingubots, chatbots, conversation agents, virtual advisers, personal assistants (Gentsch, 2019, p. 81; Corti and Gillespie, 2016, p. 431). Developers of chat bots aim at creating solutions in such a form that the communication resembles the human dimension. The high level of message interactivity compensates for the impersonal nature of a chatbot. (Go and Sundar, 2019, p. 304). Interactions between users and chat bots may occur with the use of communicators embedded on social media platforms, on websites or through SMS. The construction of bots frequently incorporates elements of artificial intelligence, which support them in recognising the context of the conversation with a human. Thanks to data that is acquired during the conversation with human users and its further analysis it is possible to intensify the personalisation of the message.

As chatbots have become increasingly popular over the past years, most social networking sites have recognised their far-reaching potential for commercial purposes (Zarouali et al., 2018, p. 1). Presently, by any means the most popular environment of chat bots operation is the internet communicator *Facebook Messenger* (Araujo, 2018, p. 183). Enterprises increasingly often use social media in communication with customers – for example the abovementioned *Facebook*. Customers in turn use social media to seek for specific information regarding a product and direct access to services. A chat bot that operates within the *Facebook Messenger* enables to generate automatic responses. A communicator of this type is classified as a solution the belongs to the area of conversational commerce.

Bots applied in the area of conversational commerce, thanks to the automation of performed tasks, make it possible to function in the global dimension, are active and responsive 24/7, support customer service and acquisition of new ones, strengthen the attachment of customers to a given brand, may be fitted with an ability to learn and adopt to the needs of customers, influence the increase of satisfaction and trust on the side of customers (Rauthan, 2019; Bakhshi et al., p. 5; Chung et al., 2018). Based on the conducted research (Chattaraman, Kwon and Gilbert, 2012, p. 2055) it has been stressed that chat bots are especially useful while supporting elderly customers (whose average age in the research was 69) in online shopping. Data acquired by chat bots is used for various types of customer analyses – for instance for customer segmentation, loyalty analysis or basket analysis. Results of analyses are transferred to the managerial staff, supporting it in making decisions in the area of marketing, sales, but also employee recruitment.

Research Methodology

Sales of plants in Western Europe generates over a half of the turnover in the whole gardening industry. This is an industry characterised by a large potential of growth. This can be confirmed by the fact that ever more people move to detached houses and create their own gardens. Presently, the promoted healthy lifestyle and trend of growing own bio-products are also important. It is worth stressing that customers of the gardening industry constitute a very diversified with regard to age, location and preferences, which is associated with the necessity to optimise sale and purchase processes. The abovementioned insights constitute a justification for conducting research in the enterprises of the investigated industry pertaining to application of e-marketing processes automation.

The research was conducted with the use of a survey questionnaire in the group of 23 enterprises that represented the gardening industry – shops conducting stationary sales and offering sales of products by means of the Internet. Sending the survey questionnaire was preceded by a telephone conversation, which constituted an invitation to participate in the survey and become acquainted with its subject matter. A phone conversation was also conducted with each of the participating in the survey enterprises one the obtained results had been analysed – so as to acquire additional opinions, not directly included in the survey questionnaire and related to widely understood problem domain of internet marketing processes automation. The range of the research covered four selected countries of the European Union – Poland (7 enterprises), the Netherlands (6 enterprises), Germany (5 enterprises) and the Czech Republic (5 enterprises). The selection of the industry was not random and resulted from the need to incorporate into the research group representative of several European countries who would function within a market of a similar specificity. The abovementioned industry is an answer to this premise as the gardening market in the selected countries – among others due to the climate, soil conditions and plant life – is of similar characteristics.

Research Results - Discussion

In the course of analysing the undertaken research problem the authors conducted a pilot research. This research constituted a cognitive study focused on the analysis and evaluation of marketing strategies carried out by economic entities in the European Union member states. In the paper the authors will

present the results obtained for one of the areas covered in the research – the section regarding e-marketing processes automation.

The goal of the research was to acquire information about interests and needs in the scope of marketing processes automation in the group of investigated economic entities. In this context the authors formulated a set of questions, which constituted the basis for further analysis of the subject information. One of the initial questions in the survey questionnaire, presented in the form of 5-point Lickert scale, concerned a reaction to the statement that it is necessary to introduce solutions in the scope of marketing processes automation in the gardening industry enterprises. In this aspect the great majority of the respondents agreed with the statement (22 respondents), and one person had no opinion about this issue.

Such a juxtaposition of the obtained answers correlates with information obtained from the respondents in one of the subsequent questions regarding applying by them the said solutions – among 23 surveyed enterprises a significant majority (19 entities) declare implementing tools from this area within the conducted business activity. However, it needs to be stressed that a dominant solution in this domain is the basic solution, which is a profile in social media.

In the course of the conducted research the authors also turned their attention to the fact whether the solutions in the scope of *Marketing Automation* found practical application in the selected areas of internet marketing in the enterprises. For this reason, the respondents were asked to evaluate a set of selected factors. This evaluation consisted in determining the importance on the scale from 1 to 10 (where 1 – the least useful criterion, 10 – the most useful one). The survey respondents gave highest marks to presentation of contents on the web portals and email marketing, the lowest marks received monitoring the behaviour of mobile applications users (Fig. 1). It is worth noticing that the factor that received top marks – presentation of contents on web portals – concerns the implementation of mechanisms that adjust the contents convergent with the buying history of users, reducing in this way unnecessary or redundant information.

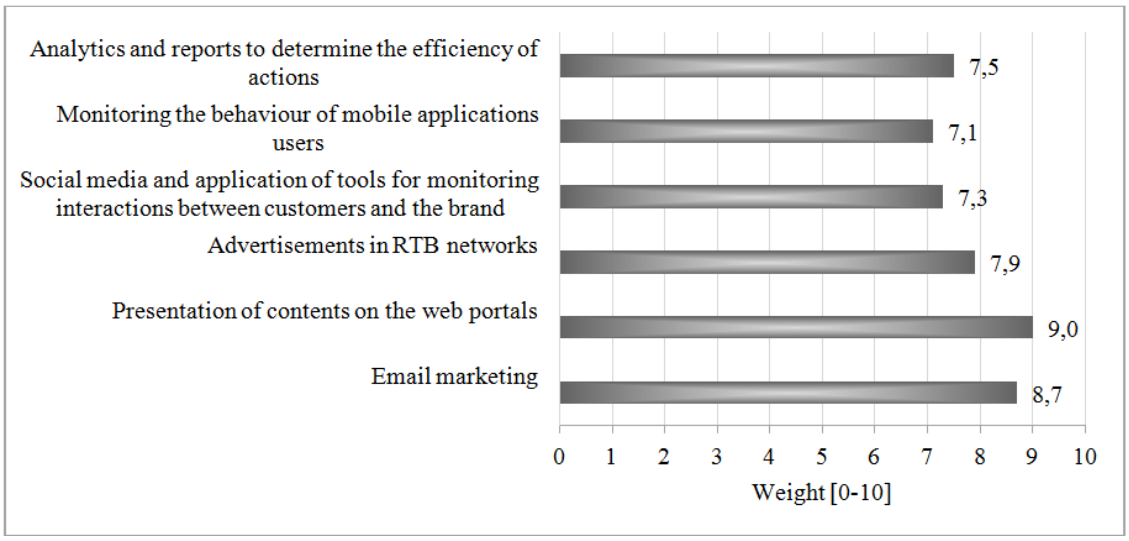

Fig. 1: Usefulness of solutions in the scope of Marketing Automation

Source: own analysis.

An extension to this issue was evaluating by the respondents (within an analogous 10-point scale) the necessity to introduce process automation in other areas of internet marketing, which in the vast majority of the investigated entities (20 enterprises) are not supported by tools of *Marketing Automation*. The

highest level of usefulness was attributed to communication with customers (9.3). Next positions were occupied by optimisation of sales and purchases of advertisement on the Internet (7.2) and the analysis and monitoring of user behaviours with regard to the course and execution of sales and purchasing processes (6.8).

The research also addressed the issue of usefulness of utilising in enterprises chat bots in the area of online marketing. In this aspect the respondents were asked to attribute weights for particular benefits resulting from their implementation. The survey respondents attributed the highest weight to the functionality related to embedding bots on communication platforms itself. This results primarily from the fact that the investigated enterprises do not apply this solution, but at the same time they are aware of the benefits that it can offer. At the other extreme was the functionality related to acquiring data by chat bots, which can be further used to conduct various analyses of the customers, which would provide the managerial staff with broader knowledge while making marketing and sales decisions (Fig. 2.).

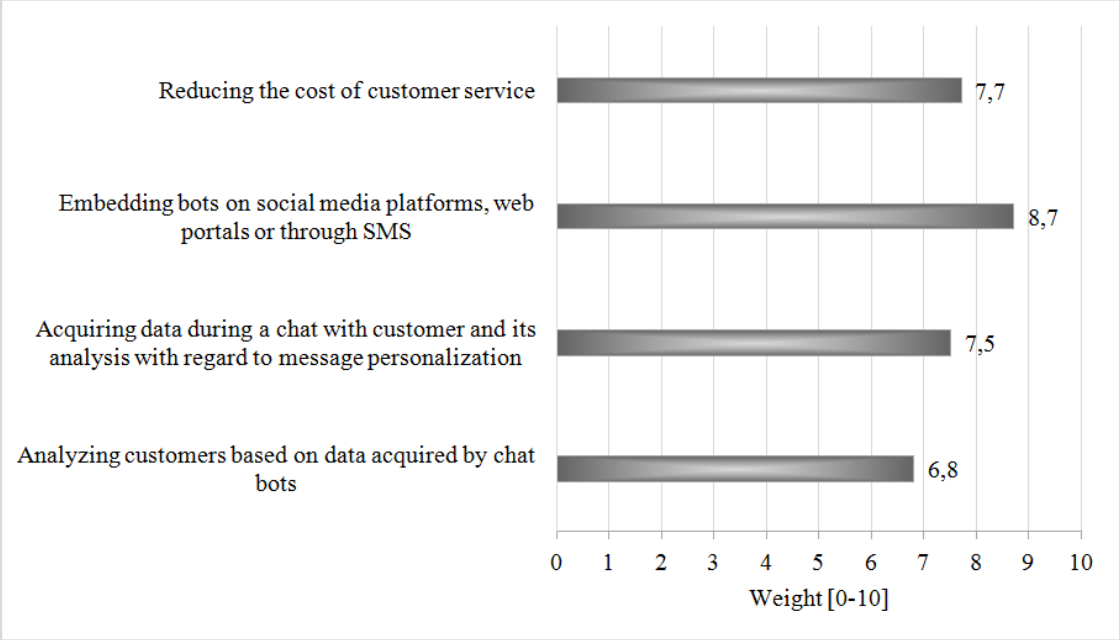

Fig. 2: Evaluation of benefits resulting from implementing in enterprises chat bots.
Source: own analysis

Due to a universal nature of marketing processes automation in managing enterprises the obtained results of the pilot research conducted among the gardening industry enterprises can be referred to economic entities in other industries. The results of the pilot research are convergent with numerous analyses in the scope of online marketing presented in the literature on the subject.

According to the research published in *State of Marketing Automation 2019* 75% of enterprises utilise in their operations solutions that automate marketing processes (*State of Marketing…,* 2019). Another research conducted by *House of Marketing* demonstrates that 48% of the investigated enterprises that apply the solutions in the scope of marketing automaton evaluate them as one of the most useful tools for customer behaviour analysis (*Yearly Marketing…*, 2019). The research presented in the report *Email Marketing and Marketing automation Excellence 2018*, unequivocally show that enterprise owners indicate time saving, acquiring new customers and growth of incomes as the greatest benefit of implementing the solutions in the scope of marketing automation (*Email Marketing…*, 2018).

The greatest challenge that marketing automation is facing include search for proper tools, business processes integration with the use of available solutions and managing the acquired data (*Marketing Automation…,* 2019). *State of Marketing Automation Survey Report 2019* stresses the fact that the most useful solutions for digital marketing automation is application of communicators and chat bots, which was indicated by over a half of the respondents (*State of Marketing…,* 2019).

The conducted literature review and pilot survey allow to make an attempt at answering the first research question formulated in the introduction to the present paper: *Are the commercial enterprises that operate based in the traditional-internet business model interested in implementing solutions in the scope of e-marketing processes automation?* The results of the survey indicate that a possibility of automating processes of this type received great approval and interest. However, it needs to be remembered that these are just the results of a pilot research. It is worth stressing that that such a result may derive from the specificity and effects of the automation issue – that is, among others, increased process efficiency, decrease in its cost, time saving, decreasing the load of employees. On the other hand, it must be remembered that automation is accompanied by the costs of implementation and possible reduction of work positions. Other fears regard a short life-cycle of specific IT solutions and emergence of new technologies that in a relatively short time will replace the presently existing solutions.

What benefits are expected as a result of applying chat bots in online marketing? The answer to the second research question is not obvious. The pilot research did not allow for investigating the measurable effects of applying chat bots in online marketing, but only the opinions of the respondents regarding potential benefits of their practical implementation. One of the greatest benefits of implementing chat bots is reducing the cost of customer service and possibility of computer analysis of data acquired from customers – among others, to segment customers, analyse their loyalty. However, despite the numerous benefits it is also necessary to remember about the necessity to comply with the requirements concerning protection and confidentiality of the acquired data, and from the customer perspective also potential problems related to trust in solutions in the form of chat bots.

It should be expected that in the years to come one will observe a significant growth in the number of implementations of solutions in the area of marketing processes automation, including chat bots. This opinion results primarily from the possibility of applying these solutions within the platforms of social media and internet communicators that are integrated with them.

Conclusions

A fundamental element of contemporary enterprises functioning is a properly determined and selected marketing strategy carried out within the virtual information space. This is a component of communication between potential customers and the company. This space requires marketing processes being automated, which is done based on the mechanisms available within the presented in the paper Marketing Automation and Programmatic Marketing. A vital role is played here by artificial intelligence tools, machine learning and software bots.

The presented in the paper considerations comprise the results of pilot research. These indicate a necessity to continue the research works. The potential present in the identified benefits resulting from e-marketing processes automation justifies further research regarding in particular the economic and organisational aspect. It also seems interesting to consider the elements related to technical, social and legal conditionings.

Based on the research results one can observe a significant interest of the gardening industry entrepreneurs in implementing solutions regarding automation of processes related to marketing communication. This area can be effectively supported with the technologies - Marketing Automation,

Programmatic Marketing and chat bots. Various methods of creating the content on the websites and e-mail marketing still enjoy large interest. Therefore, it is possible to extend their functionality through applying the elements for automating the tasks they carry out. An important factor that improves the efficiency of communication is the presence of conversation interface. This is of particular importance if it takes over the advisory function in the form of a virtual consultant. This can strengthen the involvement of potential customers, increasing the conversion coefficient, optimise the flow of marketing processes with regard to measurable benefits for customers as well as enterprises.

References

Araujo, T. (2018), 'Living up to the chatbot hype: The influence of anthropomorphic design cues and communicative agency framing on conversational agent and company perceptions', *Computers in Human Behavior*, 85, August 2018, 183-189.

Bakhshi, N., van den Berg, H., Broersen, S., de Vries, D., Bouazzaoui, H. E. and Michels, B. (2018), Chatbots Point of View, Deloitte Artificial Intelligence, March 2018, Deloitte The Netherlands.

Benway, J.P. (1998), 'Banner blindness: What searching users notice and do not notice on the World Wide. Rice University Electronic Theses and Dissertations Web'. [Online], [Retrieved December 10, 2019], https://scholarship.rice.edu/bitstream/handle/1911/19353/9928505.PDF?sequence=1&isAllowed=y

Busch, O. (2016), The Programmatic Advertising Principle, Programmatic Advertising. Management for Professionals, Busch, O. (ed), Springer, Cham, 3-15.

Chattaraman, V., Kwon, W.S. and Gilbert, J. E. (2012), 'Virtual agents in retail web sites: Benefits of simulated social interaction for older users Computers in Human Behavior', *Computers in Human Behavior*, 28 (6), November 2012, 2055-2066.

Chung, M., Ko E., Joung, H. and Kimb, S. J. (2018), 'Chatbot e-service and customer satisfaction regarding luxury brands', *Journal of Business Research*. [Online], [Retrieved January 15, 2020], https://doi.org/10.1016/j.jbusres.2018.10.004.

Corti, K. and Gillespie, A. (2016), 'Co-constructing intersubjectivity with artificial conversational agents: People are more likely to initiate repairs of misunderstandings with agents represented as human', *Computers in Human Behavior*, 58, 431-442.

Email Marketing and Marketing automation Excellence 2018. Report (2018), SmartInsights and Getresponse.

Gentsch, P. (2019) AI in Marketing, Sales and Service, Palgrave Macmillan, Frankfurt, Germany.

Go, E. and Sundar, S.S. (2019), 'Humanizing chatbots: The effects of visual, identity and conversational cues on humanness perceptions', *Computers in Human Behavior*, 97, August 2019, 304-316.

Gomez-Uribe, C.A. and Hunt, N. (2016), 'The Netflix Recommender System: Algorithms, Business Value, and Innovation', *ACM Transactions on Management Information Systems*, 13:1-13:19.

Heimbach, I., Kostyra, D.S. and Hinz, O. (2015), 'Marketing Automation – What it is and what it is not', *Business & Information Systems Engineering*, 129-133.

Khandelwal, L. (2019), 'Top 12 Programmatic Advertising Trends for 2020 and Beyond'. [Online], [Retrieved December 11, 2019], https://www.martechadvisor.com/articles/ads/programmatic-advertising-trends/?zd_source=editors_pick

LeSueur, J. (2007) Marketing Automation: Practical Steps to More Effective Direct Marketing, John Wiley & Sons, New Jersey.

Marketing Automation Challenges Report 2019 (2019), Automizy.

Mimoun, M.S.B. and Poncin, I. (2015), 'A valued agent: How ECAs affect website customers' satisfaction and behaviors', *Journal of Retailing and Consumer Services*, 26, September 2015, 70-82.

Programmatic. Raport z badania (2015), IAB Polska. [Online], [Retrieved December 4, 2019], https://www.iab.org.pl/wp-content/uploads/2015/09/IABPolska_Programmatic2015_raport_final.pdf

Programmatic Buying Ecosystems (2014), [Online], [Retrieved December 12, 2019], https://www.iab.com/infographics/programmatic-buying-ecosystems/

Przegalinska, A., Ciechanowski, L., Stroz, A., Gloor, P. and Mazurek, G. (2019), 'In bot we trust: A new methodology of chatbot performance measures', *Business Horizons*, 62 (6), November–December 2019, 785-797.

Rauthan, H. (2019), 'How Conversational Chatbots Marketing is the Future of eCommerce'. [Online], [Retrieved January 15, 2020], https://towardsdatascience.com/how-conversational-chatbots-marketing-is-the-future-of-ecommerce-6743268caa11

Rowley, J. (2008), 'Understanding digital content marketing', *Journal of Marketing Management*, 24 (5-6), 517-540.

State of Marketing Automation - Survey Report 2019, Social Media Today.

Sterne, J. (2017) Artificial Intelligence for Marketing: Practical Applications, John Wiley & Sons, New Jersey.

Tien, J.M. (2017), 'Internet of Things, Real-Time Decision Making, and Artificial Intelligence', *Annals of Data Science*, June 2017, 4 (2), 149-178.

Van den Broeck, E., Zarouali, B. and Poels, K. (2019), 'Chatbot advertising effectiveness: When does the message get through?', *Computers in Human Behavior*, 98, September 2019, 150-157.

What is Programmatic Advertising? The Ultimate Guide (2020). [Online], [Retrieved January 16, 2020], https://www.match2one.com/blog/what-is-programmatic-advertising/

Yearly Marketing Survey 2019. How can Marketers Drive Growth Through Innovation? Report (2019), House of Marketing.

Zarouali, B., Van den Broeck, E., Walrave, M. and Poels, K. (2018), 'Predicting Consumer Responses to a Chatbot on Facebook', *Cyberpsychology, Behavior, and Social Networking*, 21 (8), pp. 1-7.

Software Robots in Business Process Automation

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Abstract

The issues of business process automation and robotic process automation are usually associated with using physical solutions in production processes. These solutions enable performing activities independently of human participation. Such an approach limits the possibility of applying automation and robotization mainly to manufacturing and the IT processes which are performed as predefined in software used by organizations. A separate category of IT solutions is the technology of automation of repetitive business processes by means of computer programs — robots emulating human work the so-called Robotic Process Automation or RPA. The aim of this paper is the assessment of the usefulness of application of software robots cooperating in business process optimization. For the purpose of this paper, capabilities of software robots were determined, an implementation was carried out and 3 scenarios of robot work were developed. On the basis of the analysis of implementation works and effects of robot work during the studied period, possibilities and potential applications of solutions automating (supporting) business IT processes in public and commercial institutions in Poland were determined.

Keywords: Robotic Process Automation, Software Robots, Automation of IT Processes

Introduction

Business process automation as an area of management is relatively well described in the literature, however, the vast majority of studies refer to the robotization and automation of processes understood as the application of hardware solutions on production lines. However, over the past few years, solutions related to the use of specialized software that emulates the work of a human have appeared.. The software robot market is currently undergoing changes. This is because the concept of software robots cooperating as assistants to the computer operator has emerged. These changes, combined with a reduction in the prices of the solutions and a shortage of specialists, make the use of RPA economically viable, even for small businesses.

The concept of robotic process automation is based on the use of software robots, otherwise known as artificial intelligence workforce. The RPA technology is used to perform repetitive tasks such as application control, data collection, transfer of data between applications without the use of internal data exchange interfaces, and data operations. In the literature, the concept of RPA is considered in two aspects. The first regards software robots as a piece of software that can be configured by a computer to perform computing tasks. Whereas the second approach considers a software robot as a process consisting of a sequence of actions taken in a logical order, the aim of which is to automate tasks performed without human intervention. According to the available analyses, the main purpose of using such solutions is to save time, costs, improve productivity and increase the quality of work. Hence the need not only to define new areas of software robots' application, but also to determine their suitability for process optimization in terms of cost, time and quality. Therefore, when planning out the study, the following research questions were asked: what areas of activity of the organization's financial services can be automated, how the quality and efficiency of work of employees supported by software robots will change and how long it will take to see the return on the cost of purchasing a license and implementing the software in a small enterprise and public institution.

For the purpose of this study, the areas of application of software robots in public institutions and private enterprises was analyzed in only one area — accounting. The usefulness of application of robots for data transfer, creation of managerial reports, and performing repetitive accounting work was investigated. On the basis of the conducted research, potential areas of supporting work were identified, the quality and efficiency of work were assessed and the economic, time and quality benefits of using software robots as tools supporting accounting work were determined.

The software used for the research was provided by First Byte, under the commercial name — Wizlink. The research was conducted in cooperation with SenseMaking Automation and Robotics, a partner of First Byte, which deals with the implementation of RPA and BPA solutions.

Software Robots

The term robot comes from the Slavic word "robota" which means hard work, effort. Originally, it was used in reference to living beings — artificially produced humans intended for hard work. The term appeared in 1921 and was popularized through Karela Čapka's play entitled "R.U.R". Currently, the term robot refers to a device whose operations can be controlled directly by a human being, or by a pre-defined program, or by defining a set of general rules according to which the robot performs its tasks. The defined rules are translated into the performance of activities using artificial intelligence techniques and methods. The primary idea of using robots is to replace a human being in monotonous, repetitive, fixed actions or those hazardous to human health and life. In such situations, a robot performs work more accurately and more efficiently than a human would. As time passed, the concept of robots began to be applied to autonomously operating devices that receive information from the environment by means of appropriate sensors that process the information and determine the robot's behavior (Linner, Pan, Georgoulas, .2014). Currently, the term robot is used to describe automated machines that perform specific tasks in a real or in a virtual environment. Thus, it can be assumed that a robot is an electronic or electromechanical device programmed by a computer and capable of automatically performing a series of actions regardless of whether these actions are of physical or virtual nature. The condition for the robot to function is an intelligent link between the recognition of environmental conditions, the analysis of information received by the sensors and by means of artificial intelligence transformed into a sequence of activities performed by the effectors. The field of science which deals with the design and construction of robots is called robotics, and it also covers such areas as electronic engineering, computer science and mechanical engineering.

The idea behind software robots used in robotic process automation shall be explained in this paper. Software robots are virtual creations, applications whose task is to support and assist people in activities related to software operation and data analysis (Willcocks, Lacity, 2016). The primary purpose of using such technology is to gain a competitive advantage by eliminating the human labor element in repetitive monotonous activities based on clearly-defined rules. Importantly, these activities do not necessarily have to be directly related to the production of material goods or products, but can also be applied in the processing of information in its broadest sense. Examples of such activities include processes such as: invoicing, shipment tracking, inventory management, report generation and data transfer.

The 2017 research conducted by the Info Global Research Services Group indicates that the use of software robots is aimed at minimizing costs, shortening transaction processing time, increasing productivity and improving compliance in business processes (Brandon Buccowich, 2016). Software robot-based solutions are preferred over dedicated applications due to the immediate and low-cost approach to process automation based on structured rules. The use of software robots does not require re-engineering of the processes, and the result of their implementations is an increase in the quality and efficiency of the processes. The reorganization of databases, modification of applications or use of additional IT solutions is also unnecessary when using software robots. As the research (Moffitt, Rozario, Vasarhelyi, 2018) cited above suggests, software robots are used in all areas of activity, and are particularly useful in the areas of finance, accounting, e-marketing, banking, audit and HR.

The research carried out by Deckard (2018) indicates that the use of software robots allows to eliminate the element of human error in repetitive activities based on business rules and thus achieve an accuracy rate of 100%. In data processing, an additional advantage of a software robot is the robot's short learning time. A digital robot is often referred to as an intelligent, easy to use and cheap workforce, it emulates the actions performed by human resources and, in combination with artificial intelligence, can use learning algorithms in the scope of the tasks performed. Interestingly, in the public sphere, software robots can be used to handle unstructured data with the purpose of detection of fraud, such as money laundering. In the field of computer science, software robots can be used both to perform routine activities such as software configuration and installation or damage detection, and can also serve as tools to test applications for errors as well as efficiency and resistance to human error. Such a wide range of applications is possible due to the fact that software robots, unlike other solutions, emulate the work of a human and perform activities in the same way as a human operating a computer (Willcocks, Lacity, 2015).. Additionally, application of such solutions results in an increase in the quality of performed work through total elimination of irregularities and relatively low cost of work preparation. Taking into account the characteristics of modern software robots, it should be assumed that this market will develop and the solutions will find an ever-increasing range of applications.

Robotic process automation sees practically no use in Polish public sphere institutions. Considering that Polish public institutions make very limited use of standardized interfaces for data exchange, a software robot can be an ideal tool for transferring data between different systems. Currently, most of this type of operations are carried out manually by officials, which results with a large number of errors and a relatively long task performance time.

In case of small businesses, the use of software robots will become possible due to a radical reduction in costs. The implementation of this technology should generate an increase in competitiveness by relieving the workload of employees and management staff. The gained time may be used for other activities. Furthermore, small businesses should be able to increase the quality of products and services and improve customer relations. Typical errors resulting in losses and excessive operating costs should also be eliminated.

Business Process Management

The new development conditions created by the rapidly changing environment of modern organizations give rise to previously unknown risks (Röglinger, Pöppelbuß, Becker, 2012). A stable environment allowing for precise planning of the organization's activities requires the support by dynamic management methods allowing for flexible adaptation to the environment. In addition, the globalization processes observed in recent years, the free flow of knowledge and the development of information technologies form a new digital environment for organizations to function in. All the changes associated with digitization are often described as the digital revolution which leads to social changes, the evolution of the ways organizations are managed, or a new approach to research in management sciences.

A paradigm based on process thinking has become the dominant approach to management in recent years. The existing static, highly structured management thinking has been replaced by a dynamic approach, focused on change and the flow of information. These were already visible in the 1990s in organizations operating in rapidly changing market sectors. In this period, Hammer defined the process as a set of actions requiring input and output with a customer-specific value (Hammer and Champy, 1996). The then-new approach assumed that an organization is a set of processes that permeate one another and therefore a new perspective becomes necessary which would assume processes as the basis for design and management in an organization.

At the end of the 1990s the concept of Business Process Management was formulated, which focused on the revolutionary ideas of introducing changes and linking business processes with IT systems, resulting in a holistic approach to organizations and the introduction of the concept of process as a

basic reference point for the assessment and management of an organization. Despite the fact that the modern process approach was developed over 30 years ago, the term process is still understood quite ambiguously and often used interchangeably with such concepts as: procedure, action, task. R. Müller and P. Rupper describe the process as a chain of activities aimed at generating values corresponding to the customers' requirements (Müller, Rupper, 2000), thus drawing attention to the importance of processes in shaping the value and quality of goods provided to customers. M. Hammer is of a similar opinion, defining process as a group of related tasks whose common result is added value for customers (Hammer, 1999).

An important feature of processes from the point of view of managers was pointed out by T.H. Davenport, who defined process as measurable, structured actions designed to produce a specific product. (Davenport, 1993). Measurability is a particularly desirable feature from a management perspective. It is the element which allows managers to determine the effects of their actions and make decisions.

The process approach is also applied in normative management systems. For example, a process in accordance with ISO 9000:2006 is defined as a set of interrelated or interacting actions (activities) that transform input into output.

The number and variety of approaches, as well as the practice of implementing a process approach requires the classification of processes. Considering that the basic element of process identification is to define the rules and criteria for distinguishing groups of process types. There are many different criteria for dividing and classifying processes in the literature. According to M. Porter two types of processes can be distinguished:

- primary,
- auxiliary,

The primary processes included, inter alia, the following: — "input" logistics, which includes activities related to production preparation, — product manufacturing, — "output" logistics, which includes activities related to sales, — marketing, — after-sales services. Thus, primary processes are those that create value and quality of goods or services offered to customers. Auxiliary processes include those related to management of the organization and human resources, procurement, development, IT support or traffic assurance (Cushman, Wakefield 2015)
The classification proposed by APQC (American Productivity Quality Center), which is included in the Process Classification Framework (PCF), should be considered as the most comprehensive classification of processes. This classification contains 12 categories of processes grouped in two areas of operational processes deemed as key and supporting processes. The classification and characteristics of process groups are presented in Table 1.

Table 1: Process classification framework by APQC

Process group	**Description**
Operating processes	1.0 — Develop a vision and strategy 2.0 — Develop and manage products and services 3.0 — Market and sell products and services 4.0 — Deliver products and services 5.0 — Manage customer service
Management and support processes	6.0 — Manage and develop human capital 7.0 — Manage information technology 8.0 — Manage financial resources 9.0 — Acquire, construct and manage property 10.0 — Manage environment, health and safety 11.0 — Manage external relationships 12.0 — Manage knowledge, improvement and change

Source: author's own study

The modern concept of process management is based on the assumption that activities should be optimized focusing on processes and not functions. In modern organizations, this provides conditions for achieving specific goals, providing effective services and using the potential of employees and other resources. Implementation of process management also requires implementation of IT systems supporting management and automating data processing tasks.

Creating a coherent subsystem in the area of management of process organization, it is necessary to identify those concepts which in a complementary way support the process concept, facilitating its implementation and then reaching process maturity, and as a result — the current management of process organization. The list of selected management concepts complementary to process management is presented in Table 2.

Table 2: Selected key concepts supporting process management

Concept	Description of key competences
System concept	Application of basic recommendations of the concept: multidirectional analysis, static and dynamic system optimization, analysis of subsystems and supersystems, perception of seemingly distant variability, analysis of consequences of local sub-optimization, overall perception of the system
TQM	Philosophy of perceiving the functioning of an organization and its optimization resulting in the current approach to organizational optimization and process optimization aimed at increasing the added value for the customer through quality improvement
Lean Management	Optimization of processes in terms of their flexibility and cost reduction
Project management	Implementation of process management and achievement of process maturity seen as a portfolio of interdependent and related projects; ongoing optimization of process organization through the implementation of optimization projects
Network concept	Process structure seen as a network of interconnected intra-organizational processes, a network of links between organizations performing a given process (*exengeneering*) and a network of links between process resource providers and recipients of generated added value
Virtual concept	Perception of process links in terms of available KSFs (key success factors), deterritorialization of the links, flexibility of process configuration, integrator function
Fractal concept	Navigation tunnels between process links and the end customer (micro and macro tunnels), application of in-process marketing (customer-supplier relationship), self-restructuring, self-navigation, vitality, self-control, mentoring, coaching

Source: author's own study.

Among the management concepts commonly used today, at least a few support or even rely on in-organization process management. The management concepts presented in the table and process management set against them is only the author's selection of concepts and does not include all those that make use of process management. The selected concepts, however, are the representation of the connection between processes and information management, and thus also the area of application of software robots as tools to optimize process execution.

One of the most important areas of process management is process optimization, understood as a method of determining the best solution from the perspective of a specific criterion. In the case of business processes, the most frequently used criteria are time, cost and quality. Another definition states that process optimization is an activity of modelling, analysis and improvement of business and production processes in the private sector and administrative processes in the public sector.

Adopting such a defined concept of optimization, it can be considered that every action which results in an improvement in quality, increase in efficiency, or shorten the process time is in fact optimization. The effect of optimization can be achieved by a number of methods, including the use of hardware solutions, change of production technology, changes in the organization of work or changes in information management. This paper focuses on solutions that make changes in information management methods possible, based on software that replaces or assists humans in handling software interfaces.

Robotic Process Automation

Robotic process automation is a relatively new form of improvement of business processes in organizations. Robotic Process Automation or RPA uses a specific technology and methodology of using a computer based on software which, instead of a human operator, manipulates existing software used in processes. Since 2016, there has been a rapid increase in demand for robotic process automation. This increase is particularly noticeable in the area of office work and operations related to data modification in management support applications. Contemporary software robots are an intelligent and easy-to-use digital workforce that, due to new features and integration with the user interface, is able to perform actions that previously could only be performed by humans.

Both management theorists and practitioners see RPA as a tool that will significantly reduce process costs, increase information flow rate and eliminate data processing errors. The use of software robots for process optimization should relieve the employees from performing rule-based activities and give them more time to perform tasks of higher value. It is assumed that the correct implementation of software robots will allow for the creation of process teams based on active cooperation between humans and robots, and as research (Lacity and Willcocks, 2016) shows, people and robots in such teams complement each other perfectly.

The research conducted in recent years indicates that the natural purpose of using software robots is the non-invasive use of software that imitates the activities performed by the computer operator in the execution of business processes. Until now, the concept of software robots was associated with the construction of large data centers (software robot farms) in which applications were maintained and which were performing work by carrying out repetitive tasks in many locations and in different organizations. This concept was associated with the high price of software and the need to employ numerous programmers who adapted robots to customer requirements. These factors made the use of software robots profitable only for large entities and in situations where they could perform work consisting of thousands of repetitions of the same activities. Nowadays, with the emergence of a new generation of software robots cooperating with humans, it has become possible to robotize activities in business processes. Contemporary collaborative robots are characterized by a relatively low price, a fraction of the price of the robots created on software robot farms, and simple learning processes that do not require specialist knowledge to operate. According to the experience of SenseMaking Automation & Robotics, it takes several hours to train a software robot trainer, assuming that they are an intermediate computer operator. After such training, the operator is able to program any software robot cooperating in the execution of business processes.

For the purpose of determining the suitability of software robots for process optimization, a solution by First Byte, under the commercial name — Wizlink — was chosen. This application is classified as a software robot, and because of its capabilities, intended purpose and cost, it can be considered a new generation collaborative robot. Studies on the usefulness and profitability of this solution were carried out on the basis of analyses of robot use in a company managing resources and housing communities. Design works and tests of robot use for the purposes of performing work in the accounting department of one of the city halls were carried out as well. The data obtained for the purpose of this study was provided by SenseMaking Automation & Robotics partner and certified distributor of the Wizlink robot.

The software-based solution was implemented in the company managing resources and housing communities in December 2019. The company used a trial version of the software to evaluate the benefits of implementation and initial training of employees, and since January 2020 has been using a commercial version. Ultimately, the company decided to purchase a license allowing the robot to be installed on the company's internal server and run it from a remote desktop. Such a solution allowed the robot's engine to be used by many employees and for it to work beyond the company's working hours. During the test period, five scenarios were selected for the robot as shown in Table 3.

Table 3: Robot work scenarios in the company managing resources and housing communities

Scenario name	Average number of executions per month	Time of one execution performed by a human [hh:mm:ss]	Total time of execution performed by a human in a month [hh:mm:ss]	Time of one execution performed by the robot [hh:mm:ss]	Total time of execution performed by the robot in a month [hh:mm:ss]	Difference Between total times [hh:mm:ss]
Generation and printout of payment slips for residents	120	00:04:00	08:00:00	00:01:00	02:00:00	06:00:00
Recording of rent payments in the resource management system	1200	00:02:00	04:00:00	00:00:15	00:30:00	03:30:00
Recording of rent payments in the accounting system	1200	00:03:00	06:00:00	00:00:15	00:30:00	04:30:00
Preparation of financial statements for the management board (4 templates)	4	03:00:00	12:00:00	00:05:00	00:20:00	11:40:00
Generation and submission of tax return forms	7	00:05:00	00:35:00	00:00:20	00:02:20	00:32:40
					Total time savings	26:12:40

Source: author's own research

The table summarizes the results collected during the test period. The robot processed about 70% of the documents that are ultimately expected to be automatically handled under the executed scenarios. As the analysis of the data presented in Table 3 indicates, the time savings during the test period amounted to more than 26 working hours. Furthermore, it should be noted that only 70% of the documentation was processed in automatic mode. Thus, the total time savings can reach almost 40 hours with an unaltered scope of the executed scenarios. The total working time of the robot amounted to 3 hours 22 minutes, therefore it made considerable time savings that could be used for further scenarios, and the working time of the human-employee was 29 hours 34 minutes and 40 seconds

According to the data obtained in the company implementing the solution, the whole process of analyzing the robot's work and preparing work scenarios required 32 hours of consultant's work (4 days), which was valued at PLN 5000. Taking into account that the hourly wage of an office worker

performing tasks carried out by the robot is PLN 34.50, the value of working time saved amounted to PLN 1017.00. Monthly cost of using the robot (licensing fee) is PLN 216.00. Assuming the data presented above, the return on the costs incurred for the purchase of the license and implementation of the robot only in the scope presented above will be seen within 6 months. Taking into account the fact that the robot can be used in further scenarios and that during the test period the robot handled only 70% of the assumed number of scenario repetitions, the cost-return time should be significantly shortened.

For the purposes of this paper, the author conducted research in the city hall of a city with poviat rights. The analysis covered three processes performed by employees of the tax and accounting department. The first process was performed only manually, in the traditional manner. The other two were carried out by means of the software. A description of the processes and effects of the software robot use is presented in Table 4.

Table 4: Designed and tested scenarios of the robot's work in city hall tax and accounting department

Scenario name	Average number of executions per month	Time needed for one execution performed by a human	Total time of execution performed by a human in a month	Time of one execution performed by the robot	Total time of execution performed by the robot in a month	Difference Between total times
Signature of tax decisions	72000 per year	30 s	24 days 75 working days	2 s	1 day 16 hours 5 working days	70 working days
Generating and emailing information on salary components	240 per month	4 min	16godz	20 s	2h 35 min	13h 25min
Submission of tax return forms	240 per month	30 s	12 hours	5 s	20 min	11h 40min

Source: author's own research

The data compiled in the table are the results of research conducted by the author. The data on the number of scenario repetitions and the execution time in the current version were obtained by analyzing the number of documents processed in the office system. For the purposes of testing the robot, the author developed three scenarios of execution of these processes for the robot. It took 8 hours to develop the scenarios. The data determining the robot's working times in particular scenarios were measured during the execution of the scenarios prepared by the author. According to the information made available by the city hall, the monthly cost of work of the person signing the decisions is about PLN 9600. Therefore, using a robot to perform this activity will result in annual savings of PLN 27000.

Conclusions

The examples of using software robots to robotize business processes presented in the paper clearly indicate that the use of such solutions for process optimization is beneficial for both public and business organizations. Assigning even a small amount, just a few percent of the monthly workload,

to a robot is sufficient to cover the costs of software licensing and scenario development. An additional premise indicating the advantage of using software robots in improving public administration processes is the fact that these institutions use standardized procedures and solutions, therefore, with a minimum amount of work, a once developed robot scenario can be adapted to work in different institutions. The specificity of the applied solution makes it particularly suitable for work with spreadsheets, web browsers and for work that requires moving or acquiring data from various applications. The only limitation of the tested solution is that it requires the Windows operating system. However, given the widespread use of this operating system, it can be concluded that this limitation is practically irrelevant in Polish conditions.

References

1. Brandon Buccowich (2016). What is Robotic Process Automation. Accessed dated on 20/6/2018, https://www.laserfiche.com/ecmblog/what-is-robotic-process-automation-rpa/.
2. Cushman & Wakefield (2015), Where in the World? Business Process Outsourcing and Shared
3. Service Location Index.
4. Deckard, M., 2018. Enterprise RPA 2018 Research Everest.
5. Hammer M., Champy J., Reengineering w przedsiębiorstwie, Neumann Management Institute, Warszawa 1996.
6. Lacity, M.C. and Willcocks, L.P. (2016), "A new approach to automating services", MIT Sloan Management Review, September, available at https://sloanreview.mit.edu/article/a-new-approach-to-automating-services/
7. Linner, T., Pan, W., Georgoulas, C., Georgescu, B., Güttler, J., & Bock, T. (2014). Co-adaptation of robot systems, processes and in-house environments for professional care assistance in an ageing society.
8. Muller R., Rupper P.,(2000), Process reengineering, Astrum
9. Moffitt, K. C., Rozario, A. M., & Vasarhelyi, M. A. (2018). Robotic Process Automation for Auditing. Journal of Emerging Technologies in Accounting, 15(1), 1–10. https://doi.org/10.2308/jeta-10589
10. Röglinger, M., Pöppelbuß, J. and Becker, J. (2012), "Maturity models in business process management", Business Process Management Journal, Vol. 18 No. 2, pp. 328-346. https://doi.org/10.1108/14637151211225225
11. Willcocks,L., Lacity, M. and Craig, A. (2015), "Robotic Process Automation at Xchanging," The Outsourcing Unit Working Research Paper Series
12. Willcocks, L., & Lacity, M. (2016). Service Automation, Robots and The Future of Work. SB Publishing, Stratford.

Generating Functionalities in IT Systems Used in Public Administration Based on Reference Processes

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Abstract

The efficiency of provision of public services depends to a large extent on the IT systems used. Developing efficient IT systems that would support the provision of public services through electronic channels is problematic in Polish conditions. In addition, public administration is characterized by a lack of standardization in terms of service provision processes and a high variability of legal conditions. Hence the need to develop tools which, using business process models, will generate functionalities in the IT system. The aim of the article is to present and discuss the concept of an intelligent generator of functionalities for public administration IT systems based on models of reference business processes of public administration.

Keywords: Robotic Process Automation, Software Robots, Automation of IT Processes

Introduction

Progressing globalization, easy access to information, and citizens' growing awareness necessitate ever higher standards of functioning on public administration. Also, the limited amount of public funds makes it necessary to seek solutions that improve and raise both the quality and effectiveness of public services. Furthermore, the development of civil society, and in particular the increase in awareness and free access to knowledge about the functioning of public administration, as well as the requirements of EU and state law, make it necessary for contemporary public administration to change and adapt to the surrounding conditions which undergo dynamic changes themselves. Traditional methods of public management cease to fulfil their functions when placed in the new reality and therefore it is necessary to change the methods and forms of management in the public sector. One of the solutions that seems to meet the requirements of the modern society is the implementation of process management methods and tools that will serve as a basis for developing the functionalities of IT systems. This will allow both to streamline the work of public institutions and for a much quicker adaptation of the IT systems to provide next generation public services.

One of the fundamental problems of modern public administration is the low effectiveness of implemented IT solutions. One of the reasons for this state of affairs in Poland is the low level of standardization of public services and the lack of standardization in terms of management and functioning of public institutions.

In an attempt to find tools and methods of improvement of public administration, the author of this study proposes models of reference processes in the creation of IT systems supporting management and implementation of public services. Therefore, the aim of this study is to present and discuss the concept of an intelligent generator of functionalities for public administration IT systems based on reference models of public administration business processes.

The concept presented in this paper is the subject of current conceptual and technical-implementation work carried out by the author in cooperation with the SenseMaker Software company. In the nearest future, the process of concept evaluation will include public offices in which the modeled functions

of IT systems will be tested. This article is the first in a series of publications presenting the technical possibilities of the proposed solutions.

The article presents an analysis of literature in the scope of applied solutions of process modelling, standardization and creation of reference processes and IT systems. It presents a theoretical model of an intelligent generator of IT system functions, and indicates the conditions of its application and implementation.

The State of It Systems Used in Public Administration

The rapid development of information processing technologies led to the transformation of an industrial society into the so-called information society. This modern form of society is characterized by generating a large amount of information in electronic form (Mainka, 2018). This information is processed by high-performance electronic pieces of technology and transmitted via a global computer network. The most important feature of such a society is the blurring of organizational boundaries through the mutual permeation of the organization's IT systems and the creation of global information space (Mansell, Robin 2009). In the creation of a post-industrial society, one of the most important roles is played by public organizations, and in particular public administration units, whose task is to act as a stimulator of the evolution of society (Farazmand, (2018). This role imposes on public institutions the requirement to create a public information space in which IT systems will enable full access to public information.

The public administration units in Poland are currently characterized by a gross maladjustment in terms of participation in the digital economy. This problem is mainly caused by the lack of uniform standards concerning the IT systems used as well as poor coordination of informatization of the state. The departmentally localized use of solutions and the lack of coordination between the implemented IT projects lead to the creation of information islands between which no exchange of information occurs and which do not meet the requirements set for them. Research carried out as part of numerous projects shows that in the entire country, public offices use over a dozen different IT solutions to perform the same functions (Central Statistical Office of Poland, 2013). This situation makes it impossible to create a public information space supporting the development of the information society and at the same time it significantly increases the operating costs of public administration. Another problem is the lack of standardization of processes in public administration (Osborne, Radnor, Nasi, 2013). This leads to a situation in which the same tasks carried out in different offices require the use of different resources, and therefore the efficiency of implementation of these tasks differs as well, which in the public sector, translates to a waste of public funds. The solution to the problems that should be applied as a priority, as it seems, is the development of standards for administration processes, and then modern integrated IT systems should be built on their basis.

Lack of systemic solutions in the area of informatization of the public sector results in electronic public services of low quality. The basic problem in this area seems to be the lack of cohesion of undertaken actions resulting in the creation of “informatized islands” within public administration, instead of an integrated platform. An additional problem is that the objectives of informatization are unclear, formulated in a vague and unmeasurable manner. The analysis of the current state of informatization of the state and analyses of the effects of the implemented IT solutions shows that these barriers still persist, which means that despite the efforts made, the attempts at building a proper concept of state informatization in Poland failed. Sources of problems with effective informatization of public administration can be found already at the stage of developing the Informatization Strategy. The strategy states that the aim of informatization should be to improve the way citizens' expectations are met, which is a very vague and unclear objective (Security and Privacy Controls... 2013). In addition, the authors of the strategy do not indicate the institutions that should implement it, they did not indicate a coordinator of the informatization process and did not define their responsibilities or rights. During the development of the strategy, the optimization of processes from the point of view of computer technology was omitted, while the integration of departmental solutions was

emphasized. This leads to isolation of systems and lack of automatic exchange of information between departments. The lack of an IT framework that would integrate public administration systems, both in practice and in the strategy, means that the introduced sectoral solutions will have to be rebuilt in the future to enable their integration. This will result in unjustified costs for the state budget. The stimulating role of the state in building the information society in theory assumes that public systems (e.g. identification and confirmation of identity) will be a source of information for commercial systems providing electronic services. This issue was omitted from the state Informatization Strategy.

The basic problems of informatization also include the adoption of the superiority of a paper-based information, which leads to the consolidation of traditional inefficient information processes by means of computer technology. The result is double archiving — in paper and electronic form, both containing full information records.

Inconsistency of law or lack of regulations that will allow for a clear definition of the process that constitutes the basis for developing IT systems. The outdated organizational structure, not adapted to the organizational tasks and processes, is also a part of the problem. This causes problems in identifying process owners and makes it difficult, and often even impossible, to formulate requirements for electronic systems correctly (Glińska, 2016). An additional difficulty for companies developing computer systems is the localized specificity of processes which results in identical processes being executed differently in different offices, requiring the hardware and software to be prepared and configured in a different way.

The lack of central repositories of public information means that a client of an office is required to provide a full set of documents each time despite the fact that the office already has their information. This state of affairs not only slows down the organizational processes but also generates additional costs. Therefore, it becomes necessary to change the law to regulate electronic information repositories of public administration.

From the point of view of process management, it also seems necessary to appoint a process coordinator responsible for the smooth running of a process. Currently, each of the organizations (organizational units) is solely responsible for its part of the process. This leads to a situation where all responsibility for the process is transferred to the client (service recipient). This situation makes the citizen a “biological” integrator of the process carried out by the public administration. In such a situation, the administration adopts the principle that if the integrator malfunctions (does not transfer the information in time), they should not file any complaints against the service. This belief makes public services subordinate to the structure of the administration and not, as it should be, to requirements of the clients (Halcombe, 1997).). Therefore, a comprehensive informatization by establishing or determining an organization responsible for the coordination of processes and defining standards for data exchange seems necessary.

The literature stresses that properly carried out informatization requires the adjustment of processes to electronic support, and not the other way round. Therefore, the first step is to reprogram the processes so that they meet the standards for electronic processing of information. Failure to make such a change, or even the inclusion of the current form of the processes in information technology makes it impossible to separate the place of service provision from the premises of the office. Additionally, it results in the lack of possibility to provide the full extent of the services both in internal administration networks and via the Internet. Solutions, common in the economic sector, consisting in centralization of dispersed functions in order to reduce the costs of their performance cannot be used in public administration with its current methods of operation, which leads to incurring unnecessary costs. The experience of the economic sector shows that centralization of e.g. IT services translates to a severe reduction of costs. The analysis of administration costs indicates an opposite trend.

Both modern IT systems and those that are several dozen years old are currently in use in public administration. This state of affairs makes it impossible to assess the state of informatization in the public sector. The implemented modern solutions cannot be fully used due to the impossibility of integration with older systems. The great variety of solutions and the lack of a common concept of system integration also makes it difficult to integrate systems performing the same functions in different offices. Therefore, in the current state of affairs, it seems necessary to develop a coherent concept of state informatization, to identify and document the existing solutions and to develop a model of service integration.

Public Administration Reference Processes

The essence of a public service is that it must be provided in the same quantity to all consumers within the area of influence of the entity established to provide such service. In the case of public administration, this means that all citizens should be able to benefit equally, whether they pay for these services or not. The majority of public services provided by the administration are of an intangible — informational nature. They are connected with information processing and recording in the information registers. Taking into account the growing awareness of the society and the pressure on services to be provided quickly, it is necessary to provide IT support to the processes of providing public services. Therefore, it would to be advisable to standardize the process of service provision and, consequently, to standardize IT systems with regard to their functionality and the way information is processed. Reference processes should be used as the basis for creating such IT systems.

Analyzing the attempts to implement process management in public institutions, it should be noted that these implementations are projects related to the use of IT tools mainly for process mapping. Efforts to optimize processes based on simulation and analysis are rather seldom. However, the specificity of the public sector results in ill-considered implementation of process management meeting with great internal resistance, an increased workload and, as a result, the implementation activities fail. A common mistake is also an attempt to implement comprehensive process management covering all processes of the organization (Batko, Sasak,… 2012). This approach is often based on experiences from the economic sector, characterized by a high degree of repeatability of activities and functions as well as full control over the manufacturing process and individual functions. On the other hand, public offices do not have full control over the order or manner of performing activities, which usually only allows for partial optimization and thus does not fit into the concept of comprehensive process management. At the same time, it should be remembered that public institutions can only carry out the tasks and in the manner prescribed by law. For this reason, the concept, scope and form of implementation of process management must be different in the public and commercial sectors.

Properly conducted process management implementation in public administration should consist of the following stages.

1. Decision to implement process management methods and tools,
2. Establishment of an implementation team,
3. Organization and training of the team,
4. Development of a concept defining the objectives and scope of implementation,
5. Development of a mapping methodology and process definition,
6. Establishment of a list of processes and their owners,
7. Establishment of criteria for the selection of processes for optimization,
8. Establishment of a schedule of implementation work,
9. Conducting implementation activities.
10. Evaluation of the implementation.

As a result of implementation of process management in a public institution carried out in such a way, a database of processes is obtained, which may constitute a basis for generating functionalities

and rules of IT system operation. In the case of the Polish public administration, a problem exists related to the lack of standards of providing public services. In order to improve the quality of such optimized processes, the course of the processes and resources involved should be compared with those of other offices. This can be done using standard process modeling tools utilizing database solutions. Data on the course of processes in various public administration offices were collected in numerous EU-funded projects. Using databases of business process models of public administration and the methodology of creating public administration reference processes presented, among others, in the publication entitled "A *new paradigm of public administration functioning*" (Batko, Sasak,… 2012). The reference models of processes developed in accordance with this methodology should be implemented in IT systems of public offices.

Intelligent Generator of IT System Functionalities

The concept of using reference models to build IT systems is particularly important in public administration. This importance stems not only from the fact that the activities of public institutions become standardized, but also allows for the integration of databases and administration IT systems. A problem commonly observed in public administration is the frequent change of regulations which are the basis for the functioning of offices. Therefore, it is necessary to constantly monitor changes in regulations, modify the processes and introduce changes in IT systems. The course of implementing changes in IT systems is quite time-consuming. This is because it requires not only the work of analysts, coding, but also testing and verifying code correctness. These activities also are quite expensive, therefore the use of intelligent tools that generate system functionalities or only support the process of generating IT systems can significantly reduce the costs of adjusting systems, shorten the time of implementation work and avoid mistakes at the stage of designing and implementing IT solutions.

The implementation of process management results in the fact that making changes in the way tasks are performed entails the improvement of the organization and the efficiency of IT systems. In the case of public organizations which implemented process management, each change of regulations, law or change of the scope or manner of task execution involves a modification of processes. Modification of processes is always directly related to the need to check and possibly reconfigure IT systems. In the case of new tasks or extensive changes in the already implemented ones, it is usually also necessary to modify the IT systems by adding functionalities, modifying database structures and the data itself. The form and organization of processes also requires adapting to the specifics of electronic data processing.

Comprehensive process modelling allows for linking process activities with resources involved in their execution and automatic generation of reports and process documentation. The proper procedure in a situation where the use is IT support for modeling or process improvement assumes that by means of tools supporting modeling, a new process is created with the assignment of necessary resources to it. When modelling or improving processes, it is important to remember that they should be designed with electronic documents as the primary data carrier, which may involve changes in the resources of the organization. On the basis of the modeled process, appropriate UML diagrams can be automatically generated in the modelling support systems to configure or develop the IT systems supporting the process. Such diagrams are analyzed and, on their basis, programmers create or modify functionalities of IT systems. Lack of time and the need to commence processes in a modified version imposed by law, usually results in the omission of a thorough analysis and programmers implement the IT system functionalities according to the guidelines received from the public offices.

Modern programming tools allow to generate applications based on UML models, thus the automatically generated diagrams can be used as the basis for such systems to generate or modify relevant application functionalities. This significantly reduces the time of preparation of IT systems and as a result of implementation of the entire process.

In the proposed model, the process of creating and developing the concept consists of three stages. The first stage consists of analyzing and recording the applied IT and legal solutions, identifying barriers and factors supporting implementation of new solutions. In the second stage, a theoretical concept is defined with the necessary changes. The third stage involves the implementation, monitoring and improvement of the solution.

The need to integrate a number of levels of public administration requires an initiative to develop concepts at the highest levels of government. The team coordinating the development of the concept of informatization should be an interdisciplinary one and have sufficient powers to propose a change in the law. The most important part of the initial stage is to identify information needs. The correctness of performance of this activity depends on the proper development of informatization directions. Mistakes made at this stage can only be corrected to a small extent during public consultations. The initial concept of informatization developed should be subject to public consultation in order to verify the correctness of informatization directions and priorities. The consultations will indicate areas in which the existing IT solutions should be modified first.

In second stage, the choice and definition of the reference structure of the database may be problematic. Currently, in Poland, despite numerous attempts and IT projects, no database exists that could serve as a reference base for all public services

In the third stage, making changes to the law may give rise to certain difficulties, which will be related to the political nature of certain decisions. Building a reference base, as experience in this area shows, may be a critical problem. The process of personnel changes and the elimination of psychological barriers will also require a careful approach. The conclusions from the monitoring of the implementation and the analyses of society's needs should form the basis for future development of the concept.

Implementation of the proposed concept of informatization will enable full integration of public administration services in IT systems. The key element allowing for the integration of services is to provide access to a reference database along with developed ICT standards for public administration IT systems. The model of public administration services integration is presented in Figure 2.

Currently, there are several solutions used in Poland which act as integrators of public administration services. This state of affairs is related to the lack of task coordination between the various departments. This results in “island” solutions that integrate a part of the systems and services. Political criteria, on the other hand, lead to solutions being chosen in accordance with the current policies or lobbies rather than the best solutions in terms of technology.

The proposed model assumes that the Intelligent Public Administration Service Integrator (Pl. *Inteligentny Integrator Usług Administracji Publicznej* or IIUAP) handles the service integration. This integrator is an IT solution using knowledge base solutions, whose task is to standardize and provide access to public administration services. The information contained in the state informatization policy is the integrator's configuration guidelines. On the basis of this information, priorities for the services provided, the directions for their improvement and development are established. This information is transferred to companies offering software solutions so they can make the necessary improvements. Solutions that do not comply with the informatization policy are automatically blocked and in extreme cases removed from the database of possible solutions.

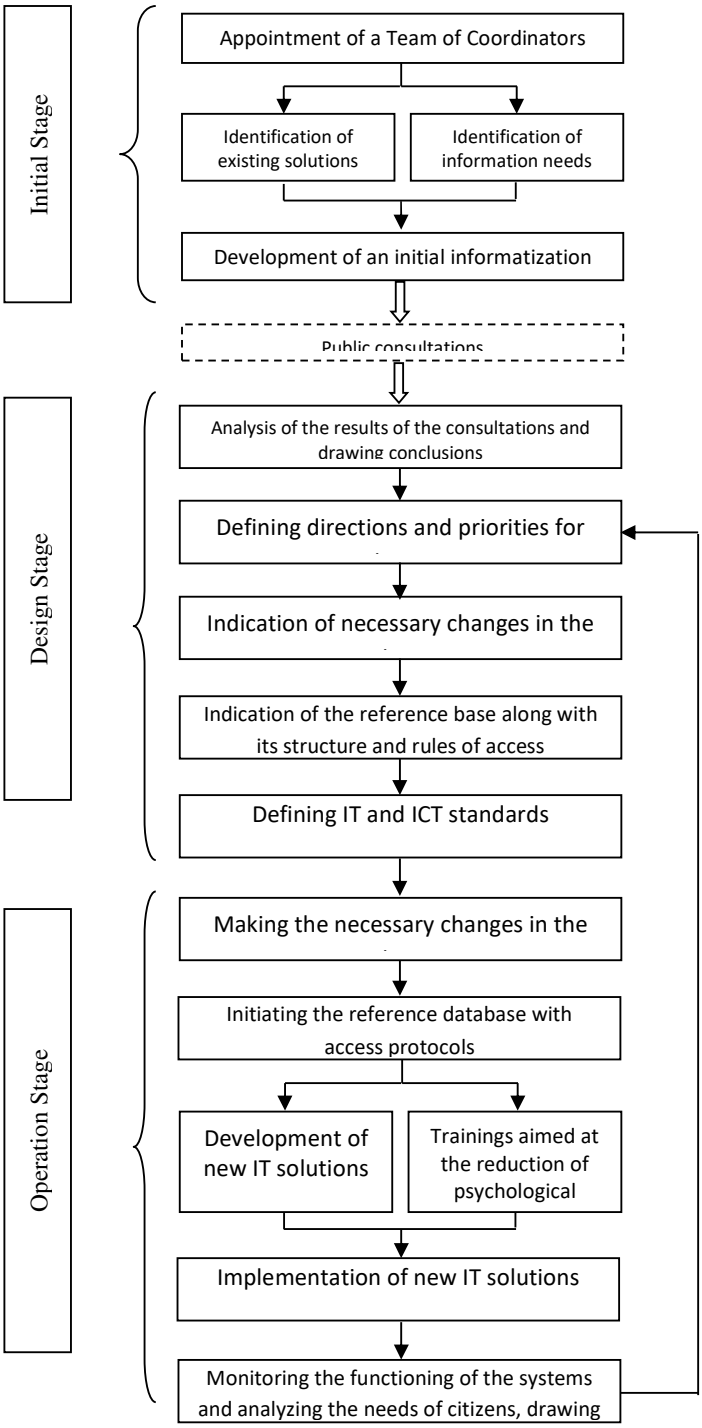

Figure 1: Process of developing an informatization concept.

Source: author's own study.

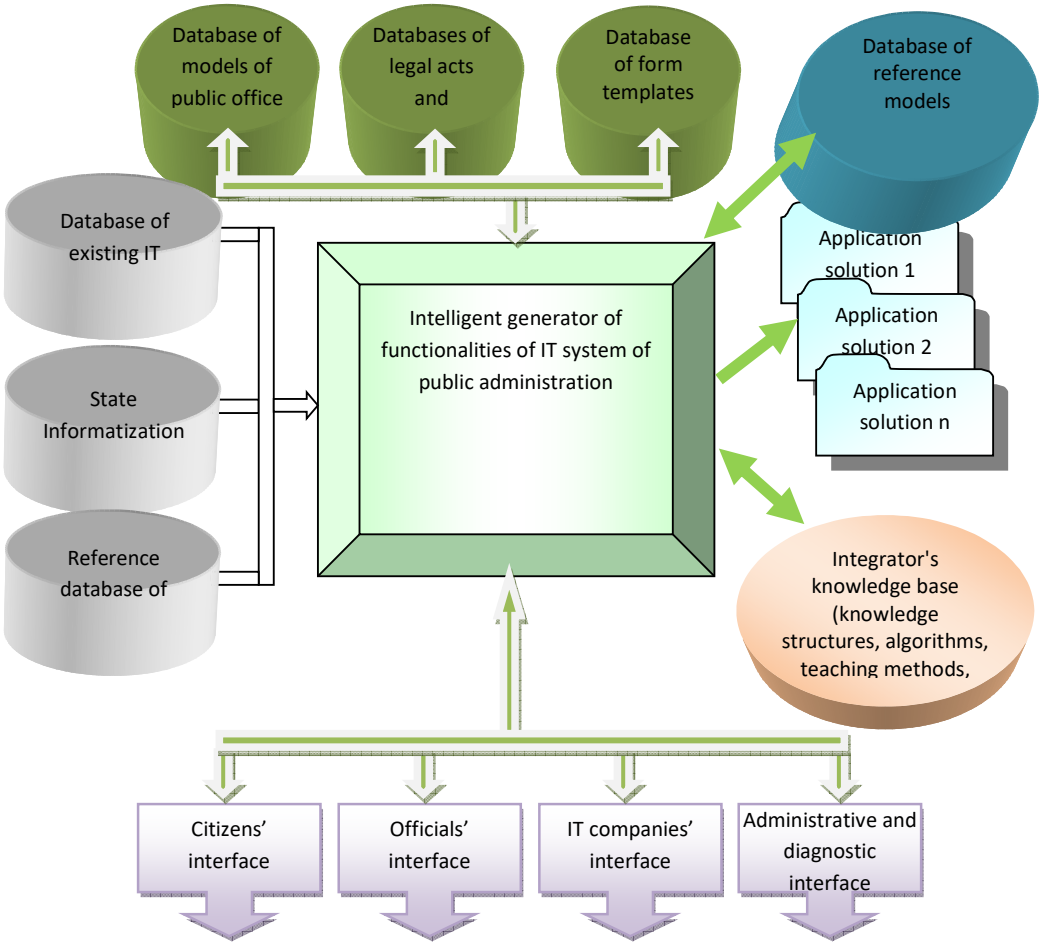

Figure 2: Service integration model

Source: author's own study.

The database of IT standards is developed in the course of creating and modifying the informatization policy. It forms a set of standardized procedures and protocols for information exchange between public administration systems. The role of the integrator is to ensure that the solutions offered within the integrated system are compliant with the standards. The third source of information external to the Integrator is the reference database. This database is used to authenticate persons and institutions using the system. Therefore, it is necessary for it to ensure that the transaction is legally sound. Such a role can only be played by a state-run database.

The Intelligent Public Administration Service Integrator (IIUAP) uses internal databases. The first group of databases are databases of form templates containing official, current and archival document templates, a database of legal acts and interpretations containing legal information about services offered on the platform. These databases are complemented by a database of public solutions that include IT implementations of service provision tools for which copyrights are held by the state or are openly distributed.

The second group of databases are application solutions — programs providing services. This database is updated and supplemented by commercial companies through the commercial companies' interface. Companies wishing to offer their solutions submit the solution to the Intelligent Public Administration Service Integrator, and after verification of correctness and compliance with the standards, the Integrator places the solution in the database and makes it available for use. Companies can remove the solution at any time and the Integrator can block it if it no longer meets the standards. This way, the software made available in this database will always be safe and compliant with the requirements.

The proposed solution uses field-specific public administration databases. Through ICT links it is possible to carry out transactions in these databases without the physical intervention of officials. This solution allows the system users to use the services at any time. The role of the integrator in this case is to verify the rights to take a specific action, provide an IT tool, secure transactions, ensure data accountability.

The efficiency of the integrator is determined by its knowledge base. The knowledge, algorithms, methods, procedures and functions contained therein allow for high autonomy of operation. A properly constructed knowledge base can analyze of offered solutions, monitor users' activity, detect security breaches and suggest changes.

System users connect via group interfaces. First, each user is authorized and authenticated using the reference database. On this basis, they are assigned appropriate rights and level of access to the application and information. Users can use different roles in the system, e.g. officials can also use the role of citizens. The choice of a role is made after the authorization process and before the granting of rights.

The use of the proposed solution is aimed at integrating the solutions used thus far in the provision of public administration services. The multitude of solutions and the lack of standardization make the electronic provision of public administration services more difficult and often even impossible. The implementation of the system should enable the coordination and cooperation of the various systems and their adaptation and integration with international systems.

Summary

The formation of the information society as well as the emergence of state-of-the-art communication solutions necessitate changes in the manner public services are provided. This process has accelerated considerably in recent years. Lack of well-thought-out solutions results in incurring unnecessary costs for informatization, which with limited resources makes the public administration inefficient. Therefore, it is necessary to change and organize the electronic aspect of public administration services. The proposed solution is one of the possible ways to improve the functioning of public administration.

The greatest threat to the implementation of solutions improving and integrating public administration IT systems is the politicization and low IT awareness of public managers. Moreover, it is common practice in the public sector to develop and build IT systems independently. Such activities often lead to the creation of systems using proprietary solutions, which, for many reasons, may become completely unusable and the data contained in them may not be available for use with other solutions.

The process of integrating administration services absolutely requires the development of uniform standards of information management in the public sector. These standards should provide guidelines for building IT systems and automating information exchange between all organizations in the public sector. It is also necessary to appoint an informatization coordinator, who will be responsible for setting standards of information exchange and rules of cooperation of IT systems in the public sector.

The proposed solution is one of the possible implementations of the concept of public service integration.

References

1. Batko R., Sasak J., Burczyński T., Figiel Sz., Ignacik I., Kożuch A.J., Płocharczyk A., Salamonowicz M., Zastempowski M,. (2012), The new paradigm of public administration, Olsztyn, IDEICO
2. Central Statistical Office of Poland, (2013), Public administration information systems, Data sources for statistical surveys, Warsaw
3. Farazmand A., ed., (2018), Global Encyclopedia of Public Administration, Public Policy, and Governance, Springer International Publishing AG, part of Springer Nature https://doi.org/10.1007/978-3-319-31816-5_1425-1
4. Glińska, E., (2016). Expertise on the topic: Monitoring the quality of public services, incl. by supporting the creation of indicators of the type of quality of governance, quality of life on a national scale, supporting the dissemination of so-called good commune indices and benchmarking included in the Action Plans IP / IP2 for 2009. https://www.wup.pl/images/uploads/VII.
5. Halcombe, R.G. (1997). A Theory of the Theory of Public Goods. The Review of Austrian Economics, 10(1)
6. Mansell R., ed., (2009) The information society. Critical concepts in sociology. Routledge, London, UK.
7. Mainka A., (2018), Smart world cities in the 21st century, Boston, MA: De Gruyter.
8. Osborne SP, Radnor Z, Nasi G., (2013), A new theory for public service management? Toward a (public) service-dominant approach. Am Rev Public Adm43(2):135–158
9. (16) (PDF) Administrative Politics: Context, Roles, and Process. Available from: https://www.researchgate.net/publication/324744162_Administrative_Politics_Context_Roles_and_Process [accessed Jan 30 2020].
10. Security and Privacy Controls for Federal Information Systems and Organizations JOINT TASK FORCE TRANSFORMATION INITIATIVE, (2013), National Institute of Standards and Technology
11. Farazmand A., ed., (2018), Global Encyclopedia of Public Administration, Public Policy, and Governance, Springer International Publishing AG, part of Springer Nature https://doi.org/10.1007/978-3-319-31816-5_1425-1

Visualization of Knowledge About the Multi-Agent Supply Chain

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Abstract

Knowledge visualization includes, among others, issues such as visualization of scientific research results. It enables creating added value and extracting new knowledge from data sets. Visualization is to help better understand the data, as well as discover new facts and dependencies that have been hidden until now. The purpose of observing and scientific research is to map that will allow determining the existing knowledge and defining the boundaries of this knowledge, and thus determining the further direction of knowledge development about the multi-agent supply chain.

Keywords: Supply Chain, Cluster Analysis, Semantic Maps, International Research Trends, Multi-Agent

Introduction

The use of mapping and visualization opens new research perspectives in inter- and transdisciplinary fields. Thus, the analysis allows you to examine the structure of science or a field or discipline and show its future trends. Semantic maps (concept maps) are a relatively new form of knowledge presentation. They enable the acquisition of both necessary and unique information. Based on one set of resources, you can create many knowledge maps that allow browsing and graphical visualization as well as filtering and searching.

Knowledge visualization is a powerful approach to analyzing various bibliometric networks. Over time, scientists began to analyze larger and larger networks, which led to the use of advanced information technology for visualization (van Eck & Waltman, 2014). The most commonly used unit for mapping or visualizing knowledge are documents, understood as scientific papers, patents, etc. Knowledge visualization maps are developed for various purposes. Let the examples be: mapping the evolution of entrepreneurship as a research field in the years 1990–2013 (Chandra, 2018), analyzing trends in the circular economy (Homrich et al., 2018), analyzing security culture research (van Nunen et al., 2018), analysis of research on multi-criteria decision making (Yu et al., 2018).

The purpose of visualizing knowledge about the concept of supply chains and the multi-agent paradigm is to answer the research questions posed: (1) What are the international research trends in the concept of supply chains and the multi-agent paradigm over the years?; (2) what are the most important conceptual clusters created on the historiographic map of scientific publications, in terms of the concept of supply chains and the multi-agent paradigm, indexed in WoS in the years 1996–2019?.

The structure of work is as follows. Part one discusses the concept of a Multi-agent solutions in supply chain. Part two presents the research method used. The third part contains the results of the visualization of knowledge about the multi-agent supply chain.

Literature Review

Nowadays, changes are faster and more unpredictable. Enterprises must respond quickly to challenges and opportunities in the business world (Saniuk, Saniuk & Caganova, 2014). High speed manufacturing involves significant investment (Jasiulewicz-Kaczmarek & Bartkowiak, 2016; Waszkowski, 2019). Multi-agent solutions have been recognized as a promising area of next-generation knowledge. An important element of survival in these dynamically changing conditions is "agility", in particular by creating flexible supply chains. Agility should be understood here as the rapid creation of a complex supply chain system based on multi-agent technology. The centralized and hierarchical organization of the traditional supply chain means that a significant part of the created system can be limited as a result of one emerging threat or failure. Multi-agent solutions ensure the naturalness of design and implementation of an efficient, intelligent and distributed system. They are by nature strongly time-oriented and highly responsive (Shen, Hao, Yoon & Norrie, 2006, p. 415; Kowalski & Chlebus, 2017). At the same time, they still focus on cost and quality. Multi-agent systems are typical collective behavior in network systems with a group of autonomous mobile agents (Sitek & Wikarek, 2018). These systems strongly rely on communication and cooperation between the involved enterprises (agents, objects). The activities and interactions of each enterprise are clearly represented in multi-agent models. Agent-based solutions are the preferred technology that allows flexibility and dynamic coordination of spatially dispersed business entities cooperating in supply chains. And due to the similarity of the supply chain system and multi-agent systems, the latter can be used to model or actually perform tasks in supply chain management.

Research Methods

Semantic maps are generated from various text sources, based on individual words extracted from scientific titles, descriptive entries or descriptors assigned by the publisher provided by the database provider (e.g. ISI keywords) (Börner et al., 2005). Then the so-called clusters are configured on the created knowledge and science maps. Cluster analysis (CA) is used to create clusters. The result of cluster analysis is the division of a finite set of objects into clusters (subsets). The finite set X consists of n objects and the finite set A contains m attributes that describe the properties of the object $x \epsilon X$. A grouping of clusters is created during grouping (Jain & Dubes, 1988):

$C = \{C1, C2, ..., Cc\}$

Grouping is the basic activity that a researcher performs for cognitive purposes. Cluster analysis involves many different classification algorithms that are designed to organize a very large amount of information and data into handy, meaningful stacks or categories, called clusters (Börner et al., 2005). As a result of the cluster analysis, it is possible to divide a heterogeneous set or set of elements into homogeneous, "similar" subsets. As a result, the objects are grouped into set A and the second set not A. Each object belongs to exactly one cluster - this assumption concerns "hard" grouping. The created conceptual clusters are created using the similarity or distance function (Jain et al., 2009). In this case, the goal is to divide the set of objects into the number of subsets.

As reported by Börner et al., Clusters should be internally highly uniform and externally highly heterogeneous. Highly internally uniform clusters mean that the assigned test objects (researcher / documents / magazines) are similar. Externally highly heterogeneous means that the examined objects are not similar to other cluster objects. Hence the similarity function is expressed by the statement: the closer the examined objects are, the more similar they are. Therefore, the goal is to maximize similarity within the cluster and minimize similarity between clusters (Börner et al., 2005). Conceptual clusters are a set of closely related objects, also called nodes, in terms of themes. Each node in the network is assigned to exactly one cluster. The number of created clusters is determined based on the so-called parameter of resolution. The higher the value of the resolution parameter, the greater the number of clusters created (Waltman, van Eck & Noyons, 2010). Each created cluster is marked with a different color, which makes it easier to read the created map of knowledge on the studied topic. As a result of cluster analysis it is possible to: (1) identifying clusters by distinguishing a

group of similar objects that intensively coexist and attempting to generalize their features, (2) designation of objects with isolated values that do not match other objects, (3) the discovery of an unexplored and unknown structure of the analyzed data.

For the purpose of the work, VOSviewer version 1.6.9 was used, which was made available on August 29, 2018. The main advantage of VOSviewer, which decided to choose this and not another IT tool, is the continuous process of updating the software functions and a relatively easy way to use it. A special positive feature is that the program completely focuses on the visualization of bibliometric networks.

Due to the very large number of scientific and research works related to supply chain research, it is almost impossible to review all published research. The literature study defined on the basis of the concept of "Supply Chain" covered 49 331 scientific publications, without taking into account the supplementary words and identifying the type and type of publication. After narrowing searches, 672 scientific papers were obtained.

Based on the bibliometric analysis according to the Systematic Literature Review (SLR) method and the local base obtained, a division into four periods was made regarding the development of the concept: (1) emergence period (1996–2000); (2) definition period (2001–2007); (3) concept maturity period (2008–2009); (4) stabilization period (2010–2019).

These periods were covered by analysis and visualization according to the Systematic Literature Network Analysis (SLNA) method introduced by Colicchia and Strozzi (Colicchia & Strozzi, 2012). This stage of research can be carried out in three steps: (1) review planning, (2) conduct a review, (3) review reporting.

In order to carry out the analysis of knowledge visualization with the help of keyword co-occurrence maps, a set of keywords was separated, which concerns the created local database with a total of 672 scientific papers. A separate set of concepts was subject to the process of "normalization". This means that the specified keywords have been standardized as to form (lowercase / uppercase) and the letter 's' at the end of the keywords has been removed. Noun expressions have been transformed from plural to singular, e.g. "agents" into "agent". This way many plural and singular keywords have been unified.

As a result, a network was created based on keywords that appear at least five times (i.e. according to the default value of the software defining the threshold for the minimum occurrence of keywords). As a result, a total of 1,682 keywords were listed that describe the scientific papers identified in the local database over the years 1996–2019. Among them was a set of keywords that take into account the minimum occurrence of keywords. Their total number is 91 expressions. On their basis, a series of semantic maps were developed for specified periods of concept development and for the entire period under study.

Research Results

Each keyword as an object on the semantic map has a different color. The colors allow you to group keywords that results from the similarity and relationship of concepts and the compatibility of the research topic. Keywords that have the same color belong to the same cluster. So they tend to be more similar, coexistent and matching than keywords of different colors. Thus, each prepared semantic map has its own unique arrangement and grouping.

The first period, the so-called emergence period, was chosen for the keyword-based analysis. It was in the years 1996–2000. During this period, 13 scientific papers from the study area were published. The emergence of the research trend in the concept of supply chains and the multi-agent paradigm falls in 2000. A total of 18 keywords were identified during this period. Due to the fact that the

emergence period concerns few scientific publications for the purposes of building the semantic map, a minimum threshold of keywords has been set at 2. This means that keywords that meet this condition have occurred at least twice in the list. Of 27 keywords related to identified research papers from the emergence period, three met established guidelines.

Keywords that meet the set condition are presented on the semantic map (Fig. 1). One cluster was specified for the examined period, which is a scientific, thematically coherent area. It was based on three identified keywords. These keywords are internally highly uniform. There is a greater co-occurrence relationship between the two keywords "Agent" and "Multi-agent System". This can be identified by the thickness and color saturation of the link that combines both concepts.

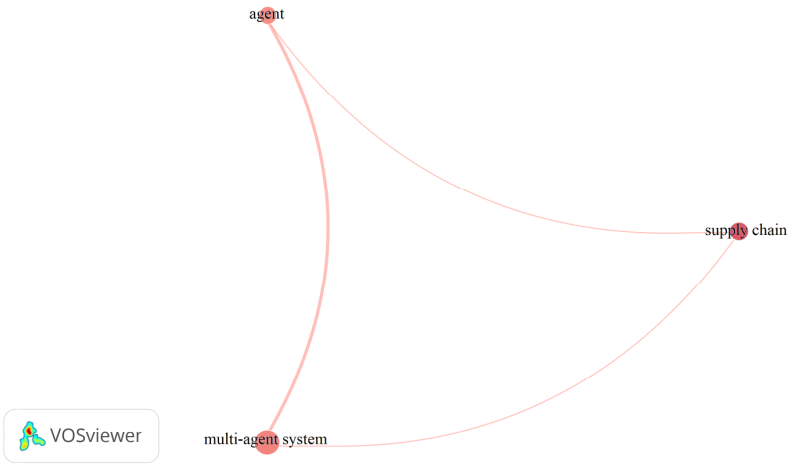

Fig. 1: Visualization of the semantic network in the period 1996–2000; research area for the keywords "Supply Chain" and "Multi-agent"; Own development using VOSviewer

The evolution of the approach under investigation began with the keyword "Agent" (1998), and at the end of the period under study there appears the expansion to the keywords "Multi-agent System" and then "Suppy Chain" (2000). The transition from the term "agent" to the "Multi-agent System" falls around mid-1999. Researchers indicate that the multi-agent system is composed of four components: (1) agents, (2) tasks, (3) organization and (4) information infrastructure.

The years 1999 and 2000 are a period of shifting the multi-agent approach to the area of supply chains. Kaihara points out that every business organization in the supply chain represents independent entities with often conflicting and competing product requirements. It may also have localized information relevant to other interests (Kaihara, 1999, p. 394). During this period, researchers are looking for the answer to the question: how can industrial networks coordinate their activities more effectively? The answer is that collaboration has an evolutionary advantage that is still embedded in social norms. From the indicated period, business units and enterprises should be treated as agents who should be assigned autonomy in making decisions. It was also found that streamlining supply chains is a key mechanism to increase profitability and improve competitive position in the market. The multi-agent paradigm fits into the concept of supply chains.

In the second development period, called the definition period, falling between 2001 and 2007, 461 concepts have already been identified, of which 18 meet the minimum keyword threshold, which was set at level 5. In the period under study, 4 conceptual clusters were identified (Tab. 1).

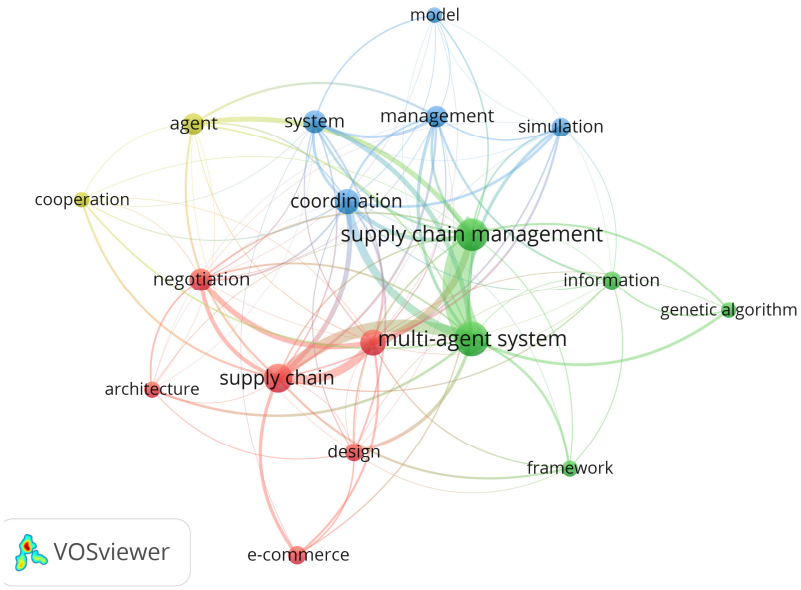

Fig. 2: Visualization of the semantic web in the period 2001–2007; research area for the keywords "Supply Chain" and "Multi-agent"; Own development using VOSviewer

In the second period of concept development, the direct link and coexistence of three keywords identified in the first period was maintained. These are (Fig. 2): (1) "Supply Chain" from cluster 1 (red), (2) "Multi-agent System" from cluster 2 (green), (3) "Agent" from cluster 4, (yellow). Therefore, it should be confirmed that the scientific structure of the studied area is changing. It results from the development of the concept. Three keywords identified during the emergence of the concept, in the next currently analyzed period 2001–2007 are concepts from which there are three differently perceived conceptual clusters. These clusters are internally highly uniform and externally highly multidirectional. On the semantic map (Fig. 2) there are several objects representing clusters - the "best" and reference objects. And so for cluster 1 it is the keyword "Supply Chain", for cluster 2 they are the concepts of "Multi-agent System" and "Supply Chain Management", while for cluster 3 it is the concept of "coordination" and for cluster 4 "Agent ".

Table 1 shows the number of occurrences of the indicated keyword in parentheses. The keyword with the highest number of occurrences is "Multi-agent System" for which the number of occurrences is 72. It is also the node with the largest total strength of 60. This means that this node shows the coefficient corresponding to the total strength of connections between the identified keywords . "Supply Chain Management" is the second strong keyword on the semantic map.

Table 1 : Identified clusters based on keywords in the period 2001-2007

Cluster 1	Cluster 2	Cluster 3	Cluster 4
Architecture (5)	Framework (6)	Coordination (26)	Agent (15)
Design (9)	Genetic algorithm (5)	Management (15)	Cooperation (5)
e-commerce (9)	Information (9)	Model (5)	-
Multi-agent (27)	Multi-agent System (72)	Simulation (11)	-
Negotiation (18)	Supply Chain Management (60)	System (18)	-
Supply Chain (39)	-	-	-

Cluster 1 refers to aspects of the application of multi-agent solutions in distributed systems, which are supply chains. Scientific publications therefore refer to the need to redesign business processes and practices with business partners in supply chains. For this purpose, a general architecture is designed to develop an experimental environment whose purpose is to design and test decentralized and at the same time advanced systems. The architecture used allows combining agent-based technologies and other fields of knowledge, e.g. tools based on operational research (Monteiro, Roy & Anciaux, 2007; Relich, Świc & Gola, 2015), applications of elements of game theory (Choi & Han, 2007).

Scientific publications from cluster 2 touch, among others, problems that solve genetic algorithms. Due to the high complexity and dispersion of supply chains, the use of genetic algorithms is appropriate and guarantees the most reliable solution in the case of: (1) optimization, (2) searching, (3) learning, (4) process modeling. Unlike traditional methods to optimize many partial problems, genetic algorithms (Burduk & Musiał, 2017) allow you to find a better solution that allows you to respond to dynamic environmental changes in real time, and as a result increase the efficiency of supply chains (Park, Choi & Kang, 2007, pp. 705–706).

Coordination and cooperation play an important role in managing complex supply chains. Hence, in cluster 3, concepts are grouped that focus on the topic of coordination and management of distributed systems. Coordination mechanisms are also tested (Yu, Qiu-yue & Ying, 2007). On the other hand, Yang indicates that simulating and then optimizing and monitoring the functioning of the supply chain using an agent has become a method of testing this supply chain (Yang, 2007).

There are 4 keywords grouped in the cluster that touch upon cooperation issues. Research from this period shows that cooperation in supply chains has two different forms. The first assumes that cooperation between business partners can take the form in which each link has equivalent decision-making capacity. All links work together with other links to achieve a common goal. The second form assumes that each link in the supply chain has limited decision-making power that corresponds to its field of activity.

The third stage studied is the concept maturity period. It falls for 2008–2009. It contains, on average, the largest number of scientific publications (60 scientific papers) that take into account the concept of supply chains and the multi-agent paradigm. A total of 358 concepts were identified during this period. Based on these identified terms, four conceptual clusters based on identified keywords are listed.

Continuing the analysis of direct connections and co-occurrence of three keywords identified in the first period on the semantic map for the concept maturity period, it can be observed that: (1) the terms "Multi-agent System" and "Agent" are located in cluster 1 (red), (2) the concept of "Supply Chain" is in cluster 2 (green). The "Multi-agent System" and "Agent" keywords are relatively significantly related. They are directly related to each other and occur in the same cluster 1. There is a relatively high degree of co-occurrence of the indicated keywords in published scientific papers. The presented semantic map (Fig. 3) also shows the connection of the keyword pair "Multi-agent System" and "Supply Chain". They are located in two different clusters, 1 and 2, respectively. These concepts, although they occur in different clusters, are strongly connected. It can also be seen that the pair of terms 'Agent' - 'Supply Chain' has no direct connection. This confirms the supposition that the concept of supply chains and the multi-agent paradigm is still evolving. Thus, the structure of the studied area is changing further.

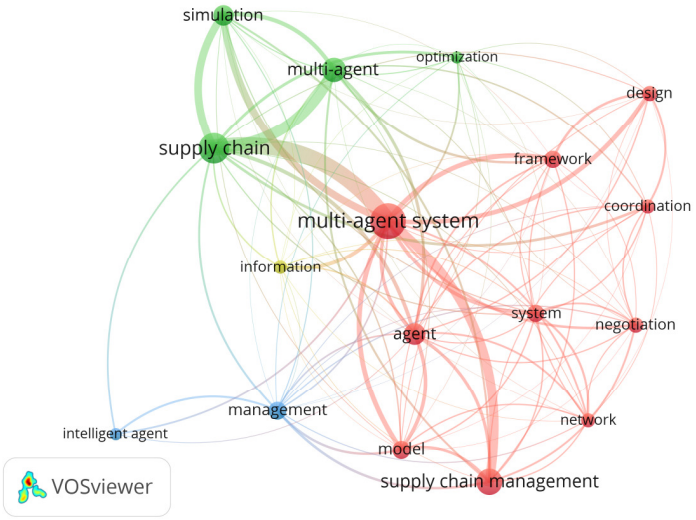

Fig. 3: Visualization of the semantic web in the period 2008–2009; research area for the keywords "Supply Chain" and "Multi-agent"; Own development using VOSviewer

Table 2: Identified conceptual clusters based on keywords in the period 2008–2009

Cluster 1	Cluster 2	Cluster 3	Cluster 4
Agent (16)	Multi-agent (20)	Intelligent agent (5)	Information (6)
Coordination (7)	Optimization (5)	Management (11)	-
Design (8)	Simulation (14)	-	-
Framework (10)	Supply Chain (32)	-	-
Model (11)	-	-	-
Multi-agent System (43)	-	-	-
Negotiation (8)	-	-	-
Network (7)	-	-	-
Supply Chain Management (23)	-	-	-
System (10)	-	-	-

Table 2 presents the clusters identified on the basis of the semantic map (Fig. 3). Four conceptual clusters are listed. The number of objects that make up them varies. There are as many as ten keywords in cluster 1 that are systemically and homogeneously linked. This means consistency, inseparability and complementarity of keywords present in this cluster; the concepts listed complement each other and focus. There is also cluster 4, which is a one-cluster. A one-piece cluster means that no other concepts with maximum similarity and at the same time maximally differentiate them from other concepts from other clusters were not found in the analyzed keyword set.

The set of keywords from the period 2008–2009, called the concept maturity period, can be divided into four clusters (Tab. 3). Cluster 1 contains the most keywords. It also contains concepts of high strength, such as "Multi-agent System" and "Supply Chain Management". Cluster 1 refers to the systematic perception of network modeling and its coordination. Research confirms that the Multi-agent System paradigm used in the supply chain seems to be a natural choice (Wang et al., 2008, p. 2687) to manage this type of distributed, dynamic and complex systems that are inseparably involved in the coordination and coherence of many entities. Is a modern technique of modeling a distributed system.

A growing interest in the problem of supply chain optimization and simulation can be observed in the analyzed period (cluster 2). This is a new area that is gaining importance due to the desire to both locally and globally optimize complex systems (Kazemi, Zarandi & Husseini, 2009).

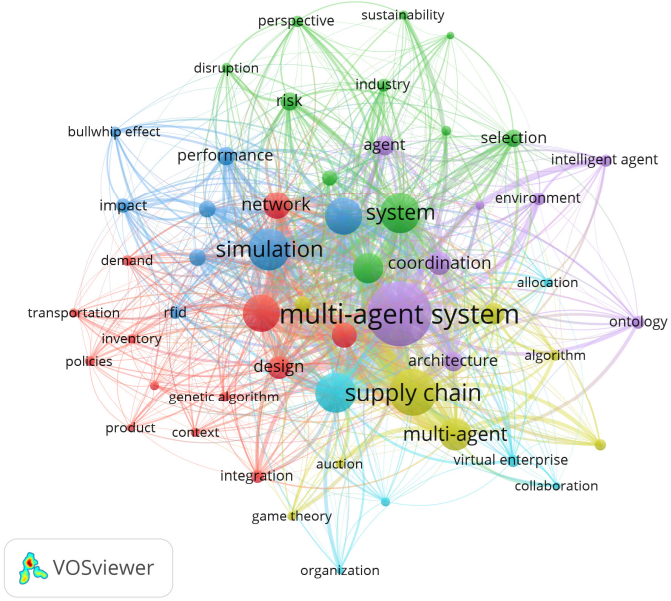

Fig. 4: Visualization of the semantic network in the period 2010–2019; research area for the keywords "Supply Chain" and "Multi-agent"; Own development using VOSviewer

In the last of the specified development periods, which falls in the period 2010–2019, called the stabilization period, 1,171 keywords from the studied area have already been identified. As many as 54 of them meet the minimum keyword threshold (5). During this period, 6 conceptual clusters were identified (Fig. 4). They are presented in Table 3.

In the fourth period of concept development, the direct link and coexistence of the three keywords identified in the first period was maintained. Those are: (1) "Supply Chain", which is located in cluster 4 (yellow), (2) "Multi-agent System", located in cluster 5 (purple) and (3) "Agent", located in cluster 5 (purple). The concept of "Agent" from cluster 1 from the previous period of concept development was reallocated to cluster 4. A similar situation occurs with respect to the concept of "Multi-agent System". This concept in the previous period was also allocated in cluster 1 (currently – cluster 5). It can be assumed that these concepts lose their importance and relevance. Whereas the concept of "Supply Chain" was assigned to cluster 4; in the previous period it was allocated in cluster 2. This shows further evolution of the research structure.

Table 3: Identified conceptual clusters based on keywords in the period 2008–2009

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
Context (6)	Decision support system (14)	Bullwhip effect (8)	Algorithm (8)	Agent (22)	Allocation (6)
Demand (8)	Disruption (7)	Dynamic (17)	Auction (6)	Architecture (22)	Collaboration (5)
Design (28)	Framework (45)	Impact (13)	Cooperation (9)	Coordination (29)	Manufacturing system (6)
Genetic algorithm (8)	Industry (11)	Information (17)	Game theory (6)	Environment (11)	Organization (5)
Integration (11)	Perspective (9)	Management (63)	Logistics (15)	Flexibility (6)	Supply Chain Management (73)
Inventory (6)	Risk (20)	Performance (9)	Multi-agent (51)	Intelligent agent (10)	Virtual enterprise (10)
Model (63)	Selection (18)	RFID (9)	Negotiation (25)	Multi-agent System (154)	-
Network (37)	Sustainability (6)	Simulation (76)	Supply Chain (94)	Ontology (11)	-
Optimization (33)	Sustainable Supply Chain (5)	-	-	-	-
Policies (7)	System (71)	-	-	-	-
Product (5)	Uncertainty (7)	-	-	-	-
Strategy (6)	-	-	-	-	-
Transportation (6)	-	-	-	-	-

The structure of the studied area in the fourth period, called the stabilization period, is spectacularly widening. New concepts appear which have not been used in this area before. As a result, the identified set of keywords shows mosaic different dimensions and areas of the studied area. They form the unity of the studied area, taking into account diversity and multiplicity. This unity creates a complex network of concepts and subject areas. Such a complex structure of knowledge could not exist, function and evolve without being composed of diverse and even opposing concepts. This shows that knowledge is rapidly spreading to other areas of knowledge during this period. There is a very intensive flow of knowledge to other areas of science, which means that existing knowledge is absorbed and applied. As a result, the studied area is significantly enlarged into many conceptual clusters. It shows that the analyzed concepts are well established in science. Table 3 presents the conceptual clusters identified on the basis of the semantic map (Fig. 4). Six were listed in the last analyzed period of concept development. The number of objects that make up them is not as diverse as in the previous period.

Cluster 1 deals with issues of solutions based on agent models, which can be used to analyze solutions at the strategic level as well as policy and infrastructure of logistics systems (Holmgren et al., 2012). In a conceptual cluster, 2 keywords take into account problems of unreliability or reliability of systems. Risk is a common phenomenon and results from uncertainty about the future. Risk, disruption, uncertainty are becoming the main factors limiting the achievement of a high level of supply chain efficiency and disturbing the current functioning of cooperating in supply chains of enterprises.

Discussion of the Results

The concept of the supply chain and multi-agent paradigm has been emerging since 2000. It could not exist, function and evolve without being composed of heterogeneous and interdisciplinary and even opposing concepts. The conducted research shows that in the area of research on the concept of the supply chain and the multi-agent paradigm, the heterogeneity, multi-facetedness and multi-directionality is an unquestioned phenomenon. The question is also a desirable phenomenon? It is highly probable to emphasize that unification of such a complex area of research is impossible. It results from the features of modern science and knowledge, which in dominant cases is interdisciplinary (Mäki, 2016, p. 8). Research shows that the concept of the supply chain and the multi-agent paradigm is from the outset an interdisciplinary area that consists of various research fields and disciplines. The heterogeneity, richness and mosaic dimensions of the study area seem to be a natural solution here, which contribute to the further development of knowledge and science. If there is a concept of diversity in science, then you can expect alternative solutions that: can compete with each other, or can complement each other.

As a result of the conducted research, international research trends for the period 1996–2019 were identified: (1) multi-agent solutions used to optimize and reduce reliability and support a sustainable industry; (2) management and coordination of complex and distributed supply chains; (3) modeling, structure or architecture of multi-agent systems; (4) simulations using multi-agent systems, including complex, adaptive systems; (5) multi-agent solutions and intelligent solutions; (6) integrating solutions for agile and flexible; (7) ontology and semantics; (8) algorithms and allocations.

Conclusions

Visualization of knowledge about the concept of supply chains and the multi-agent paradigm presented in the following semantic maps also shows and confirms the occurrence of the law of progressive differentiation, i.e. complexity. The development of the multi-agent supply chain concept goes from slightly differentiated generality (Fig. 1) towards increasing transparency (Fig. 2) and differentiation (Figures 3 and 4). The transition from one form to another is obviously staggered and can be reconstructed. This evolution requires energy that is associated with the creative efforts of many researchers. Scientific theories and research models are being built and their empirical verification is carried out. This evolution leads to a growing unification and differentiation of knowledge, which at the same time becomes more complex and more precise, and its conceptual casters better communicated.

Acknowledgment

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References

1. Börner K., Chen C. & Boyack K.W. (2005) Visualizing knowledge domains. Annual Review of Information Science and Technology, 37(1), 179–255.

2. Burduk A. & Musiał K. (2017) Genetic Algorithm Adoption to Transport Task Optimization. M. Graña, J. López-Guede, O. Etxaniz, A. Herrero, H. Quintián & E. Corchado (eds.), Advances in Intelligent Systems and Computing, vol. 527, Cham, Springer, 197-205.

3. Chandra Y. (2018) Mapping the evolution of entrepreneurship as a field of research (1990–2013): A scientometric analysis. PLOS ONE, 13(1).

4. Choi J.H. & Han I. (2007) Combinatorial auction based collaborative procurement. Journal of Computer Information Systems, 47(3), 118–127.

5. Colicchia C. & Strozzi F. (2012) Supply Chain risk management: a new methodology for a systematic literature review. Supply Chain Management: An International Journal, 17(4), 403–418.

6. Eck N.J. van & Waltman L. (2014) Visualizing Bibliometric Networks. Y. Ding, R. Rousseau & D. Wolfram (eds.), Measuring Scholarly Impact: Methods and Practice Cham: Springer International Publishing, 285–320

7. Holmgren J., Davidsson P., Persson J.A. & Ramstedt L. (2012) TAPAS: A Multi-agent-based model for simulation of transport chains. Simulation Modelling Practice and Theory, 23, 1–18.

8. Homrich A.S., Galvão G., Abadia L.G. & Carvalho M.M. (2018) The circular economy umbrella: Trends and gaps on integrating pathways. Journal of Cleaner Production, 175, 525–543

9. Jain A.K. & Dubes R.C. (1988) Algorithms for Clustering Data. Englewood Cliffs, New York: Pearson College Div.

10. Jain V., Wadhwa S. & Deshmukh S.G. (2009) Select supplier-related issues in modelling a dynamic Supply Chain: potential, challenges and direction for future research. International Journal of Production Research, 47(11), 3013–3039.

11. Jasiulewicz-Kaczmarek M. & Bartkowiak T. (2016) Improving the performance of a filling line based on simulation. [in:] ModTech International Conference - Modern Technologies in Industrial Engineering IV, IOP Conf. Series: Materials Science and Engineering 145.

12. Kaihara T. (1999) Supply Chain Management with Multi-agent paradigm. 8th IEEE International Workshop on Robot and Human Interaction, 394–399.

13. Kowalski A. & Chlebus T. (2017) Multiagent Managerial Model of Technical Infrastructure Used at Ore Mining. Bajo J. et al. (eds.), Highlights of Practical Applications of Cyber-Physical Multi-Agent Systems. Communications in Computer and Information Science, vol. 722. Springer, Cham, 187-196.

14. Mäki, U. (2016) Philosophy of interdisciplinarity. What? Why? How? European Journal for Philosophy of Science, 6(3), 327–342.

15. Monteiro T., Roy D. & Anciaux D. (2007) Multi-site coordination using a Multi-agent System. Computers in Industry, 58(4), 367–377.

16. Nunen K. van, Li J., Reniers G. & Ponnet K. (2018) Bibliometric analysis of safety culture research. Safety Science, 108, 248–258.

17. Park B.J., Choi H.R. & Kang M.H. (2007) Multi-agent Based Integration of Production and Distribution Planning Using Genetic Algorithm in the Supply Chain Management. P. Melin, O. Castillo, E.G. Ramírez, J. Kacprzyk & W. Pedrycz (eds.), Analysis and Design of Intelligent Systems using Soft Computing Techniques Berlin, Heidelberg: Springer, 696–706.

18. Relich M., Świć A. & Gola A. (2015) A Knowledge-Based Approach to Product Concept Screening. S. Omatu et al. (eds.), Distributed Computing and Artificial Intelligence, Advances in Intelligent Systems and Computing, vol. 373, Springer, Cham, 341-348.

19. Saniuk A., Saniuk S. & Caganova D. (2014) Control of strategy realization in metallurgical production. [in:] 23rd International Conference on Metallurgy and Materials Location: Brno, CZECH REPUBLIC, 1876–1881.

20. Shen W., Hao Q., Yoon H.J. & Norrie D.H. (2006) Applications of agent-based systems in intelligent manufacturing: An updated review. Advanced Engineering Informatics, 20(4), 415–431.

21. Sitek P. & Wikarek J. (2018) A multi-level approach to ubiquitous modeling and solving constraints in combinatorial optimization problems in production and distribution. Appl Intell, 48(5), 1344–1367.

22. Waltman L., Eck N.J. van & Noyons E.C.M. (2010) A unified approach to mapping and clustering of bibliometric networks. Journal of Informetrics, 4(4), 629–635.

23. Waszkowski R. (2019) Low-code platform for automating business processes in manufacturing. IFAC-PapersOnLine, 52(10), 376–381.

24. Yang C.-H. (2007) Collaborative mechanism of manufacturing enterprise Supply Chain based on Multi-agent. New York: IEEE.

25. Yu F., Kaihara T., Fujii N., Sun C. & Yang W. (2015) A multi-attribute multi-item negotiation mechanism of Supply Chain networks between buyers and sellers. International Journal of Production Research, 53(20), 6143–6160.

Formation of A System of Indicators for Monitoring the Sustainable Development of a Mono Town (Company Town)

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Abstract

For almost the entire time the human being has existed as a species, human society has remained in a state that is significantly different from modern reality. So the processes of significant processes of urbanization and enlargement of cities began in Great Britain at the end of the 18th century, in France in the 19th century, in Japan from the second half of the 19th century, in Russia in the second half of the 20th century, and in Latin American, Asian fears continue until so far. Currently, the majority of the world's population 54% currently resides in cities. At the same time, the level of urbanization depends on a specific region and country, so in Japan it reaches 91.3%, and in India 31.3%. Cities become not only the place of compact residence of the majority of the world's population, but also world centers of culture, art, as well as industrial centers and centers of innovative development. Despite the visible benefits of urbanization, there are a number of negative aspects associated with this process. These include the emergence of mono towns (city towns) or company towns, i.e. settlements that were founded by enterprises in order to provide the latter with labor resources. Such settlements are typical for countries that have experienced a wave of industrialization - the United States, Germany and Russia, and after its completion significantly reduced the volume of industrial production. The result of the completion of the wave of industrialization was a catastrophic drop in employment in mono towns (city towns), a sharp increase in social tension. The solution to the problem of mono towns (city towns) is possible by differentiating the lines of activity of the population of these mono towns (city towns), including through the development of innovative processes in these cities. The implementation of this process is impossible without the creation of an effective system of indicators monitoring the sustainable development of a mono town (city town).

Keywords: Innovation, Development, Socio-Economic Development, Mono Town, Company Town, Sustainable Innovative Development, Indicators, Monitoring

Introduction

For almost the entire time the human being has existed as a species, human society has remained in a state that is significantly different from modern reality. So the processes of significant processes of urbanization and enlargement of cities began in Great Britain at the end of the 18th century, in France in the 19th century, in Japan from the second half of the 19th century, in Russia in the second half of the 20th century, and in Latin American, Asian fears continue until so far. Currently, the majority of the world's population 54% currently resides in cities. At the same time, the level of urbanization depends on a specific region and country, so in Japan it reaches 91.3%, and in India 31.3%, figures 1.

Cities become not only the place of compact residence of the majority of the world's population, but also world centers of culture, art, as well as industrial centers and centers of innovative development. Cities grow not only in breadth, but also in height, each year the number of buildings with a height of more than 150 meters or 40 floors increases by 8% per year. Statistics show that the 600 largest cities account for about half of global GDP, while it is planned that the volume of GDP produced by large cities will increase, and these cities will provide up to 60% of future GDP growth worldwide.

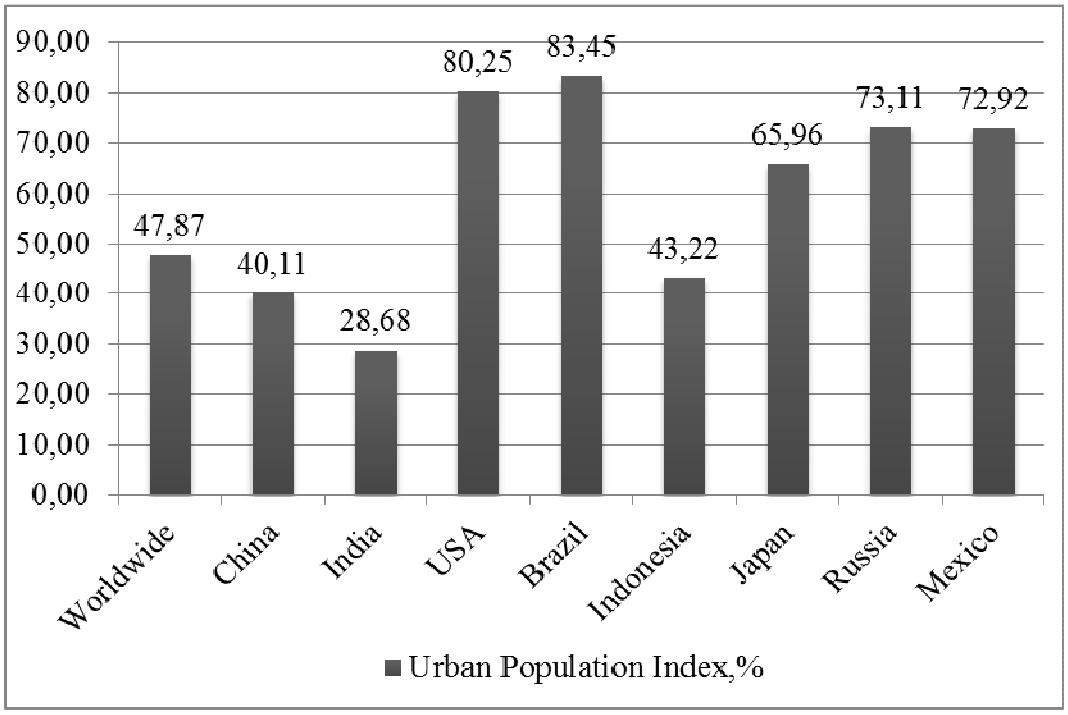

Figure 1: Urban Population Index, %

According to the forecasts of analytical agencies, more than 25% of the able-bodied population of the planet will live in the largest six hundred cities, and also about a quarter of a million households will be formed in these cities, which will create additional demand for consumer goods and services. As for the world population, the UN estimates that, by 2050, 66% of the world's population will live in cities (United Nations, 2020).

Formulation of the Problem

Despite the visible benefits of urbanization, there are a number of negative aspects associated with this process. First, urbanization entails significant environmental problems (OECD, 2012). Also, the rapid urbanization of the world, although it is a symbol of social evolution, poses numerous problems associated with intensive energy consumption, endemic congestion, saturated transport networks, air and water pollution, toxic waste disposal, resource depletion, social inequality and vulnerability, and declining public health and etc. (Bibri, 2013).

Similar conclusions are made (Jabareen, 2006), who notes that the current form of development of modern cities affects people, natural resources, habitat and climate.

The fact that a number of problems associated with the rapid growth of cities have arisen is confirmed by a number of researchers (Neirotti, De Marco, Cagliari, Mangano, & Scorrano, 2014). According to them, the rapid growth of cities threatens the environmental, economic and social sustainability of these social entities.

Also among the problems associated with the growth and development of cities should include the emergence of mono towns (city towns) or company towns, i.e. settlements that were founded by enterprises in order to provide the latter with labor resources. Such settlements are typical for countries that have experienced a wave of industrialization - the United States, Germany and Russia, and after its completion significantly reduced the volume of industrial production. The result of the completion of the wave of industrialization was a catastrophic drop in employment in mono towns, a sharp increase in social tension. The solution to the problem of mono towns is possible by differentiating the lines of activity of the population of these mono towns, including through the development of innovative processes in these cities.

Also, one of the ways to solve the problems of modern cities, including mono towns as their varieties, should include sustainable development. So (Bulkeley & Betsill, 2005) note that in order for cities to better cope with growth challenges, they need to adopt long-term sustainable development approaches. Implementation of long-term approaches to sustainable development, according to (Antrop, 2004), is a prerequisite for mitigating the consequences of the adverse effects that these cities may face as a result of the expansion of the capabilities and structures of urban systems that accompany urban growth.

At the same time, a number of researchers (Colldahl, Frey, & Kelemen, 2013), in addition to the environmental and social problems of modern cities, consider the obsolete (non-automated, non-digital) infrastructure within cities, which creates technical and physical problems, to be an important problem. This is also relevant for company towns, which received the main potential during the industrial era, and in the new era of industrialization are significantly lagging behind in their development (Troyanskaya & Tyurina, 2019).

The proposed approaches to the sustainable development of urban settlements have great potential for solving problems or providing solutions for moving towards urban sustainability. This is noted by researchers such as (Batagan, 2011; Höjer & Wangel, 2015; Kramers et al., 2014). The growing relevance of finding and making smart solutions to the problems of modern cities is noted (Nam, & Pardo (2011).

Sustainable development of a city, including a mono town, is impossible without creating an effective system of indicators that monitor the sustainable development of a mono town.

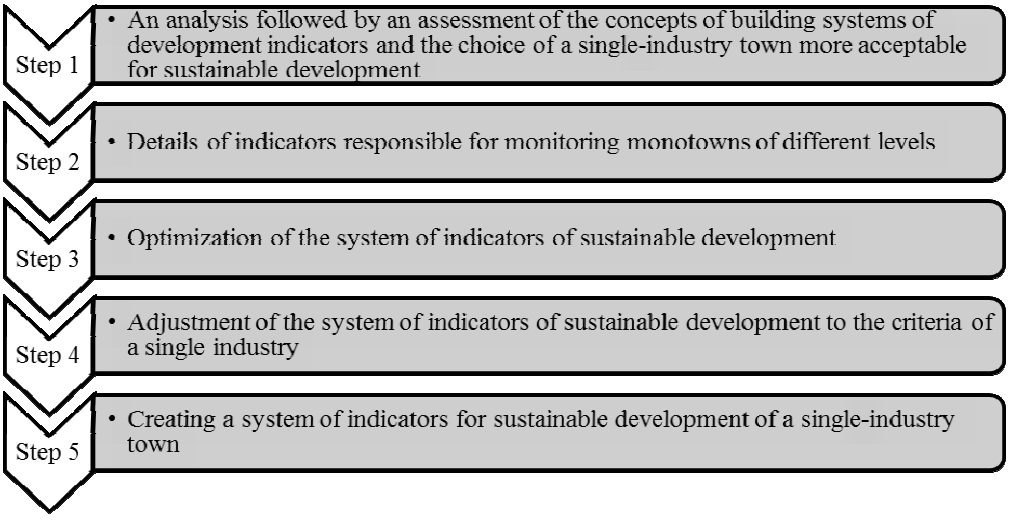

Figure 2: Stages of developing a system of indicators for sustainable development of a mono town (company town)

As practice shows, an effective set of indicators that monitor the sustainable development of a mono town has not yet been developed to assess the socio-ecological and economic situation of individual

industrial cities and determine their development. This, in turn, explains the lack of a well-implemented urban management policy.

The development of a system of indicators for the sustainable development of a mono town should be carried out in 5 stages, figure 2.

Results

We carry out the selection of indicators in accordance with the above stages of the formation of a system of sustainable development of a mono town.

The list of requirements that must be met by a system of indicators of sustainable development of a mono town:

- maximum coverage of the areas of socio-ecological-economic system;

- have a balanced hierarchy of subsystem indicators

- use data from government statistics;

- should include indicators that may be applicable for different levels (state, regional, local);

- have characteristic and sensitive indicators;

Consider the existing systems of indicators of sustainable development that can be applied to assess the sustainable development of a mono town.

At the moment, there are the following scorecards that can be used for this assessment:

- indicators of the UN Commission on Sustainable Development;

- A set of indicators developed by the World Bank;

- indicators of the Organization for Economic Co-operation and Development (OECD) and the World Health Organization (WHO).

Briefly describe each set of indicators.

The UN system of indicators for sustainable development is more consistent with the objectives of the study. This system meets the specified selection criteria, and also contains methodological instructions for each indicator with detailed recommendations for calculation, sources of the required statistical information, criteria for the importance of the indicator in the issue of sustainable development and interaction with other indicators of the system.

The World Bank indicators are more focused on assessing the resource provision of the territory and the efficiency of resource use, therefore, they are unlikely to be suitable for the formation of a system of indicators for the sustainable development of a mono town.

In the framework of this study, the indicators of the standards of Economic Co-operation and Development (OECD) and the World Health Organization World Health Organization (WHO) cannot be called priority, as they reveal only certain aspects of sustainability, namely the stability of demographic development and the sustainability of the social subsystem, respectively.

Consider a system of indicators for sustainable development of the UN

This system of indicators contains:

- input indicators - or indicators of driving force. They characterize human activity, as well as processes and resources that affect the sustainable development of a mono town;

- status indicators. They characterize the current state of those or other components of the development of subsystems of the studied territory.

- output indicators or response indicators. They allow you to make a political choice or some other way of responding to changes in the current state.

It should be noted that earlier the system of indicators of sustainable development according to the UN methodology consisted of more than 134 indicators, however, the complexity of the process of assessing sustainable development by these indicators and its high cost led to the fact that the system was optimized to fifty indicators. Moreover, 50 of these indicators were in turn included in a wider list of 96 indicators of sustainable development.

In our opinion, this particular system of indicators uses the most accessible data of official statistics.

Further, the system of indicators used in the UN methodology had to be adapted for a mono town. For this, it is necessary to analyze other monitoring systems of mono towns in Russia.

Among the systems for assessing cities and settlements, one can single out the indicator system of the Ministry of Regional Development of Russia and the indicator system specially developed in Russia for the implementation of the “Comprehensive Plan for the Long-Term Socio-Economic Development of Novy Urengoy for the Period Until 2020”.

The system of indicators of the Ministry of Regional Development of Russia is built on the principle of “topic / problem-indicator”, in which each problem has a specific indicator.

This system is aimed at monitoring such areas as:

- the possibility of an alternative application of labor released as a result of stopping / reducing the production rate of the city-forming enterprise, labor resources;

- public order, as an indicator of an open form of manifestation of social tension of the population;

- the possibility of diversification of the economy of the city; balance of the city budget.

The disadvantage of the indicator system of the Ministry of Regional Development of Russia is the lack of a subsystem of environmental indicators, which is important for a mono town, since most of the Russian mono towns have environmental problems. Thus, the principle of priority of the problem of mono towns is implemented in the system of indicators of the Ministry of Regional Development of Russia in a truncated form without fully disclosing all the characteristics of the qualitative and quantitative characteristics of the Russian mono town.

The system of indicators for the implementation of the "Comprehensive Plan for the Long-Term Socio-Economic Development of Novy Urengoy for the Period Until 2020" is quite extensive. At the same time, as a more detailed analysis of the ratio of indicators in the system, it can be revealed that this program does not reflect part of the principles for assessing the system of sustainable development, and also does not allow to elicit the result of their interaction.

The analysis of Russian systems for assessing the sustainable development of mono towns has revealed a number of shortcomings requiring improvement.

In accordance with Figure 2, we will adapt the system of indicators of sustainable development to the criteria of a mono town. For this, we use the indicators of the UN Commission on Sustainable Development on Sustainable Development, indicators of the Organization for Economic Cooperation and Development (OECD) and the World Health Organization (WHO), as well as Russian methods for assessing the sustainable development of mono towns.

We outline the most important development factors that should be used in the monitoring system under development: - the quality of life of the population directly affects the level of social tension in the mono town, namely:

- the standard of living of the population;

- the existence of other areas of labor;

- imbalance in the distribution of income;

- the presence of residents of real estate assets;

- working conditions of the population;

- life support.

Thus, the level of social tension can be called an integral social phenomenon, which is formed on the basis of information about the dissatisfaction of the population of the mono town with their social, economic and political situation.

At the last fifth stage, we define a list of indicators of sustainable development of a mono town according to the methodology of H. Bossel (Bossel, 1992).

As a basis, we will use the UN Sustainable Development Commission's system of indicators for sustainable development.

To maintain comparability of sustainable development assessment methods, indicators will be selected based on development factors that were identified in the previous step. figure 2.

As a result of the selection for the system for assessing the sustainable development of a mono town, the following set of indicators can be formed.

We will form the first set of indicators on meringue indicators reflecting and evaluating sustainable development in accordance with the UN sustainable development methodology.

This block will include the following indicators.

1. The poverty index of the population (an indicator of the control of the level of social tension).

2. The provision of comfortable housing (an indicator of the control of the level of social tension).

3. The share of utilized and recycled household and hazardous waste (an indicator characterizing the degree of environmental load as a result of the economic development of the territory of a mono town).

4. The cost of the territory’s internal natural resources (an indicator characterizing the level of the natural resource base of a mono town).

5. Debt burden on the city budget - the indicator is based on the external debt / GDP indicator, adjusted to the level of the municipality.

6. The coefficient of sectorial differentiation in wages is the Gini index, adjusted for the aspects of the municipality;

7. The possibility of employment, taking into account aspects of the municipality;

The next block is based on social indicators of the organization of economic cooperation and development Economic Co-operation and Development (OECD), this block includes the indicator of

the proportion of the population (employed in the city's economy) engaged in professional activities in adverse working conditions.

Also, to assess the well-being of the city from the point of view of public health, we will include in the set of indicators an indicator that is borrowed from the system of indicators of the World Health Organization (WHO) - the dynamics of social diseases.

As a result of the selection, a methodology was developed for assessing the sustainability of innovative development consisting of 9 indicators, which allows one to effectively assess the sustainable innovative development of a municipality that falls under the definition of a mono town.

Conclusions

The current development trend of mankind suggests that the level of urbanization of the population will grow every year, and the role of cities in the production of products and services will grow every year. Cities in the future will be the main centers of cultural and scientific development providing the future progress of human development. However, any socio-economic processes carry two components, one of which is positive, and the second carries a negative component. One of the negative features of urbanization is that any negative changes in the city related to the economy, social sphere and healthcare lead to significant social tension. A special case is a company town specially created for a specific production. The practice of municipalities shows that the emergence of problems in the company of the founder of a single-industry town automatically generates a surge of social tension and the subsequent degradation of the city. At the same time, most sites of company towns (company town) can effectively use their infrastructure for the development of this municipality in a different direction. This process should be accompanied by monitoring the sustainable development of a company town (company town) which is implemented through a system of indicators of sustainable development. The proposed system of indicators will ensure the monitoring of the sustainable development of single-industry towns during the shift strategy of their development and deindustrialization.

References

- Aguilera, G., Galan, J. L., Campos, J. C., & Rodríguez, P. (2013). An accelerated-time simulation for traffic flow in a smart city. FEMTEC, 2013, 26.
- Ahvenniemi, H., Huovila, A., Pinto-Seppä, I., & Airaksinen, M. (2017). What are the differences between sustainable and smart cities? Cities, 60, 234–245.
- Angelidou, M. (2014). Smart city policies: A spatial approach. Cities, 41(S1), S3–S11.
- Antrop, M. (2004). Landscape change and the urbanization process in Europe.
- Aron L. (2009) Darkness on the Edge of Monotown. The New York Times. 2009-10-16.
- Batagan, L. (2011). Smart cities and sustainability models. Informatica Economica, 15, 80–87.
- Batty, M., Axhausen, K. W., Giannotti, F., Pozdnoukhov, A., Bazzani, A., Wachowicz, M., et al. (2012). Smart cities of the future. The European Physical Journal, 214, 481–518.
- Belanche, D., Casaló, L., & Orús, C. (2016). City attachment and use of urban services: Benefits for smart cities. Cities, 50, 75–81.
- Bibri, S. E. (2013). ICT for sustainable urban development in the European Information Society: A discursive investigation of energy efficiency technology, Master Thesis. School of Culture and Society, Malmö University.

- Bosel, H., Bruenig, EF. (1992). Natural resource systems analysis: ecological and socio-economic systems and sensitivity analysis for the conservation and management of forest ecosystems and natural resources in South-East Asia. Feldafing, Germany
- Bulkeley, H., & Betsill, M. (2005). Rethinking sustainable cities: Multilevel governance and the urban politics of climate change. Environmental Politics, 14(1), 42–63.
- Colldahl, C., Frey, S., & Kelemen, J. E. (2013). Smart cities: Strategic sustainable development for an urban world, Master Thesis. School of Engineering, Blekinge Institute of Technology.
- Durack, R. (2001). Village vices: The contradiction of new urbanism and sustainability. Places, 14(2), 64–69.
- Egger, S. (2006). Determining a sustainable city model. Environmental Modelling and Software, 2.1, 1235–1246.
- Höjer, M., & Wangel, S. (2015). Smart sustainable cities: Definition and challenges.
- Jabareen, Y. R. (2006). Sustainable urban forms: Their typologies, models, and concepts. Journal of Planning Education and Research, 26, 38–52.
- Kramers, A., Höjer, M., Lövehagen, N., & Wangel, J. (2014). Smart sustainable cities: Exploring ICT solutions for reduced energy use in cities. Environmental Modelling & Software, 56, 52–62.
- Nam, T., & Pardo, T. A. (2011). Conceptualizing smart city with dimensions of technology, people, and institutions. Proceedings of the 12th annual international conference on digital government research.
- Neirotti, P., De Marco, A., Cagliano, A. C., Mangano, G., & Scorrano, F. (2014) Current trends in smart city initiatives – some stylized facts. Cities, 38, 25–36.
- Organisation for Economic Co-operation and Development (2020) Official cite OECD, OECD: [Online], [Retrieved: 04.02.2020], https://www.oecd.org/
- Troyanskaya M.A., Tyurina Yu.G. (2019). World practice of digitalization in the management of mono towns. Azimuth of Scientific Research: Economics and Administration, 2 (27), 341-343
- Troyanskaya M.A., Tyurina Yu.G. (2019). The development of mono towns in the digital age through a system of tax incentives, 2 (27), 344-347.
- Troyanskaya M.A., Tyurina Yu.G. (2019). Mono town management: content and characteristicsSingle-industry town management: content and characteristics, 3 (28), 372-374.
- Troyanskaya M.A., Tyurina Yu.G. (2019). Transformation of mono town management in the context of integration and global digitalization. Azimuth of Scientific Research: Economics and Administration, 3 (28), 378-381
- United Nation (2020) Official cite United Nation, United Nation: [Online], [Retrieved: 04.02.2020], https://www.un.org/en/
- World Health Organization (2020) Official cite WHO, WHO: [Online], [Retrieved: 04.02.2020], https://www.who.int/