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International Conference
"GSOM Economy&Management Conference 2023"

St. Petersburg State University Graduate School of Management
October 3-7th, 2023 St. Petersburg, Russia

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Business in Society:
the Stakeholder Perspective

How do Firms Deal with the Negative Impact of Economic Policy Uncertainty?

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Abstract:
Uncertainty is becoming the greatest certainty of this era. Financial crises, terrorism, regional conflicts, pandemics, and other "black swan" events or similar events constantly emerge, bringing great distress to firms, residents, and governments. Dealing with various economic policy uncertainties (EPU) has become one of the firms' most significant challenges. Fortunately, the emergence of digital technologies such as artificial intelligence, cloud computing, and Big Data has brought hope for firms to reduce the negative impact of EPU. First, this paper sorts out the causes of EPU theoretically and then demonstrates the impact and internal mechanism of the digital transformation on EPU. Finally, the paper empirically tests the research hypothesis using the data of China's A-share manufacturing listed companies from 2013 to 2021. The results show that corporate digital transformation can reduce the negative impact of EPU by reducing information asymmetry and improving information processing capabilities.

1. Introduction

In recent years, due to the impact of the COVID-19 pandemic, international trade frictions, and regional conflicts, the international political and economic situation has been full of variables, and the economic policy uncertainty firms face has further intensified. Economists have paid close attention to economic policy uncertainty for nearly a decade. They find that overall economic policy uncertainty depresses firm investment, reduces hiring and trade, lowers firm output, and impedes long-run economic growth (Bloom et al., 2007; Bloom, 2014; Baker et al., 2016; Gulen & Ion, 2016). Since economic policy uncertainty generally harms firms, it is crucial to study how to reduce the negative impact of economic policy uncertainty on them.

The digital economy era provides a new solution for firms to deal with economic policy uncertainty. The new generation of digital technologies represented by artificial intelligence, blockchain, cloud computing, and Big Data is changing daily, giving birth to a new economic form called the digital economy (Qi & Xiao, 2020). In the era of the digital economy, firms use digital technology to transform their production and operation systems, management models, and core business processes, forming disruptive innovations and changes. This process is the digital transformation of an enterprise (Siebel, 2019). The digital transformation of manufacturing firms is sometimes called smart manufacturing. This paper speculates that digital transformation can effectively reduce the negative impact of economic policy uncertainty on firms.

Why can corporate digital transformation reduce the negative impact of economic policy uncertainty? The negative impact of economic policy uncertainty firms face stems from limited access to information and limited ability to process information (Bloom, 2014). Through digital transformation, in other words, the introduction of digital technologies such as artificial intelligence, Big Data, and cloud computing, firms can alleviate the constraints of these two aspects to a certain extent. Firms can use information and communication technology software (such as ERP systems), Big Data, and Internet of Things technologies (IoT) to strengthen data integration and sharing within the firm and between firms and suppliers to obtain more information. Firms can improve data processing capabilities through various cloud platforms and artificial intelligence algorithms and better predict and meet individualized and diversified needs.

Case studies of well-known manufacturing companies (Shan et al., 2021) show that digital transformation can prompt companies to focus on target customers, maintain supply chain security, and control fluctuations in production costs. It enables firms to survive tenaciously under the impact of various "black swan" events.

2. Theoretical background

As mentioned earlier, under the influence of economic policy uncertainty, firms face two main problems: limited information access and limited information processing capacity. This paper asserts digital transformation can help firms reduce the negative impact of economic policy uncertainty by reducing information asymmetry and improving information processing capabilities.

First, digital transformation helps firms obtain more information and reduce information asymmetry. The most basic function of digital technology is to transmit information, including between things and people (information technology), between things (Internet of Things), and between people (communication technology). Therefore, as a means of organizational management, digital technology can effectively reduce information acquisition and agency costs (Brynjolfsson & McElheran, 2016; Goldfarb & Tucker, 2019). Gal et al. (2019), based on firm survey data in OECD countries, found that after firms adopt high-speed broadband and CRM (customer relationship management) software, the speed and reliability of information exchange within the firm, between firms and suppliers and customers have been greatly improved, which significantly increases the productivity of the firm. Specifically, digital transformation can reduce information asymmetry among different stakeholders. For instance, digital transformation can reduce the information asymmetry between banks and firms. In the traditional economic form, there is information asymmetry between firms and banks, and banks do not know the actual situation of firm financing projects, which can bring about adverse selection and moral hazard problems. After implementing digital transformation, firms can better prove business flow, financial health, and business prospects to banks using ERP software and Big Data platforms (Zhang et al., 2021). Gong et al. (2021) found that the consensus mechanism of the blockchain ensures that the relevant information of firms is close to accurate information, enabling banks to provide better financing services for firms in the supply chain while effectively controlling risks.

At the same time, digital transformation can reduce the information asymmetry between firms and investors. When there is economic policy uncertainty, the dissemination of information in the capital market is slower (Kurov & Stan, 2018), and the degree of information asymmetry between investors and company managers will deepen (Nagar et al., 2019). However, digital firms can better use digital technology to standardize and code the production and operation information, making the annual report information more transparent (Wu et al., 2021). Moreover, digital technology reduces the information disclosure cost of listed companies and improves information disclosure capabilities (Qi et al., 2020), thereby reducing the information asymmetry between investors and listed companies. In addition, since digital transformation has become a hot issue for firms, investors pay more attention to firms that undergo digital transformation. This "exposure effect" also reduces the degree of information asymmetry (Liu, 2015), helping firms reduce economic policy uncertainty's negative impact. In short, by reducing the information asymmetry between itself and stakeholders such as banks and investors, firms can improve the predictability of investment, financing, and production decisions, thereby reducing the negative impact of economic policy uncertainty.

Second, digital transformation helps to improve the information processing capabilities of firms. In the era of the digital economy, firms especially need to use the accurate information provided by data to make scientific decisions in the face of economic policy uncertainty. Technically speaking, the information processing capabilities of firms are mainly limited by computing power and algorithms. Cloud computing and artificial intelligence based on Big Data can

alleviate firms' computing power and algorithm difficulties. The primary way for most firms to carry out digital transformation is through platform empowerment, which mainly means that large-scale platform enterprises provide firms with computing power through cloud computing services and provide firms with algorithm optimization through artificial intelligence and Big Data technologies. For example, the Taobao platform supported by Alibaba empowers garment manufacturing companies to digitize. Its core idea is to transform human-based experience management into intelligent data-based decision-making and use data management to improve the decision-making ability of firms in uncertain environments (Yang & Wang, 2022).

In terms of economic benefits, Bloom et al. (2014) pointed out that ICT technology makes data storage and processing cheaper, so firms can obtain and process more information. This technological advantage can improve grassroots employees' information collection and processing capabilities and help managers better summarize information and make decisions. Additionally, information itself has economies of scale. After firms adopt digital transformation, the more information they obtain, the lower the marginal cost of processing information and the greater the value brought by information (Brynjolfsson, 1994). Such economies of scale can improve the speed and quality of management decisions (Gurbaxani & Whang, 1991). The better a firm is at processing information, the more accurate its predictions will be.

Based on the above analysis, this study proposes the following research hypothesis:

Hypothesis 1. By reducing information asymmetry and improving information processing capabilities, corporate digital transformation can reduce the negative impact of economic policy uncertainty.

3. Method

3.1. Sample Selection

This paper selects the data of China's A-share manufacturing listed companies from 2013 to 2021 as the research sample. The reason for choosing manufacturing companies is that the manufacturing industry is physical. The digital transformation of this industry is relatively complicated compared to the service industry, and the transformation differences between companies are also apparent. First, the paper eliminates companies with abnormal operating conditions. Then, all numerical variables are winsorized at the 1% level. Finally, 2,437 observations of 525 listed manufacturing companies were obtained. The financial data of the companies are extracted from the CSMAR database.

3.2. Variables

(1) Explained variable

Economic Policy Uncertainty (EPU). Drawing on the research ideas of Yang et al. (2020) and Liu et al. (2019), the economic policy uncertainty index compiled by Baker et al. (2016) is used for measurement. Baker et al. (2016) used the South China Morning Post as the analysis object. They conducted an analysis based on the number of articles on "economy", "policy", and "uncertainty" published by the newspaper. When an article contains keywords of the three types of word frequencies of "economy", "policy", and "uncertainty", at this time, the article is regarded as an article of economic policy uncertainty. On this basis, the number of EPU articles accounted for the proportion of the total number of published articles was counted to obtain the monthly EPU series data. Then the monthly economic policy uncertainty index was obtained through standardized processing. For the original data, this paper follows the existing research method (Tian & Li, 2020), taking the annual average value and dividing it by 100 to obtain the annual economic policy uncertainty index. It should be noted that this indicator is a neutral indicator reflecting the process of economic policy changes.

(2) Explanatory variable

Corporate Digital Transformation (DIGITAL). This paper draws on Wu et al. (2021) practice and uses the text analysis method to construct the digitalization level of firms. The specific construction process includes the following three steps: First, the paper crawls the annual report

(PDF version) of the listed company through Python, converts the PDF to TXT format, and extracts the content of the management discussion and analysis part. Second, following the existing research ideas (He & Liu, 2019; Wu et al., 2021), the paper searches for national-level digital economy-related policies issued by official departments such as the Central People's Government and the Ministry of Industry and Information Technology and then uses Python word segmentation to filter. After processing, the relevant word frequency list of digital transformation is obtained. Third, based on the digitized word frequency and the content of the management discussion and analysis in the annual report, the paper again uses Python to count the proportions of various word frequencies. It uses the ratio of digital-related word frequency to the total word frequency in the management discussion and analysis to measure the company's digital transformation. Considering the relatively small value, the paper expands it by 100 times for analysis.

(3) Control variables

This paper draws on previous research ideas (Bloom, 2014; Tanaka et al., 2020) to further control other relevant factors that may affect the digital transformation of enterprises, including company size (Size), company age (Age), leverage (Lev), return on assets (ROA), total factor productivity (TFP), market volatility risk (MVR), overall industry risk (OIR), power ratio (Power), and the shareholding ratio of the top 10 shareholders (Top_10). In addition, the paper also controls firm-fixed effects and year-fixed effects. The detailed measurement methods of each variable are shown in Table 1.

Table 1. Variable definition

Type	Variable name	Code	Definition
Explained variable	Economic policy uncertainty	EPU	Calculated based on the text of the South China Morning Post, and then multiplied by 100%
Explanatory variable	Corporate digital transformation	Digital	The degree of digital transformation based on the word statistics of the company's annual report, then multiplied by 100%
Control variable	Company size	Size	Logarithm of the number of employees
	Company age	Age	Current year - established year + 1
	Leverage	Lev	Total liabilities / total assets
	Return on equity	ROE	Net profit / shareholder's equity
	Total factor productivity	TFP	Calculated using the OP method
	Market volatility risk	MVR	The annual standard deviation of the company's individual stock daily returns
	Overall industry risk	OIR	The standard deviation of the industry's total return on assets for the year
	Power ratio	Power	Proportion of actual controller's control of listed companies - Proportion of actual controller's ownership of listed companies
	Shareholding ratio of the top 10 shareholders	Top_10	Number of shares held by the top ten shareholders / total share capital * 100%

3.3. Empirical Model

In order to test the impact of corporate digital transformation on economic policy uncertainty, this study constructs the following baseline regression model:

$$EPU_{it} = \beta_0 + \beta_1 Digital_{it} + \sum \chi_k Controls_{it} + \varphi_i + \gamma_t + \varepsilon_{it} \quad (1)$$

Among them, the subscripts *i* and *t* represent the firm and the year, respectively; the explained variable EPU_{it} stands for the economic policy uncertainty of firm *i* in year *t*, and $Digital_{it}$ means the level of digital transformation of the firm; $Controls_{it}$ is the set of control variables, including the control variables of the market conditions and micro-firm characteristics mentioned above; φ_i is the firm fixed effect, γ_t is the year fixed effect, and ε_{it} is the error term. The study mainly focuses on the regression coefficient β_1 in the above regression equation. If the value of β_1 is negative, indicating that corporate digital transformation can reduce the negative impact caused by economic policy uncertainty. If the case is the opposite, indicating that corporate digital transformation will not reduce the negative impact caused by economic policy uncertainty.

3.4. Descriptive statistics

Table 2 reports the descriptive statistics of variables used in the study. The mean value of the explained variable (EPU) is 0.099, the standard deviation is 0.095, and the maximum value is 0.503, indicating that China's economic policy uncertainty has fluctuated dramatically over the years. The mean of the explanatory variable (Digital) is 0.078, the standard deviation is 0.117, the minimum value is 0, and the maximum value is 0.632, indicating that the digitalization levels of different listed companies are quite different. Some companies have not yet carried out the corresponding digital transformation. In addition, the financial characteristics and corporate governance characteristics of sample companies are also different.

Table 2. Descriptive statistics

Variables	Sample size	Mean	Standard deviation	Min	Max
EPU	2,437	0.099	0.095	0.000	0.503
Digital	2,437	0.078	0.117	0.000	0.632
Size	2,437	8.391	1.182	4.968	12.520
Age	2,437	15.452	6.015	4.000	31.000
Lev	2,437	0.621	0.282	0.055	1.790
ROE	2,437	0.080	0.096	-0.429	0.475
TFP	2,437	13.842	1.007	0.000	18.026
MVR	2,437	0.027	0.011	0.009	0.095
OIR	2,437	0.043	0.026	0.000	0.010
Power	2,437	0.062	0.081	0.000	0.365
Top_10	2,437	61.267	21.053	0.000	96.401

4. Results

Table 3 reports the baseline regression results of corporate digital transformation on economic policy uncertainty. Among them, in column (1), this study controls the year-fixed effect and firm-fixed effect. In column (2), it adds all control variables. The results in columns (1) and (2) show that the estimated coefficient (β_1) of corporate digital transformation is negative and significant at the level of at least 5%; in other words, corporate digital transformation significantly reduces the impact of economic policy uncertainty. Thus, Hypothesis 1 is verified. From the perspective of economic significance, for every standard deviation (0.117) increase in the level of corporate digital transformation, the firm's economic policy uncertainty will decrease by 0.37% (-0.032 * 0.117). The mean value of the economic policy uncertainty of firms in the sample is 0.099, which means that for every 1 standard deviation increase in the level of corporate digital transformation, the firm's economic policy uncertainty will decrease by 3.74% (0.37% / 0.099).

Table 3. Baseline regression results

Variable	EPU	EPU	EPU
	(1)	(2)	(3)
Digital	-0.032***	-0.036**	
	(-3.052)	(-2.670)	
Digital_2			-0.021*
			(-1.818)
Size		0.0021	0.006
		(0.627)	(1.398)
Age		-0.001	-0.001
		(-0.625)	(-0.248)
Lev		-0.000	-0.090*
		(-0.000)	(1.894)
ROE		-0.007	-0.027
		(-0.642)	(-1.154)
TFP		0.001	-0.001
		(-0.693)	(-1.150)
MVR		0.195***	0.279***
		(2.820)	(2.833)
OIR		0.012	0.047
		(0.093)	(0.350)
Power		0.012	0.233
		(0.405)	(0.697)
Top_10		-0.000	-0.000
		(-0.410)	(0.164)
Year fixed effect	Included	Included	Included
Firm fixed effect	Included	Included	Included
R-squared	0.064	0.065	0.067

Note: ***, **, * indicate statistical significance at the 1%, 5%, and 10% significance levels, respectively, and t-values are in parentheses.

In another situation, firms facing high economic policy uncertainty may reduce digital transformation investment out of prudence, leading to reverse causality. In order to alleviate the possible reverse causality, in column (3) of Table 3, the study uses the digital transformation index measured by words with a lag of one period. It correspondingly lags all control variables for one period and repeats the baseline regression model. The results show that the coefficient of the digital transformation with a lag of one period is still significantly negative.

In short, the challenges and opportunities firms face in the context of economic policy uncertainty coexist, and firms are more inclined to seize the opportunities of the digital transformation era. Through digital technology innovation to further enhance market competitiveness, firms can obtain more opportunities for profit and growth space to resist the negative impact of economic policy uncertainty.

5. Conclusion

Rising economic policy uncertainty will increase market risks and trigger economic turmoil, profoundly impacting the macroeconomy and corporate behavior. How to deal with economic policy uncertainty has become an important research topic because it relates to the strategic goal of economic operation efficiency and high-quality development of the national economy. This paper takes China's A-share manufacturing listed companies as the research object and focuses on the impact of corporate digital transformation on economic policy uncertainty. The study found that corporate digital transformation can reduce the negative impact of economic policy uncertainty by reducing information asymmetry and improving information processing capabilities.

Firms should accelerate digital transformation, improve economic resilience, and grasp the challenges and opportunities brought about by economic policy uncertainty. Although there are

certain thresholds for digital transformation, firms should effectively improve their digital capabilities to maximize the dividends of digital transformation. For example, firms can improve their ability to apply digital technology by hiring professionals related to digital technology. By learning the successful experience of digital transformation of excellent enterprises, firms can increase the success rate of transformation and thus improve their ability to respond to crises.

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Emerging Markets, Global Challenges, and Multinational Enterprises

Sustainable Development of the Arctic Resources in the Context of Current Trends: Prerequisites for Sustainable Financing

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Abstract:
The issues of developing the resource potential of the Arctic region are particularly urgent. At the same time, modern trends and tendencies adjust the ideas about the vector of the Arctic's development. Trends in global energy transformation, green economy, low-carbon development makes the issues of natural resources exploration more and more controversial. Do oil and gas projects in the Arctic have the future? What projects are more suitable for the exploitation in the context of current environment? The article addresses the issue of applying the ESG concept to mineral resource complex projects implemented in the Arctic. Current trends in sustainable development are studied. Scenarios for the future development of the Arctic resource potential are substantiated. They include "green", "traditional" and "balanced" scenario, and each of them have its own priority projects pool. The study systemizes the prerequisites for sustainable financing of mineral resources exploitation projects.

1. Introduction

The Arctic region has a unique mineral resource base. It is here that the largest reserves of nickel, copper, precious, rare, and rare earth metals, oil and gas resources, etc. are concentrated [Strategy for the Development of the Mineral Resource Base of the Russian Federation until 2035]. Interest in the development of the Arctic resource potential is increasing as traditional sources of minerals are depleted. At the same time, in addition to system-wide tasks related to geological, climatic, ecological features of the mineral resource base development, today we must solve fundamentally new tasks related to emerging global trends and challenges [Tolvanen et al., 2019].

The development of the Arctic region's mineral resource base is both strategically significant and challenging due to the need to balance increasing resource demands on the one side, and climatic and geopolitical issues, on the other. Obviously, under the influence of modern trends, priorities are changing. Therefore, there are issues of choosing the vector of resource potential development: where should it be directed? what criteria should be followed? what should be the basis for decision-making?

The relevance of integrating ESG principles into the activities of companies operating in the Arctic is determined by the need to mitigate increased social and environmental risks, as well as the importance of preserving and maintaining sustainable development of the region in the long term [Usman et al., 2022]. At the same time, due to the increasing influence of climatic trends, the investment attractiveness of the region is significantly decreasing. Banks and insurance companies see significant risks in the region [Zvorykina et al., 2022]. Moreover, the use of ESG principles is complicated by a number of factors - lack of legal regulation, disparate approaches to ESG criteria, limited access to sustainable financing mechanisms.

The purpose of this study is to substantiate the prerequisites for sustainable financing of mineral resource complex projects in the Arctic, taking into account current trends, available opportunities and limitations.

2. Data & Methodology

The investigation is based on an extensive literature review that covers sources discussing the role of sustainable development and ESG concept in case of current trends and tendencies. Content analysis was applied to study scientific articles, reports, international reviews. The concept of sustainable financing and approaches to taxonomy of investment projects formed the theoretical basis of the study.

Development alternatives were generated using scenario-based approaches. Each scenario is based on a combination of factors reflecting different approaches to financing, overall development vector, consideration of trends, and adherence to the environmental agenda.

Russian and foreign state strategies for Arctic development were analyzed using GAP tool. Contradictions in target priorities were identified, and conclusions were drawn about the reflection of current trends.

3. Results and conclusions

Global mineral markets are currently undergoing changes. High dynamics of new trends and tendencies form a high degree of uncertainty and low level of predictability of markets. In such conditions, it is becoming increasingly difficult to form strategies. The main focus is shifting towards flexibility and adaptation.

Emerging trends affect the vector of development of the mineral resource base in different ways. For example, trends in global energy transformation, green economy, low-carbon development, and sustainable future are shifting the focus towards critical materials. On the contrary, modern macroeconomic and geopolitical trends, high market volatility leads to the actualization of traditional resources in order to ensure energy security [Dmitrieva et al., 2023]. Thus, the contradictory nature of current trends introduces uncertainty in the choice of ways to develop the resource potential, which is especially relevant for the Arctic region, which has a unique raw material base in terms of its scale and quality.

Previous studies have substantiated the multidirectionality of current trends and proved the need to revise the concept of sustainable development. The SD must be underpinned by six key pillars, namely, governance, environment, social responsibility, geopolitics, macroeconomics, scientific and technological advances [Dmitrieva et al., 2023]. Key scenarios reflecting the directions of future development of the economy and industry were formed: (1) following the low-carbon type of development, actualization of the concept of sustainable development, introduction of the principles of lean production, rejection of traditional energy resources in favor of renewable energy sources (the Arctic is a source of critical energy sources), (2) abandonment of plans related to the transition to a low-carbon type of development, turning to traditional energy sources, prevalence of resource and economic security factors (the Arctic is a promising source of energy resources), (3) search for a balance between sustainable development and the real situation, taking into account sanctions and macroeconomic parameters, search and adaptation.

Figure 1 presents key scenarios for the future development of the Arctic region's resource potential.
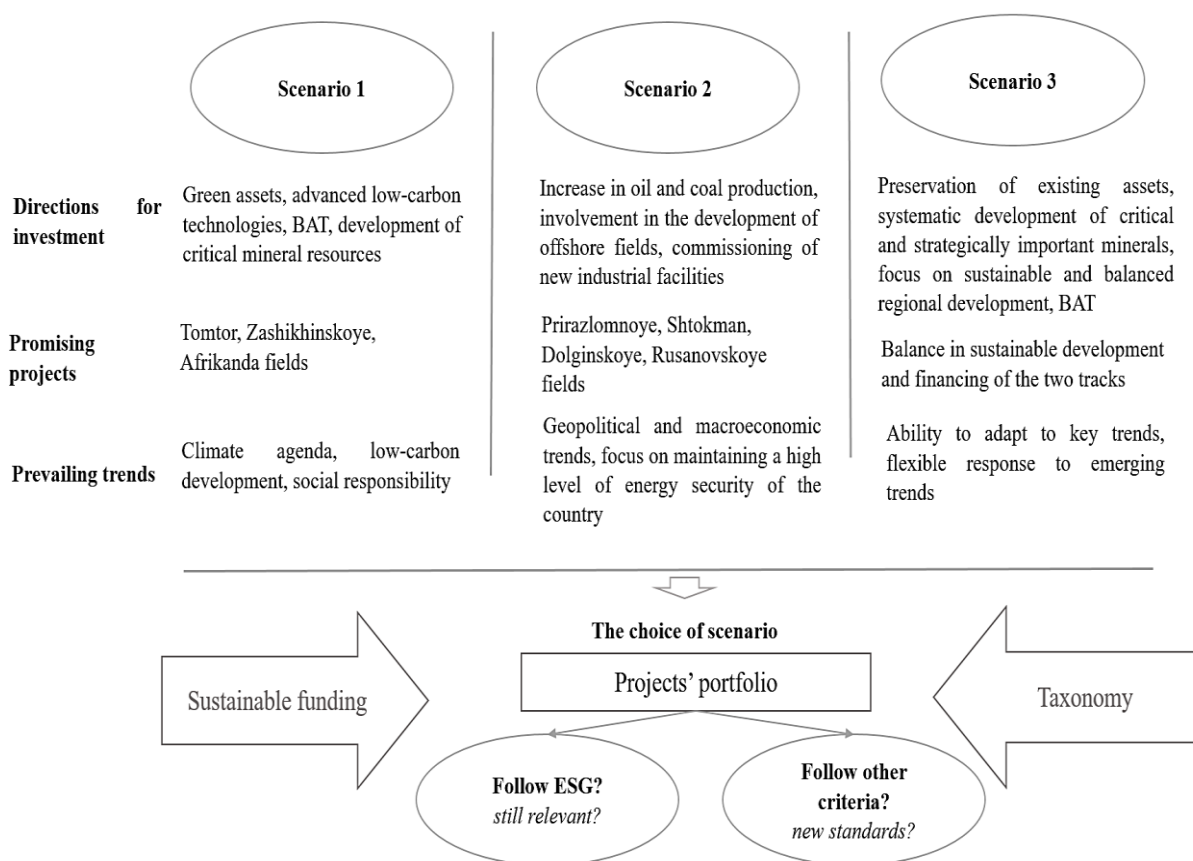
Figure 1. Key scenarios for the future development of the Arctic region's resource potential

The balance strategy reflects the key trends most fully, but following it also determines the need to adapt. However, the topic of choosing the direction of development remains relevant: what it should be based on and what criteria should be used to select priority projects. Now the issue is if it is needed to follow ESG or not?

Speaking of advantages, it should be noted that Russian companies and projects can be integrated into the international system of standards, which expands potential opportunities for attracting investment. Nevertheless, the prerequisites for moving away from this concept are as follows:

(1) Restricted access to global markets due to sanctions;
(2) The withdrawal of foreign investors from Russian Arctic projects (Britain's Royal Bank of Scotland, Goldman Sachs, Morgan Stanley, Chase, Wells Fargo announced commitments not to finance oil and gas projects in the Arctic) [Banks banning investments in the Arctic will hurt even more now, 2022];
(3) Limiting access of Russian projects to the global sustainable financing instruments;
(4) Specifics of Arctic projects that are not taken into account when using a common concept and methodology;
(5) Non-transparency of the ESG rating system;
(6) Lack of a system linking the concept to Russian mechanisms for sustainable financing of investment projects.

GAP-analysis of the current state strategies for the Arctic region's development allowed us to highlight the difference in the focus of national and foreign strategies - Figure 2. It is important to note that ESG criteria are not stated in any of the documents, despite the recognition of the sustainable development importance.

The analysis of the companies' in the mineral resources sector commitment to ESG principles indicates a gradual transition of organizations to the target benchmarks of sustainable development (examples are Norilsk Nickel, Severstal, RUSAL, and other). At the same time, the novelty of the concept, disparate assessment methods and criteria, and variability of rating values create uncertainty in the context of determining the parameters and results of ESG transformation.
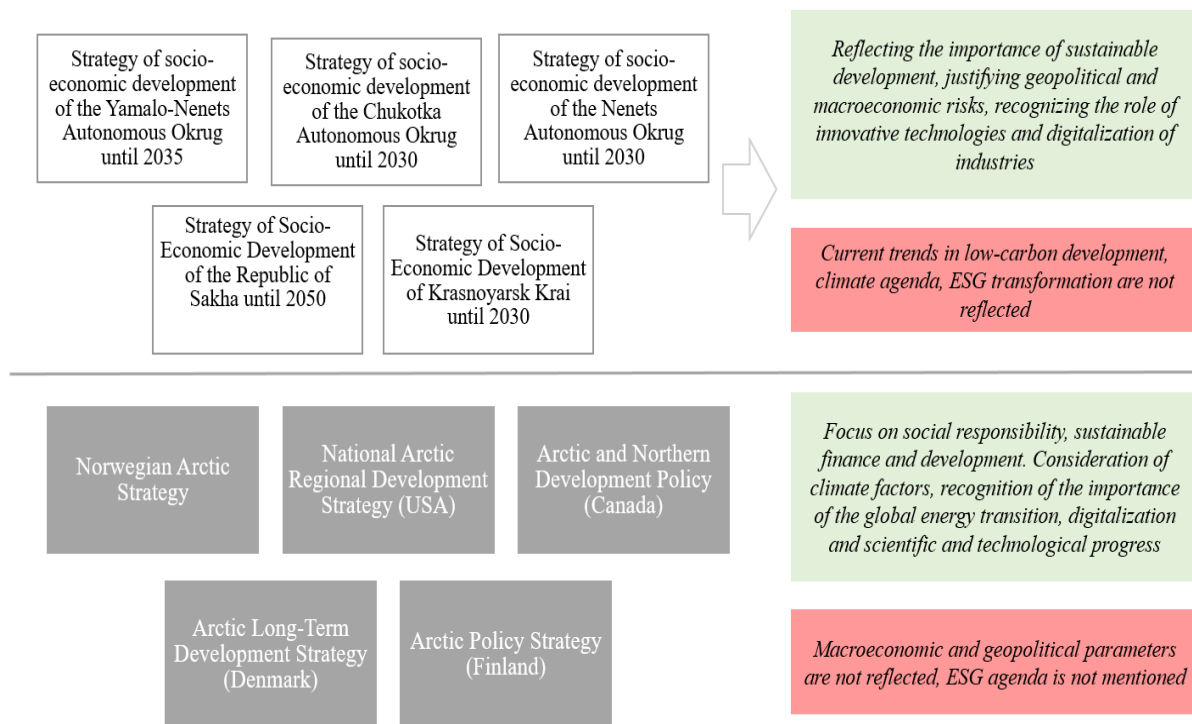

Figure 2. Arctic development regulations: key results of GAP-analysis

Despite the widespread use and development of sustainable financing instruments in foreign countries, methodological issues related to the selection of projects, establishing criteria for their compliance with sustainable development and the ESG agenda remain unresolved in Russia. The available mechanisms and forms of providing state support and attracting private investment remain uncertain. All this determines the presence of significant methodological barriers and does not allow building a unified system of selection and sustainable financing of projects in the Arctic.

Therefore, even selecting a scenario and defining a pool of projects will not provide an opportunity to establish a system for sustainable financing of Arctic projects. The sustainable financing model should be based on the algorithm of categorization of mineral resource complex objects. The taxonomy of projects should be based on criteria that reflect not only economic efficiency and technological level, but also modern requirements, as well as environmental, social development and corporate governance standards. In addition, the specifics of mineral resource complex projects and the focus of the chosen development scenario, as well as the established target priorities, should be taken into account.

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Russian Companies in Global Value Chains under the Non-Economic Shocks: the Effects of Innovations and Transformation of Business-Models

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Abstract:
Traditionally it is believed that global value chains (GVCs) play a leading role in transmitting the shocks of global crises, shrinking stronger under the impact of global shocks. However, some studies have noted that companies in GVCs are generally more resilient to macro shocks and more flexible in adapting new conditions. With the increasing probability of macro-regional and global shocks, uncertainty is growing and the demand for effective responses of national economies to emerging shocks is increasing. We analyze the behavior of firms in the GVCs and the results of their activities. Findings allows to explain the specificity of GVCs integrated firms' responses to global crises. New evidence allows to discuss the effects associated with the heterogeneity of shocks' impact on firms in the Russian economy. Finally, the results will create a basis for discussing promising factors for expanding innovation activity and the transformation of business models in Russian enterprises.

1. Introduction

Relevance. Global value chains account for 60 to 70% of world trade, according to various estimates (WTO, UNCTAD). The need to understand how firms respond to global shocks is increasing for open economies intensively involved in world economic relations. This is especially important in recent decades, along with the growing uncertainty in the world economy and the increased likelihood of macro regional and global shocks caused by economic, geopolitical, and natural factors. It is also important for the Russian economy, one of whose strategic goals is to increase the volume of non-resource non-energy exports, which can be achieved not only by expanding the number of exporting firms but also by integrating and repositioning the Russian economy in global value chains. Obtaining evidence about the specific responses of companies included in the GVCs is important for a number of stakeholders in terms of scientific and practical relevance. Crisis-related GVC research has focused on macro trends rather than the strategies of individual suppliers to deal with crises (Pla-Barber, Villar and Narula, 2021; Sass and Szalavetz, 2014; Cattaneo, Gereffi, and Staritz, 2010). That is why our paper aimed to fulfill this research gap by providing an empirical study on both: micro and macro levels.

Problem Statement. The proposed paper aims to address the scientific problem which is associated with the lack of a unified view in the world academic and applied science on the behavior and resilience of firms in global value chains during global shocks. It is traditionally accepted that global value chains (GVCs) play a leading role in transmitting the shocks of global crises. Such effects, in particular, were widely observed during the global crisis of 2008-2009. Vertical organization of production leads to a sharper reduction in intermediate demand compared to what a standard international trade channel would imply, in addition, "cascading failures" of interdependent firms can occur. At the same time, there are a number of studies that note that companies in GVCs are generally more resilient to macro shocks (Golgeci et. al, 2020;

Shinozaki & Rao, 2021). To date, a large number of studies can be identified that note that higher levels of participation in GVCs can improve operational performance and adoption of sustainable to external shocks production by industrial companies through information sharing, learning, and innovation through supply chain partners. This allows contemporary research to discuss the balancing of effects associated with increased resilience in crises with effects associated with increased efficiency in GVCs. Our research question is as follows: How do Russian companies that are included and not included in the GVC's react to the global shocks under the COVID-19 pandemic?

Goal. In this study, we propose a solution to an existing research problem - we assess the resilience of Russian companies, included and not included in the GVCs, to the crisis caused by COVID-19 in terms of productivity and changes in sales volumes, and discuss the factors that are associated with this resilience, namely assessing the effects of innovation activity and transformation of company business models. This will not only broaden the understanding of the effects of crises on the specificity of the companies included in the GVCs, but will also identify the factors that determine this specificity. Objectives to be accomplished in this study: To assess the determinants of companies' participation in global value chains, including barriers to entry in the GVCs. To investigate the response of companies, included and not included in global value chains, to the crisis caused by COVID-19, including changes in the number of employees, revenues, productivity, volume of exports, the role of state support as a factor moderating the responses of companies, included and not included in the GVCs, to the crisis. Our paper assumes assessment of the effects of innovation activities of companies included and not included in the GVCs on companies' resilience to the crisis caused by COVID-19, including in terms of measures related to product innovation and product adaptation in the new environment. To assess the effects of transforming the business models of companies, both included and not included in the GVCs, on the companies' resistance to the crisis caused by COVID-19, including in terms of measures related to digitalization, changes in models of relations with employees, and product purchasers.

Novelty. The novelty of the proposed study is contained in several provisions. First, the obtained results will allow explaining the specifics of the response of companies in GVCs to global crises through the study of the effects associated with innovation activities and business model transformation. Thus, our study is connecting two directions of works, which, on the one hand, consider the sustainability of chains in crises, but do not discuss related factors, and, on the other hand, works that study the innovative activity of companies, but without analyzing the relationship with changes in the external environment and the response to global shocks. Second, as far as the authors of this application are aware, no research has yet been conducted on the specifics of participation and the effects of firms' participation in global value chains on the Russian economy. Thus, we will obtain fundamentally new information on the participation of Russian companies in GVCs, which will expand the accumulated results on the participation of firms in exports and imports. In addition, the results will meaningfully expand the limited empirical evidence on transition economies. Finally, the results will provide new evidence on the specific responses of Russian firms, included or not included in the GVCs, to the COVID-19 pandemic crisis. This will allow us to discuss the effects associated with the heterogeneity of shocks' impact on companies in the Russian economy.

2.   Theoretical framework
2.1.   GVC's concept
The COVID-19 pandemic has caused global structural changes in the GVC's governance and restructure business processes around the world. The concept of GVC's governance arises the fundamental question about the impact on developmental potential of the country's economy

that is called economic upgrading (Humphrey & Schmitz, 2002). Theoretical background of current paper relies on GVC's governance concept that was developed by (Gereffi, Humphrey and Sturgeon, 2005). This concept relies on the work of (Gereffi, 1994) defining the GVCs as a particular production system where powerful actors that have high exporting activity and could be called as a lead firms interacting with each other through technological and organizational networks that enable economic activity between firms around the world. Countries by cooperating with each other throughout customer and supplier linkages of manufactured products to produce more complex output, processing the product thereby adding value at each stage of production cycle all the way to final consumption. In our paper we follow an inter-firm value chain approach, where the interaction between companies represents a country's economy, rather than looking at each company in the chains separately.

2.2. *GVC's in times of uncertainty*

Because of global connectivity, GVCs are generally prone to any types of crises: the financial crisis of 2008, 2014 and the recent COVID-19 outbreak in 2020 (Choksy et. al 2022). Traditionally it is believed that global value chains play a leading role in transmitting the shocks of global crises, shrinking stronger under the impact of global shocks (Gereffi, Humphrey and Sturgeon, 2005). GVC's are highly sensitive to any economic shocks due to their close cooperation with foreign and national suppliers and customers, taking on major challenges first. In this sense, COVID-19 was a fundamentally new branch of crisis management development, generating new economic challenges never before seen in the world. In this context, the resilience of GVCs is becoming increasingly important (Golgeci et al., 2020). Every global crisis brings its own challenges to the global economy by reshaping the GVCs and the 2020 pandemic was no exception that combined serious disease with trade-shocks (Javorcik, 2020). The pandemic caused shocks on both the demand and supply sides of various economic activities.

In literature there are variety of approaches to identify the resilience of company during global shocks. For example, (Linnenluecke, 2017) identified five streams of research on resilience, embracing resilience as (1) organizational responses to external threats, (2) organizational reliability, (3) employee strengths, (4) transformation of business models and (5) managerial decisions that reduce supply chain disruptions. In some industries, value chains have shown resilience to shocks, thanks to the diligence of large corporations in finding new production sites and markets (Shingal & Agarwal, 2020). (Parast, 2020) examined the effect of a firm's investment in R&D and showed that more innovative organizations are more resilient to supply chain disruption.

2.3. *Resent research papers*

Research has shown that the world economy, export-import transactions, and the resilience of global value chains are highly vulnerable not only to purely economic shocks, but also to large-scale epidemics and pandemics as well as natural disasters. For example, the adverse impacts on GVCs from Hurricane Katrina in the United States (Henriet, Hallegatte, Tabourier, 2012) and the earthquake in Japan (Miroudot, De Backer, 2013) have been identified. In this case, the second disaster was able to identify the disruption of both upstream and downstream linkages affecting buyers and suppliers (Carvalho et al., 2021). GVCs suffered significant damage, particularly among high-tech industries, as a result of the outbreaks of severe acute respiratory syndrome (SARS) in East Asia and Middle East respiratory syndrome (MERS) in South Korea. In some industries, though, chains have shown resilience to these shocks, thanks to the diligence of large corporations in finding new production sites and markets (Shingal, Agarwal, 2020). So far, few studies of the impact of COVID-19 on GVCs have already revealed a number offeatures of this epidemiological catastrophe. For example, the production of goods and services declined directly as a result of pandemic containment, while indirect impacts on supply chains resulted from disruptions in overseas production and transport networks (Baldwin,

Tomiura, 2020). The colossal increase in risk and uncertainty has already proved highly disruptive to cross-border business processes (Wang et al., 2021). In the long term, the Covid-19 crisis may affect the development of GVCs through changes in corporate strategies, including re-shoring of production to home countries, shortening the length of chains, diversification of suppliers, etc. (Javorcik, 2020). In addition, the pandemic has given a boost to robotization and digitization processes around the world (Simola, 2021).

With regard to the resilience of individual companies to the externalities of the coronavirus pandemic, given the immersion in the GVCs, the lack of the necessary statistical base does not yet allow such studies to be carried out. One exception is work based on the results of The World Bank Enterprise Surveys (Olczyk, Kuc-Czarnecka, 2021). Among other things, a positive relationship was found between the flexibility of companies' human resource policies, their receipt of financial support from the state or preferential loans from private banks and the maintenance of pre-pandemic export volumes. The second exception found is a publication on survey data from Philippine firms (Shinozaki, Rao, 2021). The authors obtained evidence of the relatively greater 'survivability' of firms involved in the GVCs, i.e. these firms were less likely to lose revenues and

profits dramatically. Both publications analysed only the initial effects of the pandemic and, as the authors point out, their results should be regarded as preliminary. The problem of GVCs sustainability during COVID-19 has also attracted the attention of domestic scholars, including research teams from IMEMO RAS (Varnavskii, 2021; Chudinova, 2021), the Gaidar Institute for Economic Policy (Flegontova, Ponomareva, 2020), the All-Russian Academy of Foreign Trade (Litvinov et al., 2020) and HSE (Simachev et al., 2020). However, all these publications focus on macro-level analysis of the problem and rely on international trade statistics or qualitative analysis of textual sources.

3.   Methods

The research design of our paper is quantitative and involves a study of differences in the behavior of companies included and not included in the GVCs, as part of the response to the crisis caused by COVID-19. Moreover, it involves an assessment of the effects of innovation and transformation of companies' business models in the GVCs, which respectively defines three phases of the study, evenly distributed over three years. Empirical modeling and econometric evaluation within the framework of the research questions at each stage of the study is carried out using macro and macro data, which makes our research particularly relevant and valuable not only for Russian structural policy and top management decisions, but also to the whole world. Our study is based on two main sources. The first is RUFIGE 2022 – "Russian Firms in a Global Economy" survey where the respondents are the top-management and CEO of the companies that was conducted by National Research University Higher School of Economics in 2022. Secondly, the predominant role in the study is taken by estimates based on firm-level microeconomic data. These estimates will be based on data from several waves of the survey, conducted jointly by the European Bank for Reconstruction and Development, the European Investment Bank and the World Bank (The EBRD-EIB-World Bank Group Enterprise Survey). The use of the noted data seems to have a number of advantages, including: allows to estimate results for Russia and conduct a comparative analysis of the results with other countries in Eastern Europe and Central Asia, where the survey was also conducted; includes data not only on industrial complex companies, but also on services; although it has an unbalanced panel structure (i.e. different waves of the survey included different companies), contains observations on the same firms in different waves of the survey, which allows to build a panel.

The empirical evaluation in all phases of the work will be carried out with the use of relevant methods of econometric analysis, in particular, it is planned to use, depending on the model specification and available data, methods of Probit regression, as well as least squares models and estimation by panel regression. In order to take into consideration the possible

problems of endogeneity, including those related to the effects of the specific distribution of state support for firms, as well as the effects of self-selection of companies, modern econometric modeling techniques will be used, including Heckman estimation (Heckman model) and regression discontinuity design.

The dependent variables of the study will include changes in revenue, employment, exports, and imports at enterprises in 2020, 2021, and 2022. At present, there is no consensus in academic and expert literature on how to define GVCs. To assess the impact of a company's positioning in the chain on its resilience during crises, we use unique indicators available to us, such as the type of product produced, the presence and exercise of control by customers over compliance with production technology, the method of determining the price of the main product when making direct sales, the presence and nature of innovation channels, and the presence of competitors in the Russian and foreign markets. Control variables include ownership form, age, firm size, industry, and regional affiliation.

4. Results and contribution
4.1. Results

The Russian companies included in the GVCs will be more resilient to the crisis - they are demonstrating a smaller decrease in revenues, number of employees, and productivity compared to companies not included in the GVCs. The effects of innovation activity and business model transformation in the response of companies to the crisis caused by coronavirus infection will be assessed. It is expected to reveal that those companies that were previously prone to product adaptation and carried out business model transformation were also more prone to product adaptation, innovation, and were more willing to subject their business model to further transformation during the crisis. The results significantly expand our understanding of the effects of the global crises on companies in the Russian economy and reveal the typology of Russian companies' adaptation to crises. From the point of view of contribution to the world level of research, the most significant result will lie in the assessment of the effects of innovation and transformation of business models on the resilience of companies to global shocks, which, as far as the authors of the application know, is currently an unexplored area of knowledge. The results can be used for the purposes of improving Russian economic policy at the stage of post-crisis recovery in order to support innovative activity of companies, transformation of business models towards modern formats, expansion of non-resource non-energy exports and re-positioning of the Russian economy in global value chains. In particular, they may be useful in discussing priorities for the distribution of state support, priority sectors of the economy, identifying and discussing drivers of innovative growth and technological renewal.

4.2. Theoretical contribution

From the positions of obtaining new academic knowledge and solving contradictions in academic research the envisioned research will jointly analyze the behavior (response) of firms in the GVCs and their performance, including in the context of the impact of the COVID-19 crisis. In terms of the GVCs literature, this can be considered as a more comprehensive approach to the study of the modernization (upgrade) phenomenon (i.e., improving the firm's position in the value chain). Since the latter is unobservable or, at best, difficult to measure, previous works have usually drawn conclusions about actual changes in positions. By analyzing the effects of COVID-19, we can assess, over a relatively short period of time, the specificity of companies' decisions in GVCs in relation to their performance. In particular, the specifics of innovation activity (product adaptation) and the transformation of business models will be studied in relation to the dynamics of the main financial indicators of the firm. This will significantly expand the understanding of what happens to companies in the GVCs during shocks.

4.3.   Managerial implications

From the point of view of the implications for industrial companies, the obtained results will be important for companies, included or not included in global chains, seeking to increase their own competitiveness and maintain growth rates. Development of a typology of Russian companies' adaptation to the crisis caused by COVID-19, including depending on the impact of external factors (activity barriers) and internal factors (product innovation, transformation of business models), taking into account the specifics of companies, such as the presence of foreign, state ownership, age, size. The results obtained appear to be comprehensive in nature, as they will have implications for company's indifferent sectors of the manufacturing complex, consider companies that differ in ownership (domestic, with foreign ownership, with state ownership), as well as differing in age (experience of activity). Moreover, since the COVID-19-induced crisis itself seems to have acted as a gas pedal of long-term trends related to digitalization, changes in companies' business models, it seems that the results will be relevant in the long term when discussing post-crisis trends. From the position of implications for public economic policy, the results obtained are important for the development and improvement of measures aimed not only at mitigating the effects of global crises, but also in the post-crisis period, aimed at increasing the rate of economic growth.

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Mapping EdTech Market: New Approach to Segmentation

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Abstract:
We witness the lack of a holistic approach to modeling and mapping new designs of the EdTech market. At this point, existing methods of segmentation seem incompatible with the vast capabilities of EdTech companies to produce different types of educational services, thereby making it impossible to assign one particular company to a single, specific segment.
This article makes a twofold contribution: establishing the relevance of new approaches in EdTech market segmentation, and revealing the unique features of different segments through their economic and institutional components. The article describes a methodical framework for segmentation. And employing open source data as well as expert interviews data we built a coherent model of EdTech market segments and identified trends of new segments' appearance.

Keywords: *EdTech market, Segmentation, Cluster analysis*

1. Introduction

The COVID-19 pandemic served as a strong impetus for the rapid development of the educational technology market. Faced with a dramatically increased demand for virtual education, EdTech companies began to rapidly develop new market segments in order to attract more customers. Consequently, due to the development of technological progress as well as expansion of the EdTech products range, the previously developed types of market segmentation have lost their relevance.

We witness other reasons for the EdTech market's substantial transformation as well. The events of February 2022 played a major role in framing demand within the EdTech market. In addition to large losses in revenue for EdTech companies (due to the reduced purchasing power) the whole vector of consumer demand has also changed. According to the Smart Ranking agency, products focused on children's education and professional skills development took top priority [3]. While, on the one hand, there was a drop in demand for tutors, on the other hand, there was an increase in demand for foreign language learning apps. The second phenomenon could be associated with the family relocation case which entails the need to learn foreign languages.

The IT-professions sector has become another leading segment of the EdTech market. In the second quarter, due to the shock situation, there was a slight decline in the overall demand for additional education programs, but by the end of the third quarter, its value increased by 15.23% [1]. According to the experts, this could be explained by the high security and relevance of IT-specialists during the periods of high instability [2].

Consumer demands in the field of business education have also undergone changes. The events of the first quarter of 2022 and the subsequent relocation of many foreign companies boosted the interest in new professions mastering [4]. Many platforms have significantly expanded the range of programs and intensives. All these ongoing changes relate to the restructuration and greater interdependence among different EdTech market segments and to their co-evolution.

There has been plenty of research revealing and analyzing EdTech market segmentation based on various criteria, but only a few types of segmentation have retained their relevance at the moment.

First, there have been different variants of models based on product type, aimed at describing various kinds of technological options and their use in the educational sphere [Конанчук, 2013 10]. As a result, these models have lost their relevance due to the obsolescence of technology.

Second, many researchers address the models based on client type [5]. This approach has been used to explain a broad range of audience, its preferences and expectations. According to it, there are three main segments: "b2b", "b2c" and "b2g". The first type refers to the business model reflecting the interaction between two business companies ("business-to-business"), the second - between a business company and a private customer ("business-to-consumer"), and the third - between a business company and a government agency ("business-to-government"). There could be more detailed client typologies which take into consideration age, educational levels (pre-school, school, tertiary education, professional development) and other characteristics.

As a supplementary direction of research, we can cite the work of foreign scientists Williamson and Komlenovich (2022) [6]. They put emphasis on the effectiveness of investment in various segments of the EdTech market. In other words, digital platforms are primarily considered as strategic assets that can provide a return on investment and different market segments are assessed from the diversification strategies.

Finally, a new approach to EdTech market segmentation is developed and adapted to describe different delivery modes [4]. The key criterion here is the way of "packaging" the educational product - the way the user's learning process is organized. There are six key options: gamification of the educational process, content delivery in the form of online courses, hybrid format of training (combination of online and offline classes), splitting educational courses into small blocks for more effective learning (micro-learning) and automatic class schedules [4]. This approach differs from previous studies, because instead of considering only technological solutions, the authors also take into account the system of student-teacher interaction. It enables a more comprehensive understanding of the mechanisms and outcomes of platform processes: reducing transaction costs, increasing communication connectivity, and developing network ties. However, this approach is intended only for describing one aspect of interactions within commercial electronic educational platforms.

The studies discussed above illuminate the educational technology market from different sides - from the side of the user, who receives an educational service, and from the side of the company that provides educational services and from the side of the investor that invests in EdTech startups and gains profit. Thus, we can conclude that interest in EdTech market segmentation has exploded among academic researchers, and for more than 25 years, they have been adding new criteria to their models making them more complex and detailed. But nowadays significant transformational changes make it necessary to reassess research approaches that we apply to studying multilayeredness of EdTech markets and the high level of internal diversity of each segment.

To evaluate the educational technology market a broader and more integrative perspective is needed: we seek to bring together disparate criteria into a more comprehensive framework. The segmentation approach seems to be justified, since it pays special attention to the main features of every segment and its relational position. The development of such an approach of segmentation with the subsequent mapping of the Russian EdTech market is the main purpose of this article.

2. Methodology
In our study we used a mix-method - a combination of qualitative and quantitative methods.

On the one hand, the study was based on data obtained from the collection of semi-structured interviews with representatives of EdTech companies. We designed the guide in reference to concepts from the literature and previous studies. The first section contained items to elicit respondents' organisational information, including their professional status in the company, as well as the basic information about company's main activities and client audience. The second section contained items to reveal motives and barriers for creating new market niches. The third section contained items to describe monetization models, delivery options and revenue flows. The data was collected during the one-hour online interviews. We divided our respondents in 4 groups: CEO of EdTech companies, marketing directors, owners/founders and new startupers in education. This method allowed us revealing new interpretation of EdTech segments' appearance and development from companies' point of view. It was important to include the representatives of all pre-identified segments in order to increase the objectivity of our research. Thus, we included in the list of respondents companies out of the top 100 leading players. The collected interviews were transcribed and coded in a special program, atlas.ti. The trends in the educational technology market, identified on the basis of the collected interviews, were analyzed and compared with the previously defined segments. The biggest advantage of collecting interviews is the opportunity to identify the key trends based on all seven segmentation criteria identified instead of only three of them, how it was shown in the quantitative part of the research.

On the other hand, we applied clusterization algorithms to provide quantitative analysis of EdTech market segments.

Prior to forming our algorithm we will summarize previously elaborated approaches and their criteria sets. Further we will consider alternatives according to criteria chosen.

The product kind. This criteria reflects the variety of final products that a particular company offers. Here we identified five main kinds. The ***online library*** type may offer educational content to the customer without the subsequent feedback or any verification of the acquired knowledge. Most often, such educational resources have the form of a virtual library, and the learning process is based on watching various lectures or reading textual materials. The second type is the ***online school***, which presents a more sophisticated version of online libraries. The key difference between these two types is the expanded list of functions and options. Besides providing content to learners, online schools also have a set of tools for assessing the user's knowledge, skills, competencies and the whole level of educational material assimilation. Such a toolset is often represented as a list of control tasks, tests with further explanation of errors made by the user (formative assessment).

The next two types differ from the previous ones. The distinctive feature is the fact that companies belonging to the third and fourth types are not directly involved in the user's learning process. Instead they are supposed to mediate the learning process. The third type is ***marketplace*** platform, the main purpose of which is providing a meeting place for buyers and "sellers" of knowledge. Their focus lies in joining different producers of content (like tutors or lecturers) and potential students. Companies belonging to the fourth type provide technological solutions and various types of ***software*** for educational content producers. This category includes platforms for the online courses development, learning management systems and others.

The product type. The second criteria characterizes the field of knowledge to which the company's product belongs. We distinguished the following areas:

- School and pre-school education: educational and upbringing classes for children up to age of 17.

- Professional skills: competence development, advanced training and upgrading employees (reskilling and upskilling).

- Business education: business skills, entrepreneurship and project management courses.

• Foreign languages: learning foreign languages both as part of professional skills and for all-round development.

• Culture and recreation: activities for personal development in the areas of culture, leisure and sports.

• Broad field: the product has a wide range of applications, not limited to one particular area.

The product purpose. The third criteria is related to the product's main purpose. The first purpose is obtaining knowledge in various fields. The second one joins tasks related to testing the user's knowledge and competencies - it could be proctoring systems, online simulators, interactive tests and creative tasks. The third option is content creation: the user refers to the platform in order to obtain tools for creating his own educational materials or "packaging" them. The fourth one is aimed at managing educational and administrative processes. Such platforms most often interact with schools, universities or corporate systems, providing them an interactive learning environment.

The type of embedded technology. A great deal of segmentations are based on technological solutions that a company predominantly integrates in their EdTech products. Taking into account existing alternatives as well as current technical innovations, eight key alternatives were identified: immersive learning with VR and AR, mobile learning, the use of blockchain technologies in order to protect consumer's data, learning with AI, the use of Big Data analysis to optimize and increase the efficiency of the learning process, cloud computing and learning management systems (LMS - Learning Management Systems) and learning personalization systems (Learning Experience Platform).

Product "packaging" type. Companies can offer four main ways to organize the user's learning process: a blended learning format (online and offline lessons), splitting the courses into smaller modules (micro-learning), the individualization of the learning process and the gamification of the learning process.

Consumer type. There are different models of segmentation based on the customers' age or educational level, but according to the authors' point of view, the most effective and relevant segmentation should be based on the widespread marketing strategies *"b2b", "b2c"* and *"b2g"*. These criteria reflect not only the type of a customer, but their interaction mechanisms and delivery channels as well.

The content monetisation model. Nowadays many companies use different methods to charge customers for the product or service they provide. The most common ways to monetize content are:

• content subscription (payment for a certain time period),

• sale of single courses,

• sale of individual lessons,

• tutoring (accompaniment of the learning process by a teacher-mentor),

• sale of services,

• payment for an account,

• freemium model (free content with limited functionality and paid use of additional features),

• payment for users,

• Income Sharing Agreement model (the training period is free, the fee is charged later after the student's employment).

Due to the lack of available data in open sources, we decided to develop the segmentation based on three criteria out of seven: kind, type and purpose of the EdTech product. The criteria chosen pre-determined the use of categorical data in the segmentation process. For this reason the CLOPE algorithm for segmenting categorical data was chosen as a suitable method. This algorithm clusters the categorical data, or, more precisely, the set of transactions, through the

maximization of the target function, which is based on the height parameter of the cluster histogram. The key idea of the algorithm is to distribute these transactions into clusters so these clusters have the set of transactions with the greatest number of common characteristics.

To test the developed methodology, we analyzed data on the activities of the top 100 leading edTech companies in terms of revenues for the 1st quarter of 2023. To test this hypothesis, secondary statistical data were taken, including the economic performance of the companies in the period from the 4th quarter of 2022 to the 1st quarter of 2023.

After applying the algorithm and analyzing the resulting separation, the main market segments were identified. Some of the clusters, identified by the CLOPE algorithm, were aggregated by meaning. The resulting segments were then analyzed in terms of cumulative income flows during the period from Q4 2022 to Q1 2023.

3. Results

The EdTech market mapping was conducted on a sample of the top 100 Russian Edtech companies ranked according to their revenue in Q1 2023. The resulting clusters were analyzed and combined by meaning into the final 9 segments. The developed segmentation includes both: large segments and small segments consisting only of a single company. According to the analysis, the largest part of the most successful Russian EdTech companies in terms of revenues in Q1 2023 is presented by online schools (66% of all companies). 21% of the companies are shared equally between platforms that provide software for content creation, learning management systems, and online libraries designed for content learning. The online schools designed for content learning represent the majority among the top 25 platforms leading in revenue growth' amount from Q4 2022 to Q1 2023. Besides, among the first twenty five positions in this ranking there are representatives of the third cluster - platforms for content creation, the fifth one - platforms providing software for managing educational and other company's processes, and the seventh cluster - online schools designed primarily for testing knowledge and competencies. Thus it was concluded that despite the overwhelming supremacy in demand for the services of online schools, new requests are beginning to appear in the market, and the demand vector is shifting.

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Strategies of the Company's Participation in the GVCs during External Shocks

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Abstract:
This article describes a study on the problem of enterprises' participation in the GVC during external shocks. Using econometric models, the assessment of the dependence of the stability of companies on the position and participation in the GVC is carried out.

1. Relevance of the paper

For a long time, manufacturing companies involved in global value chains have been experiencing external shocks that directly affect their survival. A wide range of international sanctions, including financial, commercial and private ones, have undermined Russian trade, causing disruptions in logistics and a sharp rise in commodity prices. As an example, described in the work of Kurenkov P.A. et al., 2022, shows that the ports of the Baltic Basin in July 2022 lost 76.2% of container turnover. 51.85 thousand were handled. TEU vs. 218.07 thousand. TEU last year. Exports fell by 71%, imports – by 82%, transit – by 89%. At the end of the month, 1,2 thousand were handled . TEU of coaster containers, no transshipment was carried out last year. The decline in transshipment in the Big Port of St. Petersburg was 73%, in Kaliningrad - 92%, in Ust–Luga - 49%. Russia is a major exporter of goods in the global value chain, which explains why disruptions in trade with Russia have global consequences, primarily in the form of higher energy prices. This affects transportation costs and, consequently, almost all GVSs.

Today, approximately 60% of world trade consists of intermediate goods and services that are used at various levels of production networks before reaching the final consumer. Global value chains, including cross-border trade and foreign direct investment (FDI), are becoming increasingly predominant and expanding, playing an important role in the process of global integration. Generalized studies also confirm the potential benefits of global value chains for development, including the possibility of increasing income and productivity, expanding labor opportunities and reducing poverty through specialization in value chains. However, enterprises participating in global value chains have high risks of declining profitability in the face of external shocks, in which there is a gap in supply chains. As a result, enterprises on a strategic basis lack an understanding of how participation in the GVC actually affects their key indicators, which leads to incorrectly made decisions, including without taking into account the position in the GVC.

The proposed study will allow us to jointly analyze the behavior and performance of the companies included in the GVC, including in the context of the impact of sanctions. The details of innovation and transformation of business models will be studied in relation to the dynamics of the main financial indicators of companies.

The results obtained allow us to explain the specifics of the response of firms in GVC to global crises by studying the effects associated with innovation activity and the transformation of business models. In addition, the new data will allow us to discuss the effects associated with the heterogeneity of the impact of shocks on firms in the Russian economy.

2. The research question(s) and methods

The proposed study is aimed at solving problems related to the assessment of the impact of the participation and position of the enterprise in the GVC on sustainability and efficiency, propensity for innovation in the context of crisis and sanctions phenomena.

The study is planned to be conducted using data from the BEEPS 2019-2020 survey. Modeling will be carried out using appropriate methods of econometric analysis, which, taking into account the limitations inherent in the use of cross-sectional data, make it possible to establish a causal relationship, including logit and probit regression methods, the Hausman method.

3. Recent research papers

In the framework of previous studies, results were obtained reflecting the positioning of Russian enterprises in global and national value chains, including factors determining positioning in global and national chains, and extensive experience has been accumulated in analyzing the factors and effects of foreign economic activity of enterprises, including in relation to the specifics of the organization from the industry. The existing experience of studying the specifics of the economic behavior of Russian companies in integrated structures (groups) will also contribute to the implementation of the tasks set.

The theoretical basis for understanding the effectiveness of business in global value chains was considered by Muzas S. and Bauer F. (2022). The authors identified three potentially interrelated and contradictory indicators of business performance: operational efficiency, market efficiency and financial stability in order to study their impact on profitability, growth and solvency.

The paper argues that while some specific business performance indicators will be sufficient during periods of stability and growth, they can make firms operating in global value chains vulnerable during periods of adverse conditions.

In addition to evaluating the effectiveness of companies, factors affecting the sustainability of companies in global value chains should also be taken into account. In a study by Anna-Lena Resch et al. (2023), potential factors that can increase resilience in a dynamic environment were analyzed. This study was based on an online survey of 238 logistics experts from Germany, Switzerland, Austria and Georgia and showed that reliability and responsiveness indicators in global chains have a significant impact on the sustainability of companies.

4. Expected results

The results concerning the relationship between the management model in the chain and the sustainability and efficiency of enterprises in the chain are difficult to predict. On the one hand, taking into account the available theoretical and empirical results, it should be assumed that enterprises that depend on the parent company in the chain have less financial freedom, less experience in decision-making and, thus, will demonstrate less efficiency and stability during crisis periods. On the other hand, enterprises that depend on the parent company in the chain, as a rule, receive additional information and recommendations from the parent company, and also take advantage of the opportunities to redistribute financial resources within the group, which allows them to increase efficiency without additional effort and remain more stable even in a crisis. in times of crisis.

Ranking approaches and comparing them with the final impact on business will help to form best practices that contribute to maintaining the trajectory of sustainable development in the face of crisis phenomena.

The study will help the company to choose an effective development strategy, taking into account the participation and position in the GVC.

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Language and Professional Communication
in Business Education

VR Public Presentations Training Effectiveness Subjective and Objective Assessment: Experience and Further Developments

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Abstract:
The paper is describing preliminary results of VR based training of public presentation skills held for the GSOM SPbU students of various educational programmes and concentrations from March to June 2023, and suggests further developments of research design for assessing the objective effects of trainings.
Methodology of assessing the results of trainings used in the described trainings of Spring 2023 was based on subjective measurements, including pre- and post-test questionnaires.
Results of analysis of these questionnaires are described in the paper, with suggested hypotheses for further research development and practical recommendations on the basis of the results. Namely, positive relationship has been shown between perceived ease of use of the simulator and learning progress, while negative relationship has been shown between perceived progress in learning and perceived usefulness of training, understanding of its purpose and willingness to recommend; due to the counterintuitivity of this result, several hypotheses have been suggested regarding its possible explanation, requiring further assessment in forthcoming research development.
However, just subjective measures seem insufficient for assessing the results of public presentation skills training without objective assessment of, obviously, public presentations; a possible structure of such assessment is suggested for the further research in the forthcoming 2023-24 academic year.

Keywords: *VR training, public presentation skills, research design*

1. Literature review

The introduction of virtual reality (VR) and augmented reality (AR) technologies into education is today one of the current trends in the development of education, often perceived uncritically as a kind of panacea; however, it is clear that, like any other technology, VR and AR can be relatively more effective in teaching one kind of knowledge, skills and abilities, and less effective in teaching others.

The use of VR and AR technologies is most common for teaching hard skills in medicine (Kleinsmith et al., 2015; Pensieri & La Marca, 2019), construction (Jantakun, Jantakun & Jantakoon, 2023), aviation (Näykki et al., 2022), etc.; the use of such technologies for teaching communicative soft skills, although it suggests itself (to teach, for example, stressful communication before entering into such communication with real interlocutors (Blagov et al., 2022 (1))), but began to develop later (McGowin, Fiore & Oden, 2021).

Most trainings of this kind are carried out for corporate clients (Ramnanan, 2022); quite relevant, in our opinion, is the introduction of VR training of communication skills in business education (De Barros Vasconcelos Fernandes, 2023).

The Digital Technologies in Education Science and Research Center team (including the authors of the current paper) implemented a number of studies on the comparative effectiveness of teaching communication skills using VR and alternative technologies at the GSOM SPbU and a number of other universities, in particular, the School of Advanced Studies of Tyumen State University (Blagov et al., 2022 (1, 2)); This paper describes the results of participants'

subjective assessment of the effectiveness of presentation skills VR trainings held in the spring semester of 2022-23 at GSOM SPbU, and considers options for including objective indicators in the assessment of training results, thereby integrating these trainings more deeply into the overall educational process.

2. Research methodology

A VR environment based public presentation trainings have been held at GSOM SPbU from March to June 2023 for the students of various educational programmes (mainly Bachelors in Management of various concentrations).

Before and after the training, the participants answered the questions about their public presentation skills and barriers to public presentation confidence.

Namely, the participants had to choose the value of the scale from 1 to 10 that best characterizes their skills in the following questions (originally in Russian; here the English translation is given, with Russian original version in brackets):

1) I am confident about my presentation skills (Я уверен в своих презентационных навыках);
2) It is easy for me to concentrate on the content of my speech (Мне легко сконцентрироваться на содержании моего выступления);
3) I am sure that it is difficult to distract me during my speech (Я уверен, что меня сложно отвлечь во время моего выступления);
4) I find it easy to maintain eye contact with the audience (Мне легко удерживать зрительный контакт с аудиторией);
5) I can speak without reading text from my slides (Я могу выступать, не читая текст со своих слайдов);
6) I do not use filler words during my presentation (Я не использую слова-паразиты во время выступления);
7) I do not use harsh words during my presentation (Я не использую грубые слова во время выступления).

The questionnaire filled after the training included the questions considering the training feedback:

8) I felt comfortable being in the VR environment (Мне было комфортно находиться в виртуальном пространстве);
9) I had to adapt to the environment and interface for a long time before I switched to presentation (Мне приходилось долго адаптироваться к среде и интерфейсу, прежде чем я переключился на презентацию);
10) The main purpose of the training was clear to me (Основная цель обучения была для меня понятна);
11) I find that training on the VR simulator was useful for me (Я считаю, что тренировка на VR тренажере была для меня полезна);
12) I can recommend this simulator to my colleagues (Я готов рекомендовать данный тренажёр моим коллегам).

Comparison of the answers to questions 1-7 before and after the training showed a significant increase in the average value of the answers to all questions, which also correlates with the values of the answers to questions 8-12.

The difference between the mean post-test and pre-test values of answers to questions 1-7 is shown in Fig. 1:

Answers to questions 1-7: post-test exceeding pre-test
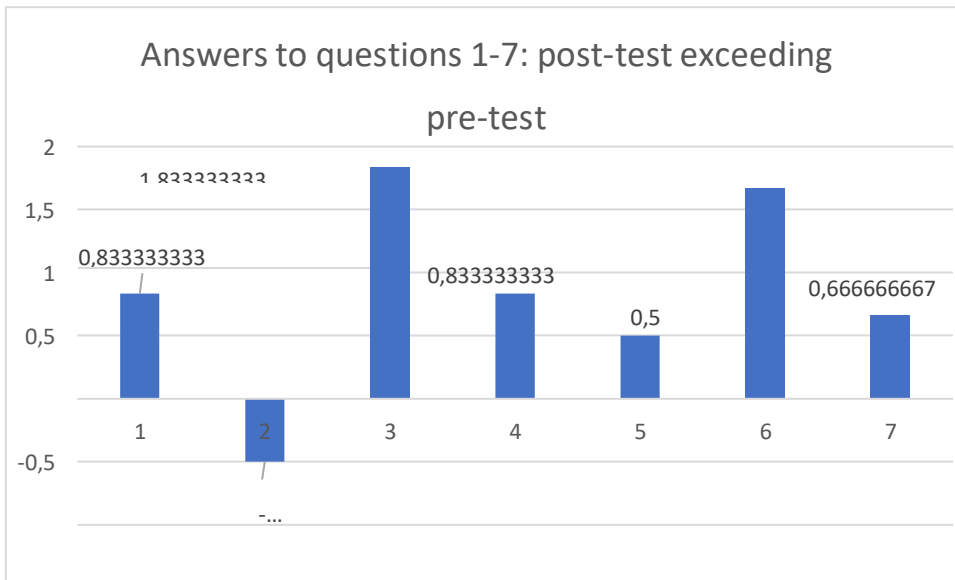
Quite interesting here is the largest value of the difference for question 6 ("I do not use filler words during my presentation"), confirming the subjective experience of some of the current study authors, after the first acquaintance with the simulator noting an increase in the speech tempo and intonation orderliness. However, this dependency has certain objective neuropsychological correlates (see e.g. (Sanborn et al., 2022; Wang, Liang & Chen, 2023)), making the use of a VR simulator especially effective; a deeper study of these dependencies seems to be quite a promisingdirection for further study development.

Let us now consider the correlation of the difference between the post-test and pre-test values of respondents' answers to questions 1-7 and respondents' answers to questions 8-12 (Table 1).

	8) I felt comfortable being in the VR environment	9) I had to adapt to the environment and interface for a long time before I switched to presentation	10) The main purpose of the training was clear to me	11) I find that training on the VR simulator was useful for me	12) I can recommend this simulator to my colleagues
1) I am confident about my presentation skills	0,36184651	-0,667947488	-0,511408312	-0,265197418	-0,48132547

2) It is easy for me to concentrate on the content of my speech	0,534838302	-0,495187568	-0,404226042	-0,089087081	-0,404226042
3) I am sure that it is difficult to distract me during my speech	0,726916264	-0,458380789	-0,327584296	-0,024895194	-0,180736164
4) I find it easy to maintain eye contact with the audience	0,226255979	-0,197654172	-0,050935455	-0,10159748	-0,3503532
5) I can speak without reading text from my slides	0,469522924	-0,192128242	-0,083645868	0,469522924	0,055763912
6) I do not use filler words during my presentation	0,45614177	-0,430516931	0,026153289	0,158507365	0,130766445
7) I do not use harsh words during my presentation	-0,214412323	-0,099258333	0,064820372	-0,142857143	0,129640745

Quite logical here are the negative correlations for question 9 "I had to adapt to the environment and interface for a long time before I switched to presentation", showing, due to the reverse coding of question 9, a positive relationship between perceived ease of use of the simulator and learning progress (that is consistent, in particular, with the results of (Elgewely et al., 2021; Lee, Peng, 2023). However, the rest of the negative correlations presented in the table (especially between questions 1-4 and 10-12) look somewhat counterintuitive, because they can be interpreted as a negative relationship between perceived progress in learning and perceived usefulness of training, understanding of its purpose and willingness to recommend. Several explanations can be given to this result.

Firstly, obtaining a positive result can lead a respondent to overestimating her own skills as

such and her contribution to the skills progress and underestimate the contribution of the training (to some extent explainable by the fundamental attribution bias effect in its self-positive bias form (Kestemont et al., 2015); evidence of such effects for VR environment based trainings can be found in, e.g., Drigas, Mitsea, Skianis, 2022; Monteiro et al., 2023).

Secondly, although perception of the presentation skills development effect of the training could be good for the respondents of the study (as well as the perception of ease and comfort of use of the simulation, as can be seen from answers to the questions 8 - 9), perception of the research design of the study itself could be not as good, thus showing requirements to the study design further optimization (in addition to this subjective authors' reflection of the current study, related evidence considering VR based training environments is demonstrated in, e.g., (Bellido García etal., 2022; Erima, Garaba, 2022)).

A third hypothetical explanation could be that a significant progress in public presentation skills during the training can be reached through a considerably high level of stress, thus decreasing the subjectively perceived comfort of the procedure itself; a negative correlation between perceived (as well as objectively measured – although no objective measures have been used in the current study, these can be used in further developments) stress and satisfaction of VR trainings is a rather well described phenomenon in literature (see, e.g., De Carlo et al., 2020; Toyoda, Russo-Abegão & Glassey, 2022; Khenak et al., 2023).

Surely these suggestions and hypotheses, being considerably general, require further testing on samples with a wide variety of demographic variables of respondents (in particular, in studies of students in higher education programs - students in programs of various levels of study, various areas, etc. (in particular, in studies of students in educational programs of higher education - students in programs of various levels of education, various directions, etc.; it is also potentially fruitful to compare the subjective answers of respondents with indicators of objective control of the parameters of the training results, e.g., grades of the course projects defense for the students (Liu, Becerik-Gerber & Lucas, 2023), as well as the dynamics of physiological and psychophysiological indicators (Labedan, Dehais & Peysakhovich, 2021)).

3. Further developments

To obtain that, it is proposed to organize public speaking trainings with a survey before and after the training for 1-4 year undergraduate students in May 2024 in preparation for the defense of course and final qualifying works; it seems interesting to compare the results of the survey (as well as indicators of objective control of behavior in a VR environment) with the results of defenses. Such a study will allow using a statistically significant sample to test hypotheses about the impactof training in a VR environment on concentration and performance quality, and about the impactof subjective self-assessment on the effectiveness of this training.

One preliminary attempt to such a study of objective metrics had been undertaken within the GSOM ESG Lab Case Championship, with groups working from mid-April to the defense of June 6th 2023; from 8 groups participating in the particular section of the Championship, one group didvoluntarily participate in the training, while the others did not; the group with a training experience had been a winner of the section according to the voting of the jury (with a subjective perception of the jury members as the only group developing an eye contact with the audience in the contrastto the other groups with eyes in the paper notes; the jury didn't have a knowledge of any of the groups undertaking any specific trainings, and as a whole didn't participate in the training as such).However, surely, an example of a one group out of 8 is under no circumstances having any statistical significance; so, a survey of a statistically significant sample takes on special importance.

A main category of **independent (influencing) variables** for such a study could be, obviously, the respondent's passing of the training.

This category can be decomposed into the:

- passing of the training itself;
- regularity of passing of the training;
- how many times the training has been passed (once or more);
- for the group projects (in the GSOM SPbU context – 1st and 2nd year course projects, as well as the case championships like the one mentioned above) – how many of the group members did undergo the training.

The **dependent variables**, in their turn, are considering various dimensions of external grades of the projects.

A considerably obvious problem here is that the grading criteria for various projects are different: even if we don't consider extracurricular activities like case championships, course projects of various concentrations, education levels and course years are having different criteria of grading (although to an extent based on close principles, but formally sharing just a Russian 2-5 and an ECTS A-F scales).

Possible solutions to this problem could lay in two main directions.

Firstly, grading criteria of (at least) various programmes and years course project defense at GSOM SPbU can be standardized to a higher level, at least in relation to the presentation skills component.

Secondly, a specific questionnaire can be developed for distribution to the defense jury before the defense, including, e.g., questions close to those from the current study questionnaire (thus, allowing looking on the same presentation skills subdimensions from both internal/subjective and external/(more) objective perspectives).

An apparent critical point to this idea could be the jury members' reluctance to doing extra job, how filling extra questionnaires can be perceived (Al-Maqbali & Raja Hussain, 2022; Khamzina, Desombre & Jury, 2023); however, even taking this into account, process of developing a questionnaire can be faster, thus leading to faster results obtaining than the various programmes grading criteria reconciliation variant.

A strong point of the special questionnaire variant is that it can help controlling the **control variables** of differences between the educational programs of various concentrations from the side of committee members specificity (thus, questionnaires for them must include demographic variables related to, e.g., their basic education and current job).

The control variables related to the students (presenters) side can include:
- the programme variables: concentration (from the "macro" level of humanitarian/social sciences/natural and technical sciences gradation, to finer micro-classifications (e.g., Information or International Management within the Management concentration)) or programme level (e.g., Bachelor or Master);
- the individual variables: age, gender, previous/basic education (for students of postgraduate programmes).

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Conversational Artificial Intelligence for Inclusive Education

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Abstract:
Conversational Artificial Intelligence systems such as ChatGPT and Google Bard conquered the hearts of developers thanks to their debugging and code generation capacities. While being trained on large textual data and enhanced with such technologies as Reinforcement from Human Feedback, these models aim to assist and answer questions on an unlimited number of topics. However, the application of Conversational Artificial Intelligence agents in real-life social domains is questionable. Large language models tend to "hallucinate", that is to generate misleading texts containing false information that might sound convincing for users without appropriate knowledge of a topic. The study aims to find solutions to this problem on the material of a custom question-answering dataset about inclusive education and Autism Spectrum Disorder. The study discovers various ways of enhancing Conversational Artificial Intelligence by applying transfer learning techniques, changing the dataset structure, using extractive methods instead of generative and experimenting with knowledge graph systems.

Kewords: *Conversational Artificial Intelligence, Inclusive Education, Dataset, Transfer Learning, Social Domain*

Conversational Artificial Intelligence is a research field that contributes to the development of dialogue systems, for example, chatbots and virtual assistants. Such conversational models enable human-machine interaction by simulating human behavior and solving text-based tasks. For example, conversational agents are capable of question answering, information retrieval, chit-chat, etc. This study focuses on social applications of Conversational Artificial Intelligence. Studies show that applying large language models, for example, ChatGPT or Google Bard, might benefit educational (Kasneci et al., 2023), medical (Moons, Van Bulck, 2023), information technology (Sobania et al., 2023) sectors and other domains. However, applied Conversational Artificial Intelligence is accompanied by a risk arising from social biases, generative "hallucinations", peculiarities of prompt engineering and other concerns (Kasneci et al., 2023). What happens if we integrate an intelligent conversational agent into the inclusive education application? If the application targets pupils with special needs, the listed problems become particularly acute.

Consider the case of developing a chatbot that answers user questions about inclusive education. The developer has compiled a machine learning dataset with question-answer pairs that contain information about respectful interaction in an inclusive class, where children with special needs and neurotypical pupils study and play together. Building a system from scratch is costly because it requires considerable time and computing power, so the developer decides to apply a transfer learning method (Ruder et al., 2019). The developer uses a pre-trained robust language model based on Transformer architecture (Vaswani et al., 2017) that already contains basic knowledge about the language structure to fine-tune it, i.e. to re-train the neural network using that small closed domain dataset about inclusive education.

On a high level, machine learning allows a model to retrieve the most statistically significant features through a given dataset; a neural network selects features that will result in the highest possible metric scores to solve a given task efficiently. Training a general-purpose large language model means retrieving and memorizing a probability distribution of tokens

through text data. For example, the model can extract common syllables, morphemes and collocations during the analysis of an open-domain dataset. Re-training a model means using the ground knowledge of the natural language as a foundation to enhance the model with closed domain knowledge. For example, during re-training, the model can memorize common collocations describing education and inclusion or extract facts about communication.

Along with such basics as the natural language structure, the models learn bias, i.e. deviations in the data indicating statistical patterns in the data (Danks, London, 2017). Although learning bias is inevitable for proper machine learning, as it allows models to find differences between entities, it is often associated with discrimination and unfairness (Ferrer et al., 2021). Harmful biases in Artificial Intelligence usually occur during model training or usage. While training, the model captures prejudices in the training data, thus, reflecting existing social inequality. Another scenario occurs when the data lacks some information or is not representative. The system is not used as intended. Most studies on Artificial Intelligence target gender and racial bias, while the issues of machine unfairness towards people with disabilities stay behind the scenes. For example, autonomous vehicles still cannot recognize wheelchair users, which can cause car accidents. Also, virtual assistants still do not recognize the voices of people with speech impairments (Whittaker et al., 2019).

The study focuses on bias manifestations in Conversational Artificial Intelligence agents and their mitigation strategies. The proposed approach uses a custom question-answering dataset about inclusive education and Autism Spectrum Disorder to build a Conversational Artificial Intelligence system with various machine learning techniques. The techniques are borrowed from the following branches of Artificial Intelligence: Data-Centric Artificial Intelligence (Zha et al., 2023), Transfer Learning (Ruder et al., 2019), and Graph Learning (Xia et al., 2021).

The Data-Centric Artificial Intelligence experiments imply changing the dataset structure to improve the technical performance of the model. The study includes different Transfer Learning techniques. First, several Transformer-based (Vaswani et al., 2017) pre-trained models are fine-tuned on a custom dataset by adding layers to the initial models. Second, the hyperparameters of the models are changed. The proposed techniques aim to adapt general-purpose language models for extractive and generative question-answering. The Graph Learning method implies building a knowledge graph for the proposed task and thus enhancing existing Conversational Artificial Intelligence solutions.

The study uses a custom dataset about Autism Spectrum Disorder as research material. The dataset inherits the structure of a question-answering dataset SQuAD version 2.0 (Rajpurkar et al., 2018). SQuAD is a dataset that can be used to build models for Machine Reading Comprehension or extractive question-answering. The task is to retrieve an answer to a user question from a given reading passage. The dataset contains sets of question-answer pairs and corresponding reading passages. The dataset also comprises a certain percentage of unanswerable questions that can't be answered based on given reading passages. A machine learning model trained on SQuAD version 2.0 should learn to detect those questions.

The dataset proposed in this study was compiled through a crowdsourcing platform Toloka. The crowd-workers were to read text passages extracted from a Russian web resource AutisticCity (https://aspergers.ru), then pose one or several questions to a given passage and highlight plausible answers in the text. Next, the crowd-workers were to create one or several questions unrelated to Autism Spectrum Disorder (the type of questions that a machine

learning model should learn to ignore). Related and unrelated questions with the extracted reading passages formed a SQuAD-like dataset. The new custom dataset was devoted to the topic of Autism Spectrum Disorder.

The dataset was a foundation for the Data-Centric part of the study. The structure of the material was changed as follows: (1) the number of question-answer pairs was decreased twice to assess the impact of the dataset volume on a model performance; (2) the number of plausible answers to each question was increased up to three; (3) the length of each answer was decreased where possible; (4) the unrelated questions that a model should ignore were eliminated from the dataset. The dataset and all of its Data-Centric modifications are available at https://doi.org/10.6084/m9.figshare.13295831.v19. Table 1 presents the results of the experiments.

The Transfer Learning experiments were conducted with the Transformer-based pre-trained models presented in the Hugging Face repository (Wolf et al., 2019). The dataset proposed in this study is initially built for extractive question-answering. However, generative question-answering is another robust technique that has proved its efficiency thanks to meta-learning capacities (Vilalta, Drissi, 2002), and the performance of GPT-family (for example, ChatGPT,InstructGPT, GPT-4) models prove this concept (Ouyang et al., 2022). This part of the study focuses on open-source solutions because Transfer Learning techniques are applicable only to "tunable" models. Thus, models like ChatGPT that are available only through API are not considered in the Transfer Learning part of the study.

As a result, the dataset was applied to train several open-source Transformer-based models supporting extractive and generative question-answering. For extractive question-answering, text retrieving layer were added on top of the models based on Transformer encoder (BERT (Devlin et al., 2019), DistilBERT (Sanh et al., 2019), XLM-RoBERTa (Conneau et al.,2020)). For the generative approach, the dataset was converted into a set of strings and used as input for the general-purpose language model GPT-2 (Radford et al., 2019), which should have learned to answer questions based on the information from the dataset with meta- learning. Table 2 shows the result of the fine-tuning. The extractive approach proved to be more reliable. The demo version of the extractive model fine-tuned for this study is available at https://huggingface.co/missvector/ru-asd-qa-bert. The fine-tuning demo and example of the model are available at https://github.com/vifirsanova/empi/ (see the file "fine_tuning_demo.ipynb").

Graph Learning in this study is an experimental idea of enhancing question-answering modelsby combining the capacity of large language models such as ChatGPT or InstructGPT (Ouyang et al., 2022) with graph-based machine learning. Although there are some solutions for enhancing Conversational Artificial Intelligence with reasoning (Yao et al., 2022), the graph-based conception is exceptionally novel. The approach proposed in this study aims to build a reliable model for inclusive education. The proposed structure of such a system is presented in Figure 1. The model takes a user question as input, retrieves an answer from a DBPedia-like (Auer et al., 2007) knowledge base with SPARQL (Segaran et al., 2009) query, and uses entities extracted from the graph to generate consistent natural language answerswith a Conversational Artificial Intelligence agent API.

Overall, the study proposes several solutions for enhancing Conversational Artificial Intelligence to adapt the existing models for inclusive education. The takeaways are the following. From the point of view of Data-Centric Artificial Intelligence, the elimination of questions unrelated to the question-answering system domain might improve the technical performance of the machine learning model. However, such a model will not be able to tell a

relevant user question from an irrelevant one. From the point of view of Transfer Learning, generative approaches lead to higher metric scores, but they also tend to "hallucinate", which is why using robust extractive approaches is preferable. From the point of view of Graph Learning, this field might allow us to use GPT-3, GPT-4 and newer versions of GPT-family Conversational Artificial Intelligence without "hallucinations" by combining the power knowledge graphs with generative approaches, although this hypothesis needs to be proven in the future.

Table 1. The results of the Data-Centric experiments obtained on XLM-RoBERTa (Conneauet al., 2020)

The applied dataset modification	F1
The dataset decreased twice	0.07
Several answers to one question	0.38
The shortened answers	0.33
The elimination of unrelated questions	**0.42**

Table 2. Results obtained on extractive and generative models compared with similar resultson SQuAD version 2.0 (Rajpurkar et al., 2018), MKQA (Longpre et al., 2021), and BioASQ(Fu et al., 2020) datasets.

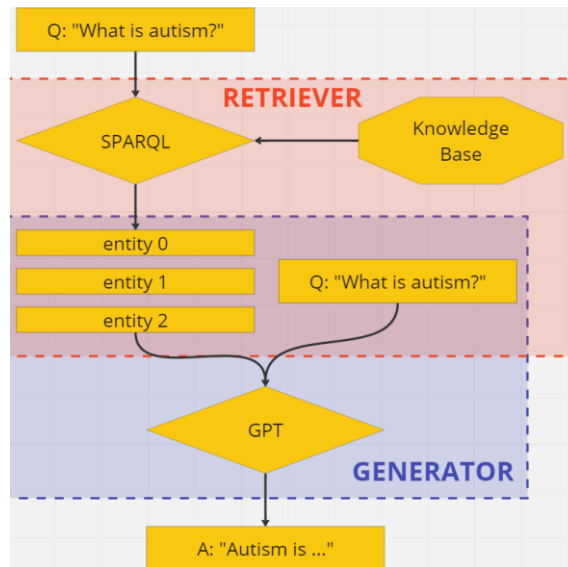| Model and approach	Dataset	F1
BERT (extractive)	Custom	0.31
	SQuAD 2.0	0.76
	MKQA	0.43
	BioASQ	0.11
DistilBERT (extractive)	Custom	0.33
	SQuAD 2.0	0.69
	MKQA	0.44
XLM-RoBERTa (extractive)	Custom	**0.37**
	SQuAD 2.0	0.77
	MKQA	0.35
GPT-2 (generative)	Custom	**0.54** (high metric score does not correlate with the quality of the model outputs due to the high rate of "hallucinations")

Figure 1. The proposed structure of a graph-based question-answering system.

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Modern Communication: Integral Approach

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Abstract:
This paper examines the integral approach and its practice that contribute to configuring a multifaceted understanding of communication nowadays. Communication in business is paramount to convey clear messages and build rapport among employees and with customers. The integral approach shapes communication as an interconnected system that includes social, linguistic, cognitive and cultural knowledge. The use of the integral approach made it possible to create an integral model of communication, which includes 4 sectors: social, cognitive, cultural and linguistic. Each sector provides valuable insights that help determine the place and role of communication in creating conditions for increasing quality of mutual understanding and efficient negotiating. The results show that company's employees can benefit from an integrated approach towards communication as it gives an opportunity to design a better communication considering social, language, emotional and value-specific particularities of your interlocutor. In this way, a successful business communicator understands and shapes the most efficient way of designing phrases, delivering the speech and interacting with the interlocutor.

Keywords: *communication, integral approach, sociolinguistics, cognitive linguistics, cultural studies*

1. Introduction and Relevance of the paper to the track topic

Communication could be defined in different meanings due to each field where and when it is examined. However, there is no doubt that nowadays it is becoming crucial not only to perceive communication as a set of phrases that transmit our message, but also as a representation of social, cognitive and cultural particularities that can provide communicators with deeper information on interlocutors and discover themselves as well. In the era of multicultural teams in companies and some business communication trends such as building trust via communicative strategies, more personalized attitude towards customers, focusing on omnichannel communication, the understanding of communication concept has become multicomponent. Communications is perceived as an essential part, which enhances business development through exchange of feelings, opinions; promotes organizational effectiveness. Communication is understood as an instrument of building sustainable relationship with coworkers and clients, and dealing with conflicts in a turbulent business environment. This principle of communication expansion leads to new approaches, which must be used in teaching successful communicators and affect the way they interact in communication.

2. The research question(s) and methods

In this paper, the notion of communication is viewed as the unity of speech, text and socio-cultural context. Consequently, a multidimensional approach to the study of communication reflects its multifaceted nature and reveals the interdependence of extralinguistic parameters (cultural, social, psychological, etc.) and the linguistic content of the communication itself. Many studies on communication have demonstrated that each approach from existing ones shows its limitations in the framework of communication analysis, if applied separately (Porus, 2013). Thus, among various approaches to communication, interdisciplinary research plays a crucial role, as it combines various means and tools for a comprehensive consideration of the multicomponent concept of communication. To study the communication with the help of

integral approach, a linguistic modeling method is used to create the integral model based on K. Wilber's idea of AQAL (all quadrants all levels).

In the second half of the XX century, the founder of the integral approach, K. Wilber, proposed his way to consider the nature of any object. The integral approach is based on the principle of non-exclusion, unification and optimal interaction of components. As a theoretical basis, K. Wilber presented the integral model AQAL (all quadrants all levels) (Wilber, 2013), according to which any event can be considered from 3 points of view (in the model they are called "sectors" and are transformed into 4 parts of a square): the sector "I" (how I perceive the object), the sector "we" (how we perceive the object), the sector "it" (objective facts about the object) and the sector "they" (collective knowledge about the object) (Wilber, 2006). This model gives knowledge about the objective truth of the object, about its subjective perception, about cultural meaning and about the functional side as it seeks to integrate different perspectives.
This integral approach was successfully adapted in discourse studies in order to examine complex phenomena of languages (Kubriakova 2006, Parulina 2020, Homutova 2017, Silkina 2021). In discourse studies, scientists pointed out that these quadrants could be adapted to the needs of actual language and communication studies as language is a complex phenomenon. According to AQAL adapted model in discourse studies, these 4 quadrants represent different aspects of language building reality, such as subjective experience, objective behavior, cultural values, and social systems.

3.   The results to be reported
Based on previous experience of applying the integral model in discourse studies by E.S. Kubriakova, I.Ju. Parulina, T.N. Homutova, O.M. Silkina, this approach has been also adapted in the analysis of communication from the perspectives of sociology, cognitive science, cultural studies and linguistics.

The sociological approach (interpretation of the sector "we") provides important insights about communicators: age, gender, occupation, relationships between interlocutors. The social portrait and knowledge of communicative values for different ages, genders, social groups influence the wording of discourse. This information is highly valuable to choose the most suitable style and register of communication, means of communication (a call, a text or voice message, a meeting face-to-face), time to initiate this communicative act (early morning amid breakfast time, late evening within after-party). In other words, business communicators are to analyze social portraits of interlocutors and modify the speech according to it: study language registers, evaluate the advantages and disadvantages of each means of communication, be aware of social values in different communities and societies in terms of communication. For example, we are aware that voice-messaging is banned in business communication on the level of top representatives or from juniors to seniors. However, this mean of communication is becoming more and more popular in the interaction with customers.

The cultural component (interpretation of the sector "they") provides data on the traditions and values of interlocutors, which could be manifested in communication or affect its process. For instance, in designing a communication strategy, one should consider psychological and emotional factors that influence how your interlocutor interprets messages due to his or her cultural background. These ones could be values and norms of the organization, community or the whole nation of the interlocutor's origins. Understanding this cultural background, a speaker could easily research the cultural values of the interlocutor and adapt the message to fit their cultural expectations. Business communicators have to develop intercultural awareness and sensitivity since this sphere demands communicating at cross-cultural settings. For example, knowing the difference between collectivistic and individualistic cultures, we could prioritize the needs of the group over our own needs amid negotiations. The correct prioritizing eventually affects communication outcomes.

Moreover, communication is considered from the standpoint of cognitive science (interpretation of the sector "I"), since our speech verbalizes fragments of our personal knowledge, emotions and reflections that we keep due to such cognitive processes as thinking, keeping attention and refocusing, analyzing, memorizing, perceiving, etc. If one understands how these cognitive processes function, it becomes clear how to express ideas, emotions in the way they are easy-to-follow and catchy for interlocutors. For example, it is paramount to analyze the physical and behavioral aspects of communication, such as body language, gesturing, facial expressions, emotional coloring of phrases and tone of voice, etc. of yours as a speaker in order to keep your interlocutor focused on you. In other words, our delivery style can enhance or suppress some cognitive processes of our listeners. A successful business communicator must be able to apply efficiently body language and modify nonverbal features of the speech such as speed, pauses, emotional express, etc. Thus, cognitive sector reveals emotions of the speaker manifested in the voice, gestures and even posture, which is closely related to certain communicative intentions of the speaker they pursue – to share a story, to support, to complain, to encourage, to gossip, to congratulate etc. For example, the level of emotionality correlates with the speed, pausing and body language. The emotion of sadness keeps a speaker delivering in a slow-paced mode, using pauses for effect, reflection and questioning; the gaze is usually directed downwards, the head is hanging, the chest is contracted, the lips are lowered. Moreover, in this way we can also identify the emotional state of the interlocutor in order to understand whether he or she is ready to perceive the information, whether the subject is becoming complicated or boring (Plutchik, 2001).

A linguistic approach (interpretation of the sector "it") crowns this integral approach, as a kind of endpoint for the embodiment of non-linguistic factors. Business communication can also benefit from this approach, because it involves analyzing the language used in business discourse, and could help to improve communication efficiency. Considering all the above, a business communicator comes to a point of shaping the content. A linguistic approach helps to deal with the number of words in a sentence, lexical connotations, and grammar structuring aiming at facilitating the wording of the ideas of speech. For instance, based on social distancing between interlocutors, cultural background and cognitive-promoting strategies, the communicator chooses the register and style-specific connectors to negotiate. Business discourse studies deal a lot with communicative strategies and tactics that a person should use to reach one's communicative goal. A communicative strategy is an operation that a speaker uses to reach his communicative goal. A communicative strategy could be packed with the help of lexical means, phrase-structuring, mode and aspect choice of verbs, etc. For example, amid business negotiations the communicator's communicative goal is to negotiate a contract. Thus, the person should use a list of communicative strategies and in a specific order. The negotiator usually uses the next ranking of strategies: informing, presenting, persuading, analyzing, demanding for agreement, informing. The choice and sequence of strategies is variable as the speaker articulates according to the developing of the situation and adjusts the communication. For example, the negotiations could involve such strategies as a compliment or emotional support, or even joking to articulate a certain idea and, finally, reach an agreement as a communicative goal. Thus, it is obvious that communicative strategies are highly interconnected with communicative behavior (delivery) and communicative interaction (social and cultural issues). This sector reveals a lot of details in the communicative process as it is estimated that each word could affect the recipient's psychological state, ability to elaborate solutions and react adequately.

To sum up, integral approach becomes necessary for the study of communication, since the integral model shows how the synthesis of directions complements the study of the object. This new approach brings about the necessity to re-think the role of the communication course in business education. It is assumed that spreading the notion of communication enhances negotiating skills of a person and ability to find the common ground with others. By taking an integral approach to business communication, one can develop a more comprehensive and

effective communication strategy that takes into account all relevant factors and perspectives. This approach can help to ensure that the message is received and understood by the audience, leading to better business outcomes. Overall, a business communicator has to consider all the quadrants of the AQAL communication model in order to pursue efficient and successful communication.

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Navigating Uncertainty through Dialogue: Metacurriculum as a Response to Educational Challenges

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Abstract:
This paper examines the need to reconsider the relationship between technology and education in the face of the uncertainty created by increasing specialisation, the proliferation of technology and the demand for interdisciplinarity in science and education. A metacurriculum design is presented to illustrate the relationship between dialogue, technology and interdisciplinarity. The paper underscores that the journey from discipline-specific knowledge to interdisciplinary understanding is key to the digitalisation and successful implementation of a metacurriculum. The authors argue that by using technology as a catalyst to reduce inherent uncertainty, dialogue can provide a deeper coordination of expectations between teachers and students.

1. Introduction

The current academic debate regarding the impact of digitalisation on education is raising a series of critical questions, including what digitalisation really entails, how educational institutions should respond to technological interventions, if there is a need to enhance digital literacy among teachers and students, and, how to harmonise technology with existing educational practices and institutional traditions. Although there is currently no consensus in today's educational discourse regarding the concept of degitalisation, experts do concur that digitalisation amplifies the uncertainty, caused, in part, by the rapid proliferation of technologies (Johnson et al, 2022). For instance, the ongoing discussion on the effects of artificial intelligence (AI) on education, strategies for comprehending and applying AI technologies to solving problems, the persistent calls for enhancing digital literacy among all participants involved in the educational process (Ng et al., 2021; Vashayil et al., 2019).

We argue that it is possible to deal with uncertainty in education by employing a dialogical approach (Bohm, 2004; Wegerif, 2007), where dialogue serves as a central component in learning that can regulate, rather than exacerbate, uncertainty. This perspective derives from systems theory, where dialogue extends beyond conversation and opinion exchange, but presents a process based on the entire spectrum of human experience, ranging from our values to the expression of emotions. Thus, dialogue serves as a means of collective inquiry, with participants collaboratively exploring a shared question or problem (Bohm, 2004). The role of dialogue lies in the collective construction of knowledge through interaction with others. In doing so, learners collectively negotiate meaning, with the teacher acting as a facilitator, guiding the dialogue. Here, technology offers tools for dialogical learning, thus, creating, expanding and maintaining the dialogical space, rather than providing 'tools for thinking' (Wegerif, 2007).

Therefore, in dialogue, knowledge is generated and maintained at the collective level, providing a mechanism for a human to interact with the world.

The described dialogical principles are the foundation of the metacurriculum model, designed and trialed by a team of teachers at the School of Economics and Management at Far Eastern Federal University (FEFU). This model seems to help participants of the educational process in adapting to uncertainty through dialogue. The model suggests moving away from the conventional linear model of education. Historically, the linear educational model was built on

the principle of 'constructive alignment'. The curriculum was shaped around clear learning objectives (often disciplinary in nature). Subsequently, to achieve these objectives appropriate techniques and methods were selected, followed by assessment procedures in order to see whether the student had achieved the goals set by the teacher (Biggs, 1999).

In contrast, a nonlinear model operates differently. Here learners craft their educational journey via self-organization, reflection and dialogue. In essence, learners acquire their own learning experience based on their abilities, prior knowledge, and leaning styles, following their own motivations and goals (Feist at al, 2018).

The model rests on the following question:

Is it possible to restructure the intersubjectivity of those involved in the educational process so that uncertainty can be regulated through dialogue?

Answering this question requires the following: approaches to dealing with uncertainty in education; a course design beyond the traditional curriculum; transformations, participants experience, within the course in terms of regulating uncertainty.

2. Theoretical prerequisites for the metacurriculum design

We consider uncertainty as an inherent feature of the relationship between technology and education. This uncertainty is exacerbated by the growing intricacy and technological diversity within the educational setting. In other words, the variety of technological options available makes it difficult for both teachers and students to decide which technologies to integrate into their educational practice.

In doing so, dealing with uncertainty involves grappling with both internal and external aspects. Internal uncertainty pertains to uncertainties arising from individuals themselves, including their abilities, preferences and capacity to adapt to emerging technologies. External uncertainty refers to uncertainties emanating from the environment, encompassing constantly changing technological trends, societal changes, the potential difficulties posed by new tools and techniques. Biologically and socially, humans function as adaptive systems that maintain stability against internal and external interventions for effective performance. Feedback loops, established through dialogue among participants in the educational process, ensure this stability (Beer, 2002; Luhman, 1996; Torday, 2015).

Thus, uncertainty is not something to be eliminated or avoided but a catalyst for dialogue, exploration and coordination. By recognising and embracing uncertainty, educational institutions and teachers can better navigate the complexities of the post-digital era and create a dialogical space that supports adaptive and meaningful educational practices (Johnson et al, 2022).

Navigating uncertainty requires creating a meta-system that connects individuals with their surrounding environment and maintains a dynamic equilibrium of internal and external uncertainty. This meta-system aids in adapting to uncertainty, which occurs both within the individual and within the educational context (Beer, 1994). In our case, this meta-system takes the form of a metacurriculum.

A fundamental principle of the metacurriculum is interdisciplinarity that aims to provide essential equilibrium within a complex system. This can shift the focus from instrumental learning, i.e., teaching students skills in specialised fields, to education that transforms students towards a more holistic and coherent system. This approach prioritises meaning-making over information processing. Such transformation may not be possible within the excessively specialised university disciplinary system, and, therefore requires an interdisciplinary approach (Johnson et al., 2022; Landesfester et al., 2019).

The idea of interdisciplinarity can also serve as a stimulus for reducing uncertainty (Barnet, 2022; Landesfester et al., 2019). In this context, interdisciplinarity is a response to the increasingly complex contemporary world that demands the ability to pose complex questions and collaboratively address challenges in mixed-team settings. The metacurriculum is designed to ensure that participants in the educational process (both teachers and students) move from the

discipline specifics towards inter- and transdisciplinarity, thereby expanding the potential dialogical space on a wider range of topics.

3. Design of the 'Global Scientific Dialogue' metacurriculum

The 'Global Scientific Dialogue' course was designed to address the increasing uncertainty and served as an experimental platform for both teachers and students of the FEFU School of Economics and Management.

This course is different from conventional university courses. It provides an opportunity for students to experience a wide variety of contemporary knowledge and skills that are not typically covered in the traditional curriculum. Conventionally, the curriculum fulfils a regulatory function in educational institutions, imposing certain rules and constraints that aim to reduce complexity and uncertainty but often fail. However, the metacurriculum is more closely related to uncertainty and can therefore create a space for innovation and experiment by releasing institutional constrains. The course embraces technology as a means of providing an educational experience which is more personal for students than is possible in the traditional setting. The course utilises flipped teaching, with extensive use of short video materials, mobile-based and AI tools, teamwork, and constant group support. Students are assisted through individual projects that employ group activities and various resources, serving as prompts for deeper dialogue that enhances further inquiry.

The course design requires the following:

● flexible teaching approaches, where teachers act as facilitator, coordinating small group of students in their teamwork;

● adaptive assessment with the final outcome assessed through a 'patchwork' portfolio (Winter 2003);

● flexible scheduling, where the course is compressed into a two-week module;

● adjustable learning environment, where small groups of students move around different classrooms and also meet in a single stream in a large conference hall.

The course content is structured around the following areas:

1) Creativity, Art, and AI

2) Science and Scientific Dialogue

3) Intersubjectivity and Social Networks

4) Interdisciplinarity and Complex Problem Solving

5) Technology, Programming, and Data

From the very beginning, students face uncertainty and learn to manage it throughout the course.

Through dialogue and teamwork, students are supposed to explore the following:

1) What is the future of the relationship between humans and machines?

2) When machines will be able to do so much, what is there left for humans to do?

3) How can technical developments help us rethink social organisation, or issues of communication?

4) Is it safe to let technology lead the way without thinking about the interconnections between communication and human organisation? If not, how do we think rationally about the future?

5) What distinguishes a scientist's perspective on nature from an artist's perspective on nature?

6) What about the data that social media companies extract from us when we use their tools? How much do they know about us? Is this a problem?

The final outcome of the course is a collection of individual 'artefacts' presented as a 'patchwork' portfolio. The portfolio contains the students' most important impressions, their internal changes, and insights, presented coherently in a single, unified narrative reflecting their personal experience of the course.

This format is a variation of the popular portfolio format widely employed today. 'Patchwork' portfolios are not merely a compilation of texts, but rather a cohesive arrangement. This type of portfolio encompasses both the distinct yet conflicting benefits of an essay's singular formation and a student's reflective compilation, resulting in a unique pattern of the student's choosing (Winter, 2003). Students select their own size and pattern for their portfolio. The 'patchwork' portfolio as the form of summative assessment helps uncover how students progress through the course. We operate on the premise that learning is a nonlinear process that develops gradually, requiring time for students to assimilate and internalise their learning (Piaget, 1950, Winter, 2003). Furthermore, this format supports autonomy in students' responses to the suggested assessment procedures and can evoke a sense of responsibility and self-awareness in students (Johnson et al., 2022; Winter, 2003). 'Stitching' together their own 'patches', students improvise, creating new patterns from materials that were previously parts of other structures. Lévi-Strauss (1966) referred to such structures as 'bricolage', and the people who create them as 'bricoleurs', individuals engaged in a dialogue with various tools and materials, thereby expanding the range of responses to the question of what each of them means (Lévi-Strauss, 1966; Winter, 2003). This format best reflects human discourse and is fundamental to the nature of learning (Derrida, 1976, Winter, 2003).

4. Intersubjectivity within the metacurriculum dialogical space through teachers' testimony

In the face of uncertainty, it is crucial to observe 'student-student', 'teacher-teacher' and 'student-teacher' intersubjective dynamics, where technology aims to facilitate collaboration and dialogue.

To evaluate these dynamics, we refer to the teachers' reflections on the course as a senior partner in dialogue. For this, six interviews were conducted after the autumn 2021 online version of the course.

The interviews revealed favourable transformations in teachers' self-perception and their view on their role as educators. Of notable significance were newly acquired competencies, such as technology proficiency, increased self-confidence, better understanding of students' needs, and greater flexibility when using technology for instruction in other fields. Initially, the teachers grappled with the novelty of the course, the interdisciplinary approach and their role in it. As they progressed, there was a noticeable shift in their self- perception: they no longer identified solely as educators but also as learners themselves. The teachers remarked that they gained a growing awareness of their abilities not only as instructors but also as individuals capable of acquiring novel skills, like mastering Python programming.

The teachers also became more aware of their own personal growth and the emotional and intellectual transformations they had undergone during the course.

Concerning their role, teachers noted that the conventional perception of the teacher as a lecturing authority had been substituted with a view of the teacher as a facilitator or coordinator of the learning process. This transformation became more conspicuous as they shifted their focus to students by encouraging autonomous thinking and an interdisciplinary approach to learning, thus adopting the role of mentors, and even co-authors for this educational project.

In the initial versions of the course, the student was viewed as an object to be acted upon and the educational process was presented in a linear and hierarchically structured manner (within the vertical framework of 'courseleader-teacher-student'). Later on, the mechanics of the metacurriculum prompted teachers to embrace a nonlinear learning approach, embedding themselves in the heterarchical relationships among all the participants.

For example, teachers noted that at first 'there was some irritation and misunderstanding, why, how it [the course] is adapted and connected to other programmes, disciplines, how it will help the student', but then they came to understand that 'this course allows students to see [something new] in us and us in ourselves, personally'. Teachers shared insights about their own

personal and professional transformation: 'I also didn't expect absolutely, it was a complete novelty for me that I could get caught up in something other than my [specialised] knowledge that I have'; the role of the course as a way of managing uncertainty: 'For me this course had some even strategic importance, there was some kind of need, just at that moment [in the COVID19 pandemic] for this kind of communication between teachers and students, ... as a revitalising factor'. Teachers also commented on the use of technology: 'I was struck by the simplicity of the AI apps. I previously believed it was more complex than it actually is, but now find it very user-friendly', 'What else struck me? Well, there's the artificial intelligence, I guess. And it also struck me that the familiar things that are on the phone can be used in a different way.'

Overall, teachers' discourse shows dynamic changes in their self-perception and perception of their role as teachers during course delivery. These changes are in line with contemporary conceptions of lifelong learning and student-centred education. Their experiences emphasise the transformative potential of such interdisciplinary and digital approaches to teaching and learning.

By encouraging interdisciplinary learning, educators can foster a holistic understanding of the impact of technology on society. Collaborative projects and interdisciplinary courses can help teachers and students develop a broader horizon, consider different perspectives, and find innovative solutions to complex problems. Through collaboration, education fosters collegiality and the ability to collectively address uncertainty

Conclusion

Based on the four-year pedagogical experiment results, the incorporation of an interdisciplinary metacurriculum that showcases the interdependent relationship between technology and learning and allows educational institutions to adaptively respond to a rapidly transforming educational landscape. The proposed model emphasises the significance of dialogue, innovation and flexibility in curriculum design and delivery, enabling teachers and students to navigate uncertainty.

This, in turn, cultivates learning environments that promote collaboration and experimentation, encouraging students to take risks, explore new ideas, and participate in collaborative discussions and projects. Collaborative learning provides learners with diverse perspectives, collective intelligence and joint problem solving, ultimately enhancing their capacity to manage uncertainty in a more effective way.

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Corporate Approaches to Building Language Competencies and Designing Profiles of Professional Communications in Gazprom Group

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Abstract:
The purpose of this paper is to outline corporate approaches to building language competencies and provide an insight into designing profiles of professional communicators in Gazprom Group.

Keywords: *corporate language learning, levels of language ability, profiles of professional communicators, methods of intensive learning, communicative approach, immersive language training.*

The purpose of this paper is to outline of corporate approaches to building language competencies, provide an insight into designing profiles of professional communicators in Gazprom Group and exemplify how learning goals are achieved through the implementation of the proposed solutions.

Language skills are essential for highly-skilled oil and gas professionals at the current stage. As Gazprom's strategic goal is to strengthen its leading position among global energy companies, language skills become an effective tool for the implementation of the company's strategy.

At present, Gazprom Group is involved in multiple international projects and joint ventures and cooperates with foreign partners from more than 20 countries across the globe. The company's presence in the international energy environment suggests that international communication, handled in a foreign language, play a significant role in the system of corporate values and priorities. Therefore, the company's management dedicates a lot of time and attention to the development of language skills, which are required in order for the company's personnel to run transnational projects and participate in international business events and activities.

The status of foreign language skills as a corporate competence is set down in the Catalogue of Gazprom Group's Corporate Competencies [PJSC Gazprom internal resource].

In order to ensure that the company's employees possess the required level of language ability, the company developed "The Framework of Corporate Language Training for PJSC Gazprom and its subsidiary companies". The Framework was adopted in 2010 to set down key goals, levels and learning formats used for language training [2]. The English language was identified as a priority language for the company.

The company also developed several profiles of professional communicators, which align classes of the company's employees with the required level of language ability (Table 1).

Table 1. Profiles of professional communicators in Gazprom Group

Classes of employees	Foreign language	Level of ability
Employees of the Department, responsible for international business activities	English	C1
	Another* foreign language depending on professional duties	B1 - C1 (depending on the complexity of professional tasks)

Managerial employees starting from Head of Directorate and above	English	B1
Employees occupying other positions that require a certain level of language ability	Depending on professional duties	Depending on professional duties, but no lower than A2
Employees traveling on business once a quarter and more frequently	English	No lower than B1
	Another* foreign language depending on professional duties	A1 and higher (depending on the complexity of professional tasks)
Classes of employees	Foreign language	Level of ability
Employees of subsidiary companies, occupying positions that require a certain level of language ability	Depending on professional duties	Depending on professional duties, but no lower than A2

* Another foreign language is a language, which may be needed for interactions with companies
  – partners of PJSC Gazprom within the framework of international partnerships and projects: Chinese, Arab, Farsi, Turkish, Spanish and other languages depending on specifics of particular professional duties and tasks.

Corporate language training is based on the Common European Framework of Reference, CEFR, which includes 6 levels of language ability from A1 to C2 [5].

In the course of designing and implementing an integral and consistent system of corporate language training in Gazprom Group, internal methodologists adapted CEFR descriptors to the purposes of Gazprom's Human Recourse Management Policies in order to reflect corporate business realities and specific tasks fulfilled by the employees in their jobs.

As a result of adaptation, the number of language levels was reduced from to 5 to 6 (C2 level was excluded from the scale as it does not match the nature of the employees' tasks and activities). Moreover, CEFR descriptors were modified in order to concretise specific aspects of language skills, which helped to establish a correspondence between corporate requirements and levels of the employees' language ability. At present, an adapted version of CEFR descriptors fulfills an important didactic function and enables to set out communicative goals and objectives at each stage of the language training process (Table 2).

Table 2. Matrix of correspondence between CEFR levels and Gazprom Group's corporate requirements to levels of language ability.

CEFR descriptors harmonized with PJSC Gazprom requirements	
A1	• Can understand and use basic phrases when communicating on familiar topics in the day-to-day context. • Can introduce oneself and others, can ask and answer questions relating to personal information (name, gender, occupation, contact details, etc.) • Can support a conversation on condition that an interlocutor speaks slowly, distinctly and can provide the necessary verbal support.
	• Vocabulary includes 800-1200 words
A2	• Can understand sentences and phrases that describe the main situations of day-to-day and professional context (personal data, family, occupation, daily routines, working duties, location of familiar objects, leisure activities) • Can handle typical communicative situations that require exchange of information on familiar topics and the use of relatively simple and day-to-day and business vocabulary • Can make up simple descriptions of familiar realities and concepts • Vocabulary includes 1300-1800 words
B1	• Can understand in full contents of lengthy utterances in familiar contexts • Can confidently handle communication in most situations in private and business trips • Can write a text on a familiar topic • Can produce unprepared spoken descriptions of one's own experience, past, goals, plans and intentions, reasons of actions and decisions, выражать мнение и обосновывать точку зрения. • Vocabulary includes 2000-2500 words
B2	• Can understand and correctly interpret all main thesis of complex texts on specific and more abstract topics, including profession- and industry-relating topics • Can handle communication with native speakers at the mutually comfortable fluency pace, including a reasoned discussion on profession- and industry-relating topics; can take part in training programmes delivered in English; can present and negotiate in English • Can write clearly structured, detailed texts on a wide range of topics, can defend a viewpoint and discuss polemic subjects • Vocabulary includes 3000-4000 words
C1	• Can understand texts of advanced complexity on a wide range of topics; can actch implicit shades of meaning • Can express ideas fluently and precisely, experiencing no noticeable difficulties with the choice of necessary language means and structures • Can use the language at the extent of flexibility and efficacy sufficient for fluent communication with native speakers in professional and academic contexts (e.g., can deliver training programmes, prepare publications and scientific papers in English) • Can write clearly structured and detailed texts on a wide range of topics of advanced complexity, demonstrating confident command of the required language means • Vocabulary includes 4500-5000 words

Corporate language training in Gazprom Group is based on a number of principles that underpin the entire system of learning format and activities. They include:

- Timely and correct priority setting;
- A reasonable and justifiable choice of methods, tools and resources;
- Concentration of attention and maintaining motivation under the pressure of mounting learning challenges;
- Continuous improvement and error correction.

A reasonable and justifiable choice of methods and formats is essential for effective language learning in all contexts, and this principle is particularly relevant in the corporate context.

In terms of building timeframes, two basic scenarios are used:

1) Basic scenario (*average track skills acquisition*) suggests that one CEFR level is acquired during one learning period of 6-8 months, the average course duration being 120-160 academic hours;

2) Intensive scenario (*fast track skills acquisition*) suggests that one CEFR level is acquired during a shorter learning period of 2-3 weeks, the average course duration being approximately the same as in the basic scenario (up to 160 academic hours). The desired training effect is achieved through maximal enhancement of learning intensity and application of dedicated learning methods based on the so called immersive effects. In this scenario, the time factor becomes critically important and it is essential that appropriate course map and students' learning trajectories be developed and followed for the entire duration of the course.

Gazprom Corporate Institute uses a wide range of learning methods, tools and resources in order to ensure that the best outcomes be achieved in the selected scenario and learning format. The choice of an optimal method depends on a variety of factors and corporate realities effecting the training process and learning conditions.

When participants in corporate training can only study part-time, the most obvious solution would be to arrange learning sessions outside of standard working hours, which are delivered systematically in accordance with a fixed schedule. Normally, such an approach may be applicable to a situation when ability-based grouping is practiced in language learning. Classes are evenly distributed over the entire learning period, which may take up to 6-8 months for 120-160-hour courses. Normally, corporate training providers experience no organizational and management difficulties when arranging such courses.

The case is quite different when we have to organize a language training programme with extremely tight deadlines, e.g., a 10-day full-time crash course. Obviously, a different methodological approach is needed in order to address the challenge of achieving the desired result under pressure.

Intensive courses are often arranges for specific categories of the company's employees in mixed ability groups, where students come from diverse professional backgrounds and represent various profiles of professional communicators. Mixed- ability groups are usually formed, when multiple criteria are used to select candidates for the specialized corporate training and development programmes with dedicated goals and specific expected outcomes.

Gazprom's Programme for Young Professionals is aimed at developing personal, managerial and professional skills required for prospective industry leaders and proactive members of the Company's talent pool. In particular, one of the course objectives is to build and develop business communication skills in order for the participants to take part in internships and

training programmes in partner companies of Gazprom Group, including foreign partners and branches as well as joint ventures and cross-border collaborations. In addition to this, the course also focuses on developing system and strategic thinking and decision making in the rapidly changing international environment.

The programme participants are expected to achieve a certain level of fluency and accuracy under a very tight timeframe and complete the course by preparing and delivering a profession-relating presentation in English, in which they provide an overview of a relevant business or technical problem and propose a solution, which could ideally benefit not only their own professional development and career advancement and in broader sense could be potentially upscalable across the company and the entire industry.

The course includes several stages, with dedicated learning and development activities being integrated into each of them (Table 3).

Table 3. Gazprom's Programme for Young Professionals. A course map

Stage	Stage contents
Stage 1	• Professional interviews (in groups) • Concluding
Stage 2	• Assessment centre • Primary language testing • Assessment centre feedback
Stage 3	• Information and induction session about Gazprom's strategy and key projects • Summarizing and concluding.
Stage 4	• Professional skills development • Language training: o Getting acquainted Small talk o Talking about your duties o World oil & gas reserves o Describing your company o LNG production and transportation o Pipeline systems o Project Management. SWOT o Attending formal events o Going global o Job interview Skills and qualifications. Teamwork Remuneration o Making projections of global trends o Renewable energy o Language sensitivity. Company's image, reputation, brand management. Corporate ethics[*] • Individual advice on self-study between the course stages
Stage 3	• Personal skills development. • Self-study in accordance with individual advice. Including e-learning • Consolidation of self-study • Language re-testing (• Final selection of candidates based on the results of self-study and language testing • Preparing individual internship plans

Stage 6	• Managerial skills development. Training sessions in system thinking, decision making and personnel development

Stage 7	• Professional skills development: Language training
	    ○ Challenges of modern communication
	    ○ Transformation of business. Innovations. Social responsibility
	    ○ Media and PR
	    ○ Crisis communication
	    ○ Language of professional communication: oil and gas production, repair and maintenance, trends and tendencies, models and their visualization, scenarios of the global energy market development, energy security
	    ○ National models of management. Working with the Global South
	    ○ Presenting skills: linking ideas, smooth structure, non-verbal and para-verbal communication, persuasive techniques, image building
	• Final presentations in English

Stage 8	• Professional skills development • Internship at Gazprom's production facilities in accordance with individual internship plans
Stage 9	• Preparation of final projects, consultations with supervisors
Stage 10	• Presentation of final projects • Summarising and concluding

* This section is delivered in collaboration with the Language For Academic And Business Communication Department of GSOM SPBU

In terms of language skills development, *fast track skills acquisition* is justifiable for the programme's purposes. As it was mentioned previously, an intensive scenario of building communicative skills is particularly sensitive to the time factor and the pace of progress. Therefore, a correct methodology for intensive programmes should work towards these two factors. After several potentially feasible methodologies were scrutinized, the use of suggestive methods turned out to be the most suitable methodological solution for the intensive courses.

The term «*suggestion*» derives from the Latin verb «*suggestio*», meaning «prompt», «advise», «induce». Psychological and pedagogical opportunities of suggestion as a teaching and learning method are based on the effect of psychological persuasion, which helps achieve desirable changes in mental processes, emotional state and behavior of the affected person. The Bulgarian scientist Georgy Lozanov was the first to propose suggestopedia or alternatively suggestology as a methodology for successful language learning in the 1950-60-s [3]. Suggestion as a learning method is based on the suggestive effect called *hypermnesia* – an ability of the human brain to process and memorise excessive amounts of information, in particular, new lexical items of a foreign language that a learner has no previous experience of dealing with, under certain experimental conditions. A fundamental condition for the emergence of suggestive effects is overcoming psychological barriers, connected to a fear of making mistakes, suggesting students confidence in the possibility of utilizing sizeable and yet untapped cognitive and creative reserves. Interestingly, the necessary depth of suggestion is achieved not through hypnosis (as this is done in psychoanalysis) but through active engagement in role-play activities [3, p. 57], which enables to transform a learning session into a well-staged theatrical performance, accompanied by audio and visual effects (music, visual images), aimed at creating a favourable psychological environment and maintaining emotional positivity in students. As a result, a connection with the subconscious thinking is established and activities of the left and right hemispheres are harmonized. The personality of a trainer (teacher) plays a key role in this

system. The trainer, whose function is similar to that of an actor during a play, should be able to perform various acting transformations in the course of every learning session.

In order to make G. Lozanov's principles applicable to the system of corporate Methodologists of Gazprom Corporate Institute further developed and adapted G. Lozanov's principles and combined with the ideas of another prominent suggestologist, the Russian educationalist – innovator, V.V. Petrusinsky, who pioneered experiments with automated systems for intensive language learning in late 1970-s. V.V. Petrusinsky's suggestive-cybernetic approach [4]. Part of pedagogical functions was transferred to an automated system, which enables to use modern educational technology to produce suggestive effects on the learner. They include audio recordings accompanied by a simultaneous demonstration of visuals, which illustrate the newly introduced lexical items through images, pictograms, synonyms, contextual examples, etc. (Figure 1).
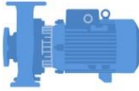

Figure 1. A sample of a visualisation, used to introduce lexical items from the topic "Drilling for oil and gas".

As was the case with G. Lozanov's methodology, when the suggestive- cybernetic approach is used in language training, students use autogenic training to self-regulate their psychological state under certain role-play conditions, aimed at removing information barriers. As a result of multiple playing textual and visual elements a notably high extent of material digestion is achieved (from 50 to 90% depending on the offered volume) [4, p. 3-5].

Learning sessions of these courses are delivered in the training format and are based on the principle of changing the type of an activity. Each session is a practical case on a certain topic. A session's goal is to fully activate speaking skills through completing various communicative tasks, mostly based on pair work and group work and role-plays. Training participants are divided into learning teams of 2 to 6 people, the group assortment varying at different stages of a training programme. A constant change of learning activities and training conditions ensure that a high extent of involvement be achieved, which helps to prevent fatigue, promote loyalty and team spirit. By creating a comfortable, relaxed learning environment skills are acquired more easily and quickly as if it was done through an interaction with a native

speaker in the natural language environment. A breakdown of time and types of learning activities is represented in Figure 2.
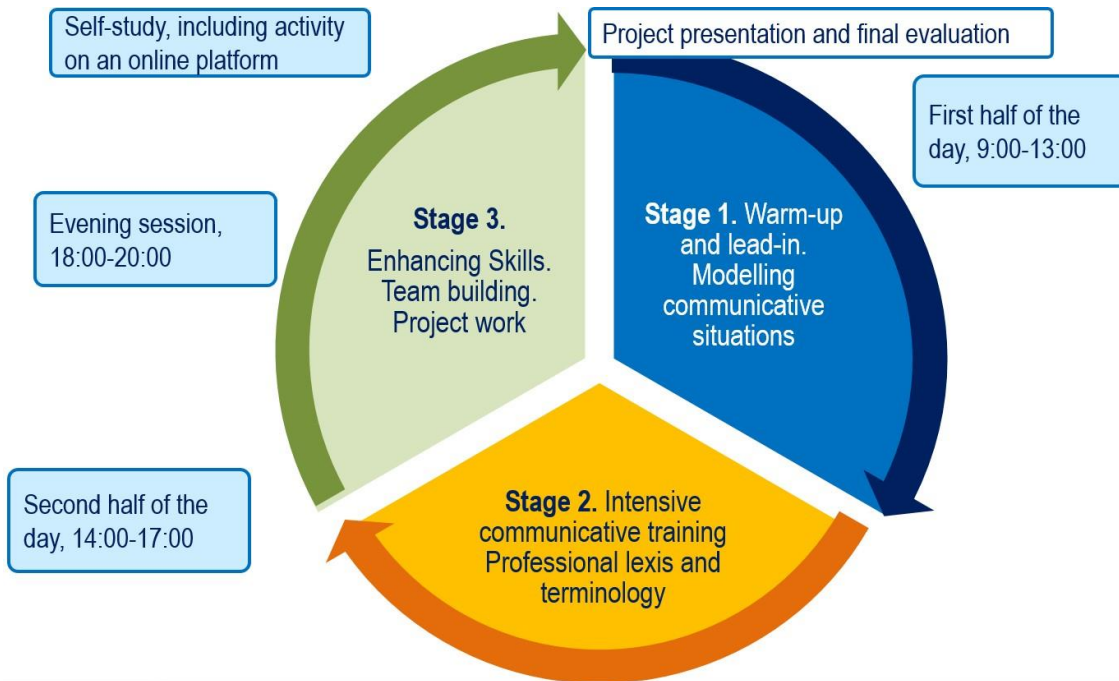
Figure 2. A snapshot of a typical learning day of an immersive language training in Gazprom Corporate Institute

According to the accumulated data reflecting final evaluation results, 100% of participants in intensive programmes achieve progress in the development of their language competencies. 75-80% of participants achieve a significant improvement of their skills and demonstrate a 0.75 to 1.0 CEFR Level progress. For the students with a higher basic level (B1-B2), a less noticeable progress is registered within the range of the existing level, on average from 0.5 to 0.75 CEFR. At the same time, this progress is accompanyied by profound transformation of skills (Figures 3-4).
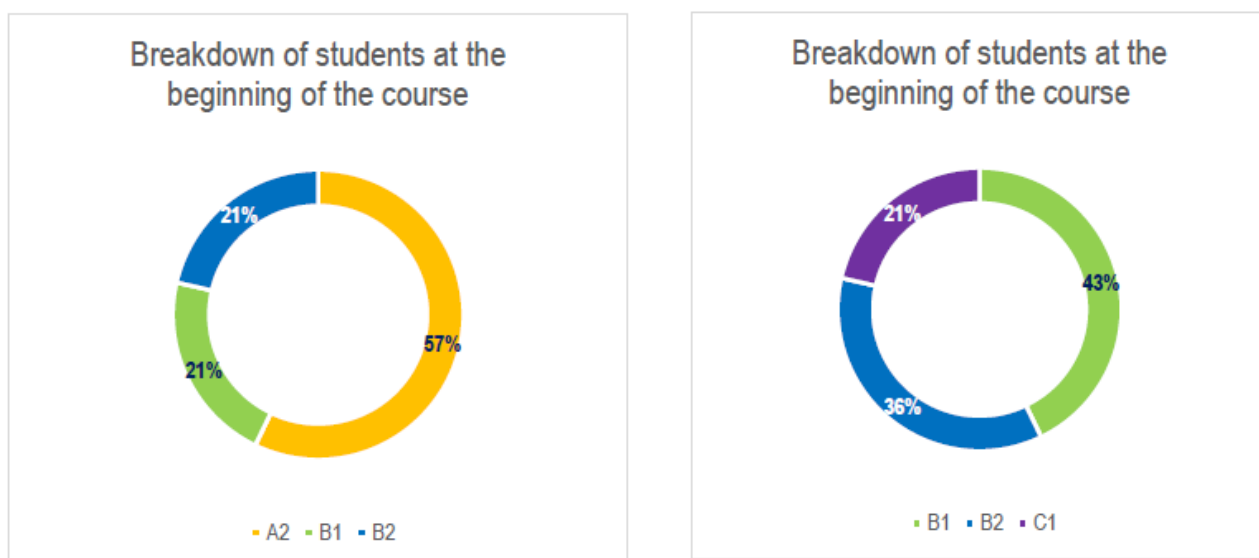
Figures 3-4. Changes in the breakdown of the levels of students participating in the Programme for Gazprom's Young Professionals

Along with the Programme for Gazprom's Young Professionals, the above methods and approaches were implemented in the following corporate language learning programmes, developed by Gazprom Corporate Institute:

− An Immersive Course in Business English;

− English for Management in the Oil and Gas Industry;

− Protocol and Etiquette of Modern Business Communication; Modern Business Communications in the Oil and Gas Industry.

Conclusions

Gazprom Corporate Institute formed an integral and consistent system of corporate language training. This system has been checked and tested through its perennial implementation across Gazprom Group and proved to be successful in terms of the achieved outcomes. Continuous improvement of corporate language training is one of Gazprom Corporate Institute priorities as language competencies play are essential for professional development of Gazprom Group's employees. Communicative confidence will facilitate further enhancement of personal efficacy, will boost professional productivity and help to address the contemporary challenges in a timely and appropriate manner.

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Communication Dumb-down and Three Imperatives for Education Systems (Stating a Research Problem)

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Abstract:
The problem of communication as an ever-evolving interplay of meanings and understandings and our attempts to match the former with the latter has once again manifested itself in the recent onslaught of AI, ML, and our own dealings with them. While trying to solve the human-to-machine communication problem, we are effectively dumbing down human-to-human communication, along with our own cognitive and analytical skills. To offset the effect, education systems around the globe need to shift their focus onto these three imperatives: digital literacy, increased share of humanities, and soft skills.

"We always know more than we can say, and we will always say more than we can write down."(1). In his 'Rendering Knowledge' article posted on Cynefin.co in 2008, Dave Snowden presented this idea as a knowledge management principle—the last out of seven and, in his own words, the most important one. But this also works in reverse: *we always process less than we actually hear, and we will always hear less than we are told*. Using any kind of medium to render, perceive and interpret thoughts will sadly, but inevitably entail loss of context and meaning. This is a general communication problem, which I as a translator and interpreter am quite familiar with.

The issue of translatability in translation is not a new one. Umberto Eco explored this in his "Mouse or Rat: Translation as Negotiation" (2003), where he pointed out that any translation will always be but an approximation – a pre-doomed endeavour to say practically the same with other words. Eco comes to the conclusion that any attempts to stop the endless negotiation of a translator with the "ghost of a distant author, with the disturbing presence of foreign text, with the phantom of a reader they are translating for<…>" can only be discarded "<…>as a vicious habit if we can refer to a Perfect Language." (2). In 'After Babel', George Steiner dissects Borges' 'Pierre Menard, autor del Quijote', a story of a fictional eccentric 20th-century French writer, who sought to go beyond a mere "translation" of 'Don Quixote' and tried instead to create a text that would coincide—word for word and line-for-line—with the 17th-century Spanish original. Steiner notes that while "Cervantes' text and Menard's are verbally identical <…> the second is almost infinitely richer." (3). Depending on our own contexts, cultural, educational and historical backgrounds even while dealing with the same texts, we will always understand them in slightly different ways. Which begs the question of validity and the actual possibility of communication as such.

This, of course, is a philosophical issue. People learned to communicate with one another tens of thousands of years ago and have since been practicing this skill with varying degrees of success. Exactly how effective this communication can be is another matter. Communication between people speaking different languages would naturally require a medium—an interpreter/translator or a specialized computer software—which as we noted earlier can and in most cases will result in loss or distortion of context, subtle nuances of meaning, modality, etc. Precisely how much will be lost depends on two factors: the quality of translation and the complexity of the subject matter. In absence of such a medium, people would still cope, perhaps

using gestures, drawing pictures, and for some reason, raising their voices. Meanings would still get across, albeit with much confusion. This is especially pronounced in the Earth's numerous toponymical tautologies like the Sahara Desert or the River Avon, where *sahara* and *avon* stand for *desert* and *river* respectively, in their original languages. The above, of course, is relevant for interlingual communication, but it also appears to be very true for people speaking the same language.

In coaching, when a coach explores a client's request, their questions will go along the lines of "do I understand understand correctly that…?" or "I hear that…". This need for clarifying the meaning coupled with verbatim quoting (verbatim being the operative word here) of the coachee's musings serves as evidence of the importance we place on getting our understanding right. When we hear the word 'table', depending on the context we find ourselves in at this particular moment, it will either prompt a mental image of a flat horizontal surface raised on some sort of a support or foundation, or a spreadsheet—a series of lines and columns of data organized in some sort of logical order. But even in the case of the former, our mental images will vary in endless ways. The mental image of the horizontal surface will stand on any number of legs or supports, it will be rectangular, square, oval, or round in shape, be made of wood, metal, plastic, glass, or a combination of these materials, ad infinitum. So when somebody says the word 'table' how can we be sure that our mental images of the object associated with the word will be the same?

Old as it is, this problem of communication as an ever-evolving interplay of meanings and understandings and our attempts to match the former with the latter has once again manifested itself in somewhat new and slightly unexpected ways with the recent onslaught of artificial intelligence, machine learning, and our own dealings with them (although some AI experts may say that this was very much to be expected). The idea of a perfect language, a codified *tertium comparationis,* which Eco argued in some ways underpinned the concept of the early studies in machine translation (a field, which served as a springboard for natural language processing and the development of large language models) has once again run into a brick wall of trying to get Siri, Alexa, Alice, or any other voice assistant application to do one's bidding. Anyone who tried to draw a specific image in Midjourney or attempted to get a straight and unambiguous answer from ChatGPT, will soon find out how limited our communication faculties seem to be.

According to its creators ChatGPT is a model that people can interact with using a natural language, but how natural it actually is, when in order to get the desired outcome the prompt given to the machine needs to be edited and re-edited until it is dumbed down to the level of a three-year-old child? It is not a coincidence then, that we now see a rise in AI trainer job openings available on the global labor market. A standard set of job requirements for an AI trainer would typically include such skills as being able to quickly familiarise oneself with new and complicated topics, varying from algebra to poetry, to quantum physics, to offshore drilling; fact-checking and being able to tell reliable sources from fakes; write and edit texts that help solve real-life problems of people; and regularly check, evaluate, and correct texts written by others, including those generated by neural networks.

We need people to teach machines how to interact with people, which seems reasonable on the surface, but if we assume that what was said above about communication and subjectivity of understanding is true, how much will these two factors affect the outcome of any such AI training, especially considering the fact that subjectivity appears to be built into the very job description for an AI trainer? The current answer seems to be in getting enough AI trainers whose subjective viewpoints and beliefs when aggregated into a large dataset would enable us to

come up with some sort of a consensus or a more or less objective average understanding of any given problem. But then how many is enough? How do we ensure the diversity of viewpoints in terms of various cultures, religious beliefs, ethnic groups, educational backgrounds, etc., and at the same time establish a universal ethical standard that any person on the planet will be able to agree with? Finally, how do we avoid bias when the job requirements themselves are so exclusive and limited to a small sample of educated language professionals with a very specific and narrow skill-set? In the meantime, we continue the communication dumb-down process with billions of dollars poured into AI and ML development only, it seems, to get the human-to-machine interaction right. Humans are naturally competitive. This was one of the pre-requisites for homo sapiens' evolutionary success in becoming the planet's most dominant species. That, and also, as Christof Koch recently put it "because we are the most intelligent and the most aggressive." (4) It is both one of our greatest advantages and our collective Achilles' heel. People can get sucked into solving a theoretical or practical problem with the only reward being the joy of finding a solution. This is how our brains are wired. If the problem at hand is fascinating and complicated enough, we will often start digging into it without giving much thought to (a) why are we doing this? and (b) what are the potential implications and consequences—both short- and long-term? The current attempts at cracking the AGI (artificial general intelligence) appear to go exactly along this inherent competition pattern. It's a race for productivity but what is beyond the finish line?

The race for productivity has been the primary driver behind any kind of innovation for much of the 19th, 20th and so far, all of the 21st century. In fact one could argue that doing more with less has been one of our goals as a biological species since the dawn of civilization. Our economies are built on exactly that premise. And so sucked into solving this problem, we seem to completely ignore the fact that in this endless race for productivity we are, as Simon Sinek brilliantly put it, promoting and rewarding toxicity in our businesses. Yves Morieux and Peter Tollmann addressed the same problem in their 'Six Simple Rules', arguing that in search for cracking the productivity issue, organizations train their employees to avoid cooperation as less effective in terms of achieving their individual key performance indicators (5). Meanwhile, cooperation is built entirely on people using their communication skills to perform complex tasks in groups of any size.

So, while the latest developments in large language models and machine learning advance humanity tremendously on its path to finally hack productivity and performance, they also seem to effectively destroy the richness and the complexity of our communication at an equally alarming pace. All the attempts at reducing natural language processing to a series of true-false algorithms are, in fact, nothing but that—reduction. What we think of as *the* solution, the divine perfect language that would incorporate in itself all other languages and would have names for all things and matters, is in essence a binary code, an endless string of ones and zeros that have very little to do with communication and even less so with human experiences, beliefs, or values. In our search for making machine understanding possible, we subtract from our own understanding of things. As numerous recent studies as well as our own personal experiences show we have already grown a generation of young people who have trouble with direct person-to-person communication, focusing on complex subjects and reading and understanding long pieces of texts. A generation that has reduced learning to googling and mistakes knowledge for fact-finding. The stress that we put on STEM-education in recent years has only added to the problem. To solve it, we need to fix our education systems with these three imperatives:

1. **Digital Literacy** in the broadest sense of the word, i.e. not only understanding digital technology and the best ways to go about human-to-machine communication, but also understanding the risks that over-reliance on AI brings along.
2. **Shifting the Focus to Humanities**, and especially literature, philosophy, culturology, and ethics.

3. **Dubling down on Soft Skills** development, primarily cognition, analytical thinking, and communication.

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In Search of the Perfect Foreign Language Textbook

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Abstract:
The article asks whether there is an ideal textbook for adolescents and adults, or whether a teacher can get results by compiling multiple textbooks, using multiple resources, working on a copy-and-paste basis?
We have studied this topic closely by conducting a survey of 400 students studying French at different universities with different areas of specialisation. Teachers at all levels of education (school, university) were also surveyed to find out their opinions.
The questionnaire was sent to respondents from several regions of Russia, as well as to the republics of Azerbaijan and Uzbekistan.
The results obtained allowed us to draw contradictory, but most importantly - clear and objective conclusions. So, what should be the ideal textbook for learning a foreign language (based on content and format)? Our study aims to provide answers to many questions.

1. Introduction

Currently there is no shortage of textbooks and teaching aids – teachers have access to foreign and domestic educational and methodological complexes (EMC) for different levels of education. Many of them exist in both printed and electronic versions, as well as hybrid versions (the textbook and workbook are printed, whereas audio files are available on the publisher's website). But the rich experience of teaching and working with various teaching materials, the use of Internet resources, the need to adapt to the rapidly changing demands of the labor market and, accordingly, foreign language learners, encourage many teachers to resort to several textbooks at the same time. This is a fairly common scheme, thanks to which a teacher can place accents in the program's content as required by the starting level of training of students (with existing gaps in knowledge, heterogeneity of the group, abilities and motivation) and the tasks set.

On the one hand, this approach is effective: it meets both local (working out individual lexical units, specific grammatical rules, correction of basic knowledge) and global requirements (subject matter, specialization, preparation for international exams).

On the other hand, it can cause reasonable bewilderment on the part of students: is there really no one "normal" textbook? why so much heterogeneous material? it's not always convenient! Thus, the teacher himself at some point comes to the conclusion that such a format is often inconvenient (especially if the textbook versions are printed), energy-consuming and, unfortunately, does not guarantee a decent assimilation of the material.

Such an experience encourages us to continue searching for the perfect textbook that would meet not only the goals and objectives of learning, but also "keep up with the times", was interesting to students and reflected their completely new vision of the learning process.

2. Survey

We conducted a large-scale study involving almost 400 respondents – students of higher educational institutions of the Russian Federation (Moscow, St. Petersburg, Penza, Volgograd, Kostroma, Magnitogorsk, Makhachkala, etc.), Azerbaijan and Uzbekistan. The target audience – namely students – was not chosen by chance, since students aged 17-23, in our opinion, are able to give the most critical assessment of the used methods. It should be noted that at present, while

observing the main criterion – compliance with the requirements of the program – there is relative freedom in the choice of EMC in higher education, which is why their diversity is often great.

2.1. The purpose of the survey

Understand how satisfied the expectations of students are, whether the educational materials used correspond to the actual needs of young people and what, in their opinion, should be the "ideal" textbook of a foreign language.

2.2. Questions about the current textbook

In this regard, in the first part of the questionnaire, it was proposed to answer several general questions, in particular:

1. In which educational institution / faculty you are studying.
2. You are learning French as: first /second / third foreign language.
3. What textbooks you are studying / have studied before.
4. You use the paper / electronic version of the textbook or both versions.

Next, we were interested in:

1. How much do you like the look of the textbook.
2. Convenience in working with the paper version of the textbook.
3. How interesting are the topics and texts presented in the textbook; if they are voluminous.
4. Difficulty / feasibility of perception of texts for understanding and discussion.
5. Are there enough exercises for vocabulary, grammar, listening?
6. Are there enough creative oral and written assignments, as well as video materials.

Then followed a block of questions about what a good foreign language textbook can / should be. The questions concerned:

-   the appearance of the textbook (format, electronic / paper version, table of contents, rubricator), additional materials (workbook, interactive exercises on the website, audio and video materials, applications, etc.);
-   the content side of the textbook (which types of exercises / tasks you like the most, which text material you like to work with the most, you need whether there are blocks for preparing for international exams, etc.).

2.3. Answers

So, the profile of respondents (see Fig.1). Most of them (53%) study French as their first foreign language. The textbook versions used at the moment are reflected in Fig.2.

77 % of respondents are satisfied with the appearance of the textbooks they are studying, 8% expressed their dissatisfaction.

65 % of respondents believe that paper versions of textbooks are not too heavy and easy to use, but 15 % disagree with them.

Interest in the textbook topics was distributed as follows (on a five–point scale, from 1 – not interesting, to 5 - very interesting and relevant) (see Fig.3).

According to 20 % of respondents, textbook texts are too long, 33 % consider their volume to be normal, 38 % - average, and for 9 % the texts are not voluminous.

As for the assessment of the difficulty / feasibility of perceiving texts from 1 (easy, do not cause any difficulties in understanding) to 5 (very difficult to understand and discuss), the figures are as follows (Fig.4).

We also wanted to know the respondents' opinion on the subject of exercises / tasks offered in modern textbooks. Namely, whether the respondents consider their number to be sufficient / insufficient, respectively, or find it difficult to answer the following points (see Fig. 5):

- listening tasks - 43 % - 44 % - 13 %
- exercises for practicing grammatical skills - 82 % - 16 % - 2 %
- lexical exercises - 78 % - 19 % - 3 %
- creative oral assignments - 48 % - 40 % - 12%
- creative writing assignments - 50 % - 37 % - 13%
- video materials - 26 % - 60 % - 14 %

The following answers to the question: "What do you like most about the textbook you are studying?" are of particular interest.

21 % - grammar: a large number of grammatical rules with a clear explanation and a variety of exercises.

12.7 % - vocabulary: a large number of new vocabulary, a variety of interesting vocabulary learning tasks.

10 % - texts: a variety of texts (genres, styles) with a lot of information, the presence of authentic texts.

31.7 % - structurality: textbook structure; clear separation of grammar, thematic vocabulary and texts; consistency and clarity in the presentation of the material, consistency and coherence in the presentation of grammatical and lexical material.

10 % - relevance of the topics covered, modern (useful) vocabulary, applicability of the studied material in practice.

8% - availability (feasibility) of new material, which is easily assimilated thanks to clear and accessible explanations; ease of perception of the material.

11 % - a variety of interesting topics and tasks.

5.4 % - ease of use: convenient textbook format, its compactness, color rubricator, the ability to perform tasks directly in the textbook.

2.8 % - design: large font, good paper quality, colorfulness, abundance of pictures, attractive appearance.

3.6 % - a systematic approach; completeness of content (the presence in one textbook of materials for mastering vocabulary and grammar along with the development of all types of speech activity), comprehensive training.

1.3 % - a large number of listening tasks.

Less than 1 % noted the presence at the end of the textbook of verification tests for the assimilation of a block of topics (units) – 4 pers.; communicative orientation and interesting tasks for the development of oral speech skills – 3 pers.; a large number of exercises in reading – 1 person; the opportunity to get acquainted with the regions of France – 1 person; the availability of video materials – 1 person.

4 people found it difficult to answer, while two do not like anything.

2.4. Questions and answers about the design of a perfect textbook

The second part of the questionnaire contained questions aimed at identifying what a good textbook on a foreign language looks like.

To our surprise, it was revealed that the youth audience prefers paper textbooks of A 5 format – 45 % (whereas modern textbooks of foreign languages are mainly A4 format), 32 % would like to work with the paper version of A 4, and only 23 % voted for the electronic version. Currently, all educational and methodological complexes include a lot of additional materials offered separately from the textbook, but without which the work cannot be carried out in full. Accordingly, there is a need to purchase them, which significantly increases the cost of the UMK

and sometimes this is seen exclusively as a marketing ploy on the part of publishers. Additional materials may include: workbook, audio and video materials on disk (now rare), audio and video materials on the site, interactive exercises / tests on the site (with the ability to see the correct answer), keys, etc.

Some of the respondents' answers were unexpected, for example, 22 % of respondents considered it possible to have audio and video materials on the disk. The rest of the data were distributed as follows (see Fig. 6).

Since modern EMC almost necessarily include a workbook, we wanted to find out how necessary it is, according to students. The answers received are also of interest for analysis, namely:

36 % are sure that a separate workbook is not needed, and prefer that all tasks be in one textbook;

30.5 % believe that a separate workbook with exercises on each topic of the lesson is needed to complete homework;

30 % answered that a separate workbook with repetition exercises is needed to summarize the materials of a lesson or a block of lessons;

3 % suggested that a separate workbook is needed only with creative tasks;

0.25 % suggested creating a workbook (for training and homework) exclusively in electronic form.

It is worth paying attention to 36 % of students who are against having a separate workbook: perhaps this is caused by economic considerations or additional weight. It can also be assumed (especially if we are talking about a foreign EMC) that all exercises don't meet the requirements of the program and are often not performed, remaining outside the classroom time. Thus, the purchased notebook is not used in full. Modern textbooks, as a rule, are provided with a block of video materials. This is really necessary and convenient. The opinion of the respondents on this issue is reflected in Fig. 7.

The survey participants also noted that it is easier for them to navigate in the textbook if:
-        the table of contents is at the beginning of the textbook - 71.8 %;
-        table of contents at the end of the textbook - 15.8 %;
-        the page number indicates each topic / text in the table of contents, not just the beginning of the lesson 58.3 %;
-        the color rubric divides the lessons 57.5 %.
As for the applications, according to the students, they must be present:
-        reading rules, maps, verb conjugation tables, a list of new words alphabetically;
-        list of new expressions by topic;
-        a list of verbs with prepositions.
At the same time, other options were proposed, which are presented in the diagram (Fig.8).

Since many students make notes in the textbook (in case the textbook is in their own use), it was curious to find out whether, in the opinion of students, it is necessary to allocate a special place for these purposes. The numbers were distributed as follows:
-        yes, in the margins – 59.6 %;
-        yes, a separate page at the end of the textbook – 6 %;
-        no, there is no need for a special place – 33.7 %;
-        several pages at the end of each section – 0.5 %;
-        in the margins, if the textbook is in personal use – 0.25 %.

2.5.   Questions and answers about the content of a perfect textbook

The most attention is drawn to the answers of students regarding the content of the "ideal" textbook on foreign languages. First of all, we are talking about the proposed texts. Since it is the text that is the basis for teaching speech activity, the selection of text material is extremely important when creating any textbook. Traditionally, in the textbooks of the French language (especially by Russian authors), excerpts from works of classical and modern fiction are widely presented, the merits of which are not questioned when teaching foreign language communication. 57 % and 63 % of respondents, respectively, supported the need to include literary texts by classical and modern authors in the textbook. A significant part of students are attracted by articles from foreign media (79 %), socio-cultural texts (51 %), various blogs and forums (57 %). A little more than 1 % suggested to include infographics by all means. In general, opinions on the stylistics of the text material were divided as follows (see Fig. 9).

The students' opinion about the translation exercises from Russian into a foreign language in the textbook turned out to be interesting. It is no secret that in the modern teaching environment, the attitude towards this type of tasks remains ambiguous, and the number of opponents of translation is comparable to its supporters. As for the students surveyed, only 5 % opposed the presence of exercises for translating phrases or individual phrases in textbooks, 25 % of respondents like the idea of one generalizing exercise to consolidate the entire vocabulary and grammar of the lesson (unit), 21 % consider translation mandatory for each grammatical and lexical topic separately, and 45 % turned out to be adherents of the widest use of such tasks (Fig.10).

It was also interesting to find out that a significant part of the respondents (60 %) cannot do without memory development tasks and are ready to memorize poems, songs, excerpts from prose. For 31 %, such tasks are uninteresting and even superfluous. Some students (about 9 %) realize the benefits of these tasks, but they do not like this type of work. They are sure that memorizing poems and songs is relevant only at the beginning of learning, then it is enough to learn only particular words and expressions (Fig.11).

Another question of the questionnaire was addressed primarily to the category of students who are attracted by the opportunity to pass an international exam on the level of proficiency in a foreign language. These are students who plan to continue their studies on Master's programs in foreign universities, or who wish to record their achievements in an official document of international weight for further career development. The opportunity to prepare for a successful international exam is an additional incentive to learn a foreign language. And therefore, as follows from the diagram below (Fig.12), the vast majority of respondents think necessary to include in the textbook the tasks for preparing for such testing.

3.   Conclusion

The analysis of the survey results does not give an unambiguous answer as to what an "ideal" textbook should be, but it confirms the idea that there is a need for a unified teaching and methodological complex as opposed to disparate dossiers and compilations from different manuals. The process of its creation would be much more effective if the opinion of the target audience, i.e. the students for whom the textbook is intended, were taken into account. The unexpected interest in this questionnaire on the part of the respondents shows the importance of a well-structured, well-considered, understandable textbook for foreign language learners, especially at the initial stage of learning. Being the most important tool for teaching foreign language speech, a textbook, created taking into consideration the wishes of students, can serve as an additional source of motivation in mastering new knowledge.

- *Fig. 1. Respondents' profile*

French is for you
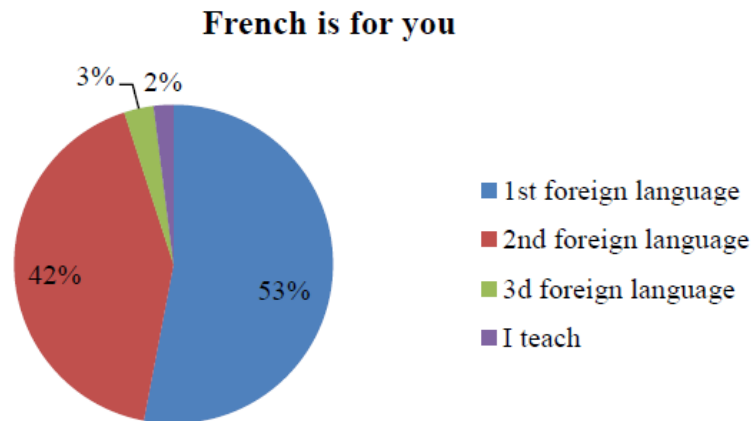
- *Fig. 2. Textbook versions used in training at the time of the survey*
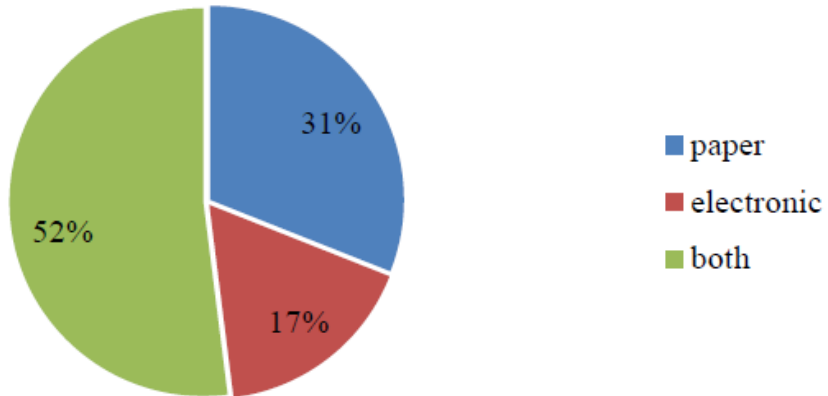
- *Fig. 3. Interest in the topics and texts of the textbook*
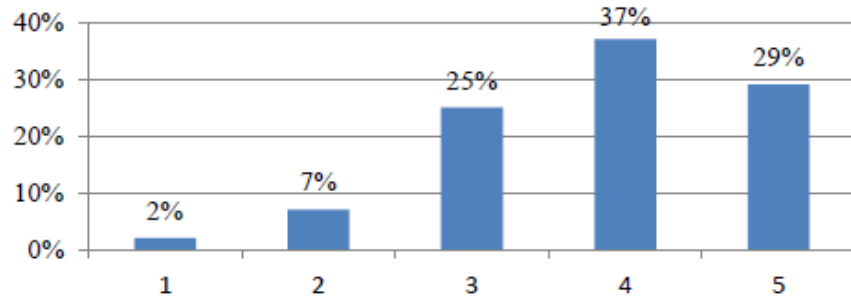
- *Fig. 4. Difficulty / ease of texts*
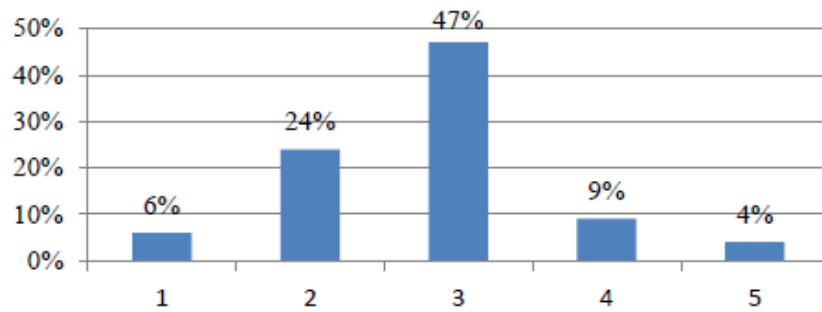
- *Fig. 5. The content of textbooks*
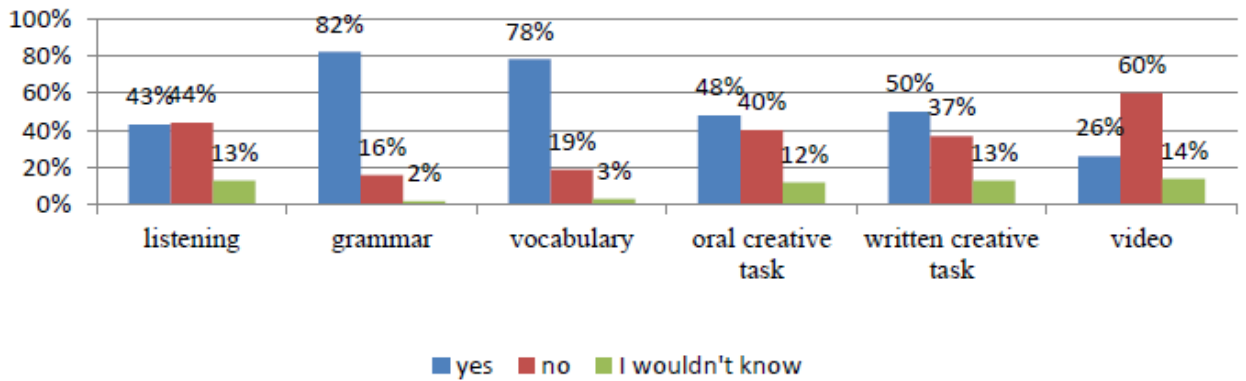
- *Fig. 6. The need for additional materials (separate from the textbook)*

blog (excerpts of texts)	0,5%
dictionary	0,25%
tests by type of control work	0,25%
additional ex./tests in the paper version	0,25%
keys to exercises	46%
interactive ex./tests on the website	76%
audio and video on the website	69%
audio and video on disk	22%
workbook	57%

0% 10% 20% 30% 40% 50% 60% 70% 80%
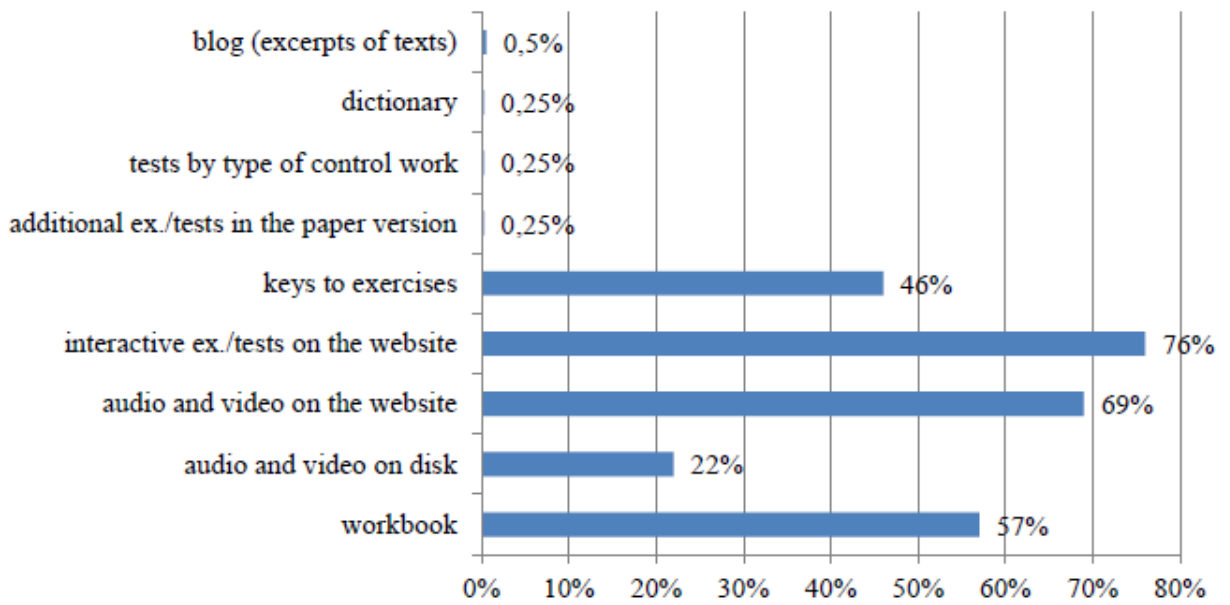
- *Fig. 7. The need for video materials*

1	2%
2	10%
3	19%
4	27%
5	42%
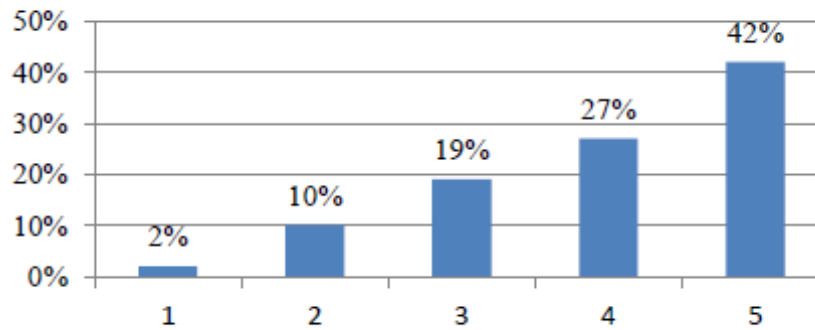
- *Fig. 8. The content of the applications*

illustrated vocabulary	0,3%
gram.rules in tables and diagrams	0,3%
active vocabulary of each section	0,3%
rules for setting superscripts	0,3%
additional audio/video	0,3%
socio-cultural information	0,3%
verbs with prepositions	73%
expressions /phraseological units	67%
reading rules,maps,verb conjugation,list of new words in alphab.order	68%

0% 10% 20% 30% 40% 50% 60% 70% 80%
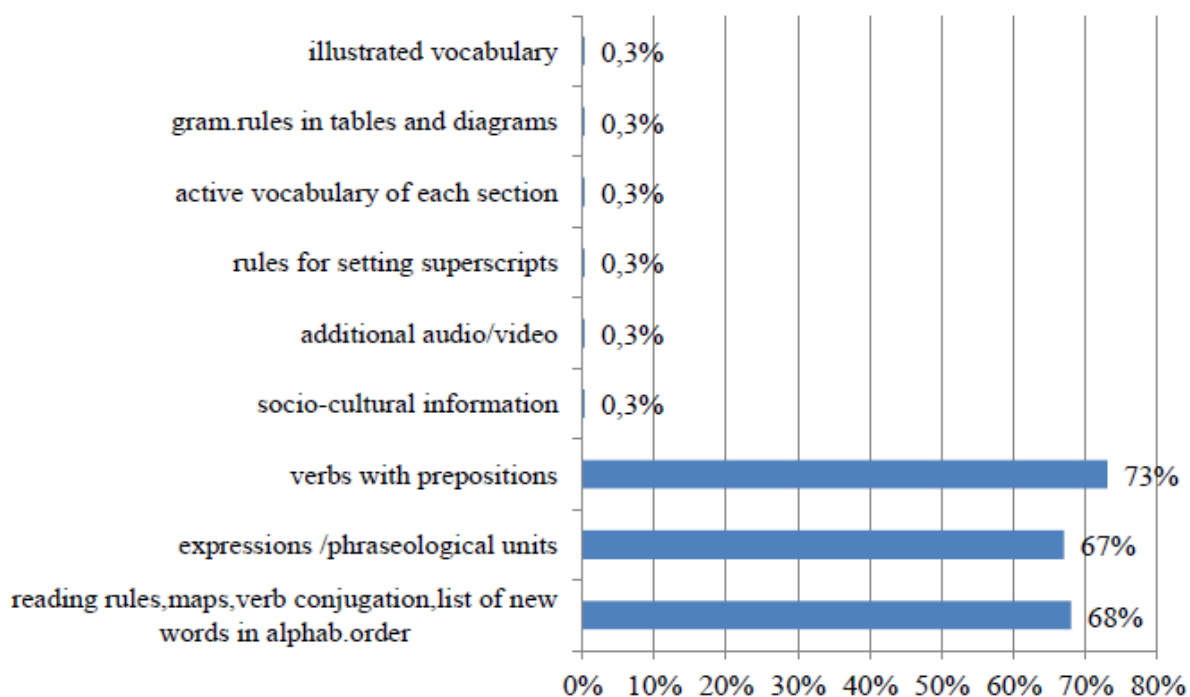
- *Fig. 9. Necessary text materials*

other	1,2%
advertising texts	39,9%
blogs/forums	57,3%
sociocultural texts	51,3%
excerpts from articles	78,8%
modern liter.texts	63%
lit. texts (classical)	56,8%

0,0% 10,0% 20,0% 30,0% 40,0% 50,0% 60,0% 70,0% 80,0% 90,0%

90
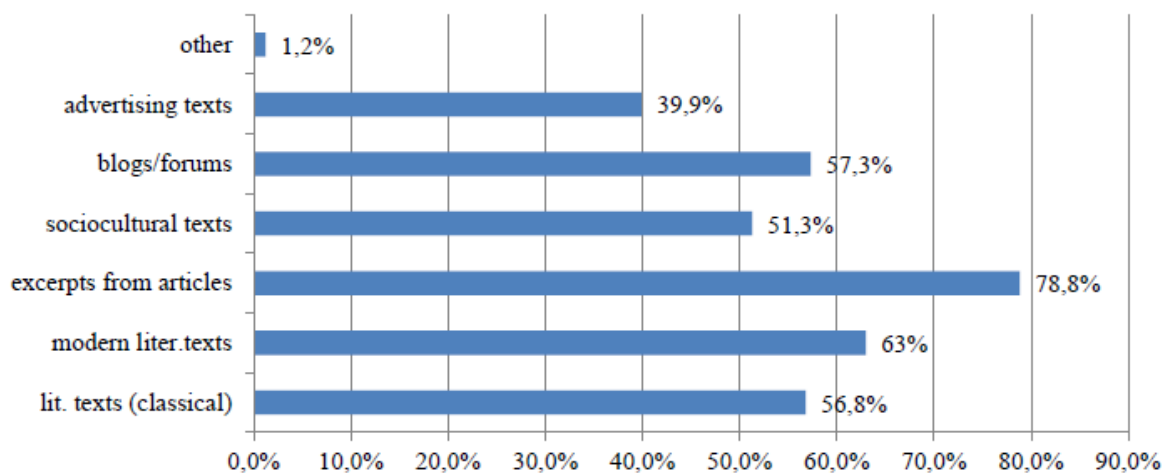
- *Fig. 10. The need for translation exercises from Russian into French*
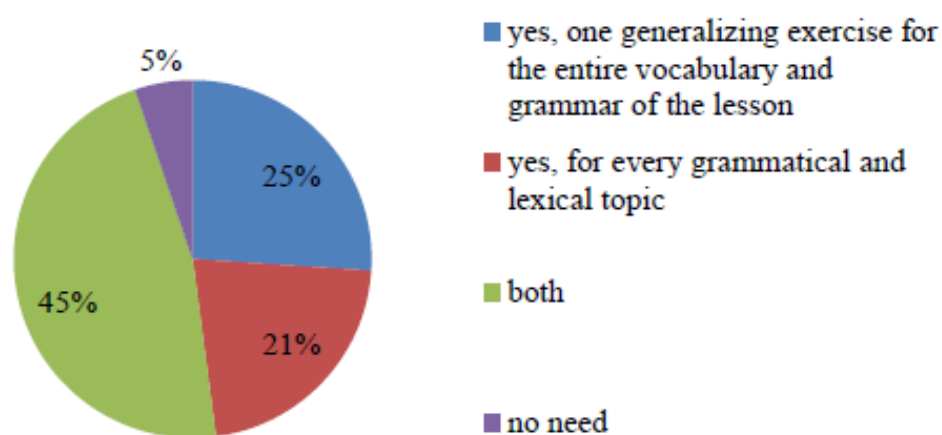
- *Fig. 11. Material for memorizing by heart*
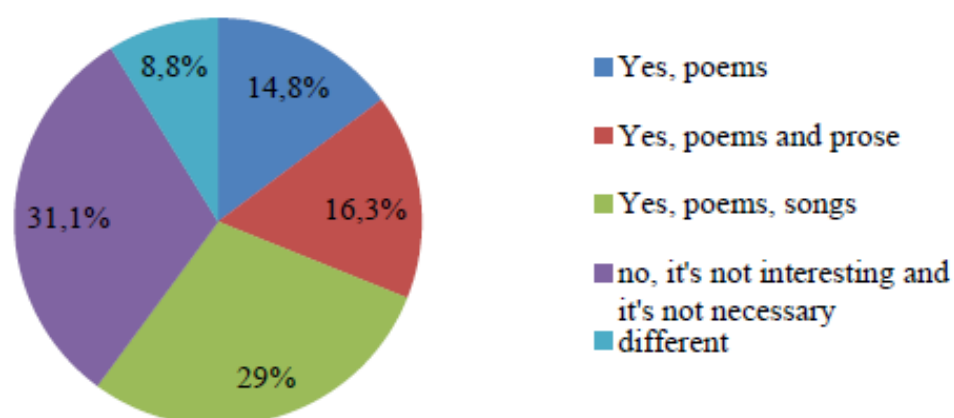
- *Fig. 12. The need for exercises to prepare for the international exam*

14,8%

85,2%

yes

no
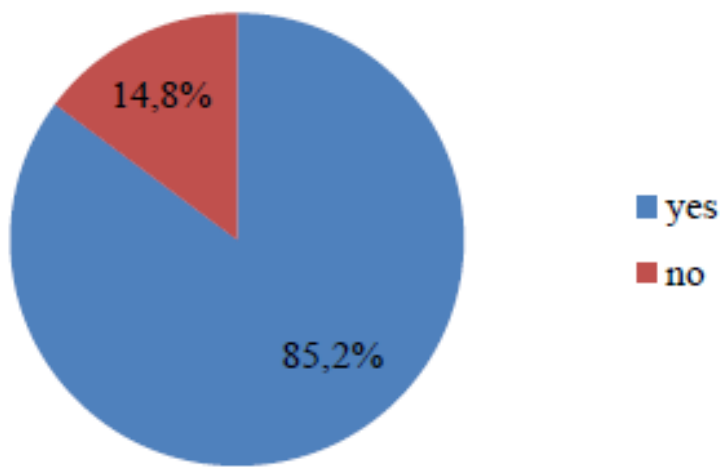
Developing Language Sensitivity of Business Communicators

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Abstract:
Developing language sensitivity is one of the learning goals of the "Language of Professional Communication" course for master program students at the GSOM, SPSU. The paper aims to explain the concept of "language sensitivity" and to identify skills, which language-sensitive business communicators need to develop. The paper raises the question of the necessity to specify an appropriate instrument to measure the development of language sensitivity of students. We argue that interdisciplinary communicative competence can be a solution. The case study of the communication course "Language of Professional Communication" for GSOM master program students includes the analysis of the preliminary results of the development of language sensitivity by means of interdisciplinary communicative competence.

Keywords: *language sensitivity, business communicators, interdisciplinary communicative competence, communicative behavior, professional communication*

Introduction

The role of language sensitivity for business communicators
Rethinking our research and practice aimed at the formation of students' communication effectiveness we have come to understanding that for years we have been doing it on instrumental level. "We will teach you the language that is a perfect tool to communicate for better profit."
Facing today's societal challenges, we need to admit that graduates of a business school deserve a better strategy to incorporate language and communication agenda into their professional identities. On graduation they should be able to position themselves as business communicators who can promote and protect their vision of the societal good.
How? They have to know themselves. They have to reflect themselves on a number of levels to understand what kinds of business communicators they are or they want to be. What is his or her idea of the societal good? What business school educators can do is to introduce new crossroads where students can learn more about the world and about themselves.

Why do we argue that every business school graduate should be a business communicator? Why business communicators are to be language sensitive? These questions became the motivation of our research interest; our decision to investigate the concept of language sensitivity was borne out at the intersection of a number of processes:

1. Interdisciplinary research project "Integration of language, communication and subject- specific knowledge in business education: The formation of interdisciplinary communicative competence".
2. Participation in international research conferences and two joint symposiums in collaboration with the professional Association – Research Group on Management and Language (GEM&L) and GSOM.
3. Introduction of new language and communication courses for master program students into the GSOM curriculum.

In these new courses we observed the development of students' language and communication skills. They interpreted the meaning of words and concepts, analyzed communicative behavior of

their own and their colleagues, interpreted communicative behavior, as conditioned by social, political, cultural factors, referred to their previous experience rooted in their educational background. We assumed that what we observe can be interpreted as language sensitivity, a special ability of students to control their language.

During various interactions, students demonstrate their ability to be sensitive to the language choices that might cause or be results of misinterpretation, unfavorable behavior and conflicts, unfavorable social/political context.

Where can instructors observe the manifestation of language sensitivity? It can be observed in various communication acts that students perform when they interact during the course. These interactions are strategically designed to create the moments when students demonstrate language sensitivity and observe language sensitivity of others.

The development of the concept "language sensitivity"
The development of the concept "language sensitivity" takes root in language-sensitive research in international business which conceptualizes language as a social practice when language is located in interaction between users, and meanings are created in the process of using language (Karhunen, Kankaanranta, Louhiala-Salminen, Piekkari, 2018). This interpretation of language suggests that professional communication among specialists is highly dynamic and often cross-functional. Professional communication involves three main processes – transfer, translation, and transformation of knowledge along with three types of boundaries – syntactic, semantic and pragmatic respectively (Carlile, 2004). For effective cross-functional professional communication, participants need "to establish a common lexicon for transferring knowledge at the syntactic boundary, develop common meanings for translating knowledge at the semantic boundary, and establish common interests for transforming knowledge at the pragmatic boundary" (Shen et al., 2015, p.2812).

Our research on integration of language, communication and subject-specific knowledge in business education also contributed to the understanding of language sensitivity.

Professional communication rests much on the ability of team members to skillfully use language. Experts from different professional fields often have specific interpretations of the same concepts and theories and it may result in hearing and understanding of meanings in a variety of ways. Thus, in cross-functional professional communication, language stops being only an instrument of communication; it serves as a social construct when meanings are created, clarified and evaluated in the process of communication which is always contextualized. Such interactions require the ability of speakers to communicate across the boundaries between professional areas and make connections across the fields of knowledge: to verbalize and communicate the shared goals and responsibility, to formulate and explain complex problems, to negotiate diverse meanings, ask clarifying questions, choose an appropriate register of speech and evaluate the identified solutions.

This problematization of language as a social construct enabled us to define the concept of "language sensitivity" as an ability of individuals to detect and produce appropriate language choices in order to react to complex problems. Language-sensitive communicators need to be able: (1) to interpret communicative behavior (verbal, non-verbal) and intentions of themselves and others; (2) to predict and evaluate the impact of language on different social groups; (3) to communicate their solutions in spoken and written forms with the focus on the intended communicative goal.

The current stage of the research process is about the interrelation between two concepts: language sensitivity and interdisciplinary communicative competence. We argue that all participants of learning process can observe the manifestation of language sensitivity and the components of interdisciplinary communicative competence make language sensitivity measurable.

We define interdisciplinary communicative competence (ICC) as the ability and willingness of an interdisciplinary team member to achieve shared goals by establishing a common lexicon, negotiating meanings, and producing texts in the process of integrating knowledge and expertise from two or more disciplinary areas. This competence is conceptualized as a complex of three components: (1) knowledge (interdisciplinary way of thinking and knowledge of language), (2) communication skills and (3) personal qualities of effective interdisciplinary communicators (Martynova, Gilenko, Kitaeva, Bondar, Orlova, Drozdova, Cherenkov, 2023).

This knowledge allowed us to put forward the following hypothesis: if we consider interdisciplinary communicative competence an instrument to decompose students' communicative behavior to knowledge, communication skills and personal qualities, then language sensitivity becomes a measurable indicator of communicative behavior's effectiveness given that communication tasks are properly designed.

The case study: "Language of Professional Communication" course

The course "Language of professional communication" is designed for the students of three master programs at the GSOM – "Corporate Finance", "Business Analytics and Big Data" and "Smart Cities Governance".

The course that we conducted in 2021-2022 consisted of three parts. LPC 1: business communicators and cross-functional communicationLPC 2: crisis communication

LPC 3: corporate storytelling

During the course, students are exposed to communication cases related to their specializations:
1)   they are highly integrated,
2)   they are often risky
3)   they are always about reputation

The program designers and instructors design communication tasks where they focus on:
- the diversity of students' backgrounds;
- the diversity of the students' master programs specializations;
-       the diversity of instructors' specializations and areas of expertise that results in course content variety;
- the diversity of international expertise.

The instructors follow a three-stage trajectory where students become aware about language sensitivity as a special ability which they develop (Table 1):

Table 1. Three-stage trajectory

Stages	Communication acts
The concept of language sensitivity is introduced; the communication task is designed to initiate a talk about language sensitivity.	Students react to a Harvard Business case "Is It Ever OKto Break a Promise?": write their responses that reflects their position. They need to lessens the negativeoutcomes of their decisions and protect the professional reputation of their own.

Language sensitivity becomes more visible for students. Students can interpret the communication effectiveness and failures as an effect of language sensitivity.	Students meet to discuss their responses in a group with opposite opinions; it enables them to rethink and improve their initial texts. As a follow up they write a brief explanation what they have changed in their texts and why.
When responding to problems that provoke conflicts students interpret language sensitivity as their ability to control their communicative behavior.	Students write a pitch that correlates to their individual and corporate culture of risk-taking, promote an opinion or position. Protect the values that they share. Protect the company's reputation.

When students prepare to communicate, they control the quality of their language choices at stage 3 (Table 1) with the components of ICC: knowledge component, communication skills component and personal qualities component. In other words, the abstract concept of language sensitivity turns into a controllable process when students demonstrate their knowledge, relevant communication skills and appropriate qualities of business communicators.

Before writing the pitch texts, students think about solutions which can help them enhance the credibility of their solutions; they suggest how they can increase a positive effect and lessen a negative one for the audience (Table 2). Their answers correspond to three components of ICC.

Table 2. Examples of a students' solutions

Knowledge	Communication skills	Personal attributes (attitudes)
Knowledge of language: use clear and concise language which will help the audience to easily understand the content of the pitch. The use of technical jargon or complex terms makes the audience lose interest in the presentation. Avoid jokes, attitude words Knowledge of professional areas:	clearly communicate the benefits of policies highlight success stories and emphasize the collaborative nature of the process making employees feel valued and included in shaping the workplace culture appeal to the audience's emotions; it can help to create a deeper connection with the audience.	confidence calmness formidability openness empathy resilience integrity open-mindedness

	the company can ensure transparency in the investigation process and communicate the findings to the employees. This will show the employees that their concerns are being taken seriously and the company is committed to inclusivity and diversity. the company can encourage open communication among the employees by providing a platform for them to express their thoughts and concerns. This can be done through town hall meetings or online forums.	incorporate personal stories or anecdotes to create a deeper and more memorable impression. provide real-life examples of employees who have benefited from the wellness program. show enthusiasm and excitement about the program. It will help to engage and motivate the audience to participate in the program.	

The analysis of the students' examples shows the elements which they reflect on in order to better demonstrate their knowledge, communication skills and personal qualities in the pitch. Firsts, the answers include various knowledge elements – disciplinary knowledge; knowledge of professional areas; broad-based knowledge: understanding of social, cultural, historical, political issues, and the knowledge of language as a social practice: language resources and communication devices that increase persuasiveness of the text.

Second, the abilities to decide on a desirable effect and desirable reaction from the audience; choose means to enhance the desirable effect and reaction; predict possible negative effect and reaction from the audience, and decide how they will reduce a possible negative effect and reaction.

Finally, students indicate the qualities which are necessary to articulate their position in the pitch (Table 3).

	Components of interdisciplinary communicative competence	Elements that students demonstrate
1	Knowledge	disciplinary knowledge knowledge of professional areas
		broad-based knowledge: understanding of social, cultural, historical, political issues: read extra sources to understand the scale of the problem in the given context (historical, socio-cultural, political) knowledge of language

2	Communication skills	Abilities to decide on a desirable effect and desirable reaction from the audience; choose means to enhance the desirable effect and reaction; predict possible negative effect and reaction from the audience; decide how they will reduce a possible negative effect and reaction
3	Personal qualities (attitudes)	personal qualities to demonstrate when pitching

What we observed in 2022: most students focus on communication strategies (communication skills component) and language strategies (knowledge component). Still the students rarely turn to their disciplinary knowledge or their broad-based knowledge: understanding of social, cultural, historical, political issues: read extra sources to understand the scale of the problem in the given context (historical, socio-cultural, political).

Conclusion
The present study sets a few avenues for further research in order to advance conceptualization of language sensitivity and pedagogical practices aimed to develop this ability:
1. Investigate what topics and questions raised by language-sensitive researchers in IB are of theoretical and practical interest to practitioners who implement courses aimed at developing language sensitivity.
2. The concept "language sensitivity" needs to be elaborated for teaching and learning purposes. Practitioners need to understand what skills and personal qualities relate to language sensitivity.
3. Further research should shape the methodology, which can be applied when evaluating communication acts with the focus on language sensitivity. A scale to measure language sensitivity of students needs to be developed.
The following stage of the present study is to work out a method to measure language sensitivity of students using the components of interdisciplinary communicative competence and describe levels of its development.

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Training Firm as an Educational Tool for Development of Professional Communication Skills in the Process of Teaching Business German

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Abstract:
The purpose of the article is to identify and describe the features of using such an education technology as Training Firm (Übungsfirma) in Business German classes for future managers. The article emphasizes the role of various teaching techniques and methods that allow students to analyze, select and use proper behavior models and practices of top management that exist in real world. The authors argue that the universal nature of Training Firm concept allows solving various methodological tasks, and its integration in the process of teaching Business German is an effective means of improving professional communication and managerial skills of future managers, as well as significantly increases motivation for learning a foreign language and creative self-development and promotes active participation of students in the educational process.

Keywords: *Training Firm, Business German, professional communication, simulation method, teaching a foreign language, Training Firm Creation, learner autonomy*

1. Introduction

Relevance of the study is related to the fact that Training Firm as an educational technology has been of interest to modern pedagogical science in various fields for a long period of time. This is due to the fact that it has a pronounced practical orientation and helpsto organize the educational process in a most efficient way, which is based, as a rule, on building a model of a certain enterprise [3, 4, 5]. At the same time, its universal nature is manifested in the fact that such a form of education can be implemented in any educational institution, using a variety of materials, while a target group can be persons with different experience in a particular field, (in the context of Training Firm as a method of teaching a foreign language) with different levels of proficiency in a foreign language.

The subject of the study is the features of integration of Training Firm concept in educational process in Business German classes at university, taking into consideration the fact that respective students (future managers) do not have rich practical experience in the field in which they plan to carry out further activities, while they already gained some theoretical knowledge during subjects' study in their major specialization, and their levels of proficiency in German vary from A2 to C1.

The novelty of the study lies in the presentation of methods of adapting Training Firm concept to the course of Business German for the Master program at St. Petersburg State University Faculty (Institute) "Graduate School of Management" (SPbU GSOM) by the natural integration of Training Firm elements (with regard to its universal nature) into the series of classes based on the teaching materials specified in the academic course syllabus, that is, using the content and materials that are the foundation of the present course.

2. Training Firm and Features of its Integration into Business German Course

First of all, it should be noted that the Concept of Training Firm is closely related to German-speaking area. The history of the emergence of Training Firm as an educational concept has its roots in rather distant past. In 1660 the textbook Ambrosius Lerice on accounting was published in Danzig, the second part thereof was called "Commission and

Factorey", in which first traces of Training Firm can be found, i. e. a fictitious merchant Peter Winst conducted fictitious business, the accounting thereof was to be conducted by students studying accounting. Circa 1920 first European syndicates began using business correspondence for academic purposes. This is how the so-called Business Correspondence Union firms emerged that became modern Training Firm prototypes. In 1954 a "real" German Training Firm was founded in Bremen, and in 1960 the oldest German Training Firm appeared in Witzenhausen and it still continues its activities. In 1963 the first Training Firms fair was organized in Karlsruhe; in 1971 Professional Development Support Center (Bfz- Essen GmbH) was established in Essen, and in 1979 the Central Office of Training Firms German Association (die Zentralstelle des Deutschen ÜbungsFirmenRings) appeared at the same place as the service center for as many as 80 commercial Training Firms operating throughout West Germany (Federal Republic of Germany) which took Training Firms under its wing in 1989, that had previously been under the wing of the Central Department in Heidelberg [8]. In the1990s Training Firms methodology became widespread in Austria and Germany and it was integrated into all levels of educational process, including staff retraining. In 1993 Project called EUROPEN-PEN (PEN Worldwide - Training Enterprises Network [7]) was launched. The said European Training Firm Network includes pproximately 7600 Training Firms from more than 42 countries [6]. The possibility to connect Training Firms from different countries and continents into one network opens up great opportunities in teaching international business.

Training Firm concept is based on a principle of modeling (simulation), i. e. it is a model of real company (firm) that reflects features of a company's operation in a particular industry. Based on it, industrial processes can be studied. As a rule, relations with other firms, partners, clients, and investors are an integral part of the said model [1, 3, 4, 5].

Thus, one of the most important features of Training Firm is also professional communication skills development in different aspects and at all levels (which can be also defined as the main purpose of the referred concept integration in classes of Foreign Language for Business). And this feature can also be called one of the key features in the scope of Foreign Language for Business Course as Training Firm concept can be harmoniously (naturally) integrated in foreign language class due to its universal nature and it allows one to organize educational process efficiently, the ultimate goal of which is to have a good command of foreign language in business communication sphere.

Integration of Training Firm concept in Business German classes into the course of the Master program at St. Petersburg State University Faculty (Institute) "Graduate School of Management" (SPbU GSOM) has the following features:

1) It always correlates with such an important educational process component as goal-setting which also in turn affects setting tasks, content and selection of material, possible social interaction forms in classroom, information technology use, etc.;

2) It requires elaborate information and language preparation work from both instructor and students; in our case it is, e.g., necessity to familiarize oneself with the very concept of Training Firm, as well as various production branches, types of legal entities in Germany, company's organizational structure, etc., that is preparation of language and information field (basis) for further implementation within Training Firm (various methods, materials, technical means, various forms of social interaction between students are used at preparation work stage);

3) It is often stage-based: in a global sense – students' activities are subject to different stages of a real company activities such as:

    a. Training Firm Creation (e.g., at this stage, global aim can be a skill to make a presentation of one's Training Firm with an indication of industry, type of activity, name selection, logo creation, mission statement, structure definition, etc.; this stage may also include possible supply and demand analysis or

research of competitive advantages of a product);

  b. direct company's activity (such as conducting interviews and recruitment, performing professional duties in terms of job description, establishing partnerships and relations with clients (including business correspondence, negotiations, telephone conversations, etc.), working with contracts, financial documents, etc.) [3];

  c. liquidation of a company (study of the grounds for a company liquidation, bankruptcy, etc.- this stage rarely appears in our teaching practice).

4) Integration of Training Firm Concept in educational process allows the use a wide range of methods (e.g., project method, case method, interviewing, surveying, brainstorming, carousel strategy, role-playing games, business games, etc.);

5) Integration of Training Firm concept can occur in varying degrees at different educational trajectories (A1, A2, B1, B2, B2+) and at different time intervals according to objectives and tasks, as well as feutures of educational material that is due to be studied, whereas the most preferable option is the beginning of a term, when later, during several months, students' activities in educational process stem from Training Firm concept by one means or another, as well as fully or partially, and that way the probability of achieving educational goals is much higher;

6) Training Firm as a learning technology is activity-based technology, and in the process of applying thereof modelling (simulation) of professional activity within educational process occurs [1];

7) learner autonomy plays an important role in the process of integration of Training Firm concept in educational process, i.e. they create their own companies, manage them, take responsibility for decisions made, solve cases, etc.;

8) A teacher (educator) in Training Firm acts as an observer, assistant, consultant, facilitator while his main tasks include the following: assistance at all stages of Training Firm operation, motivation, promotion of activity and decision-making, control and feedback;

9) Introduction of Training Firm concept is focused on working program of academic course Business German within the framework of Federal State Educational Standard and is aimed at development of all components of foreign language communicative competence (linguistic, language, socio-cultural, discourse, strategic, social, learning and cognitive ones);

10) Specific features of Training Firm allow the use of a variety of social work forms in foreign language for business classes (such as frontal, group, pair, individual and independent ones);

11) While integrating Training Firm concept in Business German classes, features of German-speaking business area are also taken into consideration (i.e. a variety of organizational and legal forms of enterprises established in Germany, specific structure and features of modern management practices peculiar to German companies, etc.);

It is significant that the above-mentioned features indicate that Training Firm concept is of universal and complex nature. Taking into account the said features, when Training Firm concept is integrated in educational process, both a separate class and a whole series of classes can be organized within Business German course in SPbU GSOM Master program.

It is necessary to underline that incorporation of Training Firm concept into the program implies the focus on students' activity owing to the fact that many of them already have working experience or internship experience and are acquainted with the basic principles of the real firms' functioning to a certain point. Practically all learning stages and forms of work are planned to encourage students' initiative and to make them active participants of the learning process.

The following table illustrates the way and the extent of the students' and teachers' involvement in performing tasks at the first stage of work within the framework of the Training Firm concept.

teacher	students
formulates training goals and objectives	get acquainted with educational goals and objectives
sets the time limits for the educational activities	plan individual and group activities based on a given time frame in the context of the concept Training Firm
explains assessment criteria	use assessment criteria to prepare a firm presentation
prepares informational and teaching materials	study informational and teaching materials
provides informational and language training, including exercises	train language material as part of business communication accomplishing proposed exercises
sets out the specific task of establishing a Training Firm, provides support and assistance in the selection/establishment of a firm and in case of any language difficulties	on the basis of the proposed material and their experience choose a real company, which could potentially serve as a model, or create their own company, choose a name, formulate a mission, etc.
formulates the task of making a presentation of the selected/created company	make a presentation of their Training Firm, indicating the industry, type of activity, name choice, logo creation, mission formulation, structure determination, etc.
acts as mediator during presentations and initiates discussion	ask their colleagues questions, lead the discussion, note the weaknesses and strengths, make suggestions to improve the model
evaluates results , gives a detailed feedback	improve their model

It is possible to observe how some of the above points are implemented in practice. It is noteworthy that they also manifest themselves in a complex, that is, it is impossible to isolate any particular feature at a separate segment, stage or type of work.

For example, during preparation work students receive information on basic terms and concepts that characterize company's operation, as well as, possibly, on operation of certain German companies and their features. For this purpose, one can use diagrams, infographics and other visual materials in foreign language classes. Various types of work are used there (such as group, pair, individual ones), various methods are applied, e.g., such as survey / questioning method, discussions or quiz games. Students' presentations on certain German companies engaged in real commercial activities can be indicators of goals achievement within concerned work.

While creating Training Firm, the entire study group can be engaged in one enterprise operation, otherwise, students can be separated into small groups of 3-4 persons to create their own company. In both cases, a conducted procedure includes the following: industry, activity type and name selection, logo creation, mission statement, structure definition, etc. Roles are distributed within groups (to perform actions related to both educational activity and performing functions and tasks in a certain position). However, it is important to

emphasize that the concerned distribution is transferable, no role is assigned to a particular student for the entire period of Training Firm operation, while each participant is assigned with 2 or 3 roles. In this case, each group is a separate Training Firm, within which activities are carried out aimed at students' forming foreign language communication competency in professional sphere. For example, company modeling (simulation) allows to achieve the following communicative goals: capability to introduce a company and tell what it produces or which services it offers, to describe one's role in a company, responsibilities and further development prospects, to describe company products, etc.

A wide range of linguistic means can be used at this point and each group is supposed to give a presentation of their own company as a result.

For example, to describe a role and functions of an employee, a company type and its product/service characteristics, one can use the following set of expressions [2]:

- to describe a company (Unsere Firma):
    o Wir sind (we are) - ein Konzern (a corporation) - eine Unternehmensgruppe (group of companies) - ein Unternehmen (company) - ein Familienunternehmen (family business) - ein Betrieb (factory / plant) - eine Firma (firm)- eine Tochterfirma der / des ... (branch) - eine Organisation (enterprise) - ein Institut (institute) - eine Zweigstelle/Niederlassung der /des
    /von (branch)... mit ... Mitarbeitern (with…employees);
    o Wir gehören zu ... (We belong to ...);
    o Unser Stammhaus befindet sich in ... (Our headquarters are situated in ...)
    o Wir sind klein / mittelständig / groß / multinational (We beelong to small / medium-sized / big business segment)
- to describe activities (operation) (Unsere Tätigkeit):
    o Wir stellen ... her. (We produce...)
    o Wir produzieren ... (We produce...)
    o Wir handeln mit ... (We trade with ...)
    o Wir kaufen / verkaufen... (We buy / sell...)
    o Wir transportieren ... (We transport...)
    o Wir forschen auf den Gebieten ... (We conduct research in the field of …)
    o Wir beraten... (We advise (consult)...)
- to convey the values and mission of the company (Unsere Unternehmensphilosophie):
    o Wir denken zukunftsorientiert / umweltbewusst / qualitätsorientiert / kundenfreundlich / innovativ / marktorientiert (We are future-oriented / environmentally conscious / quality-oriented / customer-friendly / innovative / market-oriented);
- to tell the story of the foundation (Unsere Geschichte):
    o Unsere Geschichte / Unsere Firma wurde ... gegründet (Our story started / Ourcompany was founded…);
    o Wir blicken auf ... Jahre Erfahrung zurück. (We look back on…years of experience);
    o Wir können Erfahrung auf den / allen Gebieten der / des ... vorweisen. (Wehave experience in all areas of ...);
- to describe the workflows (Unsere Arbeitsweise):
    o Wir orientieren uns an hohen Qualitätsmaßstäben, deshalb haben wir absolutes Qualitätsmanagement eingeführt. (We are guided by high quality standards, that is why we have implemented absolute quality management.)
    o Um effektiver zu arbeiten entschieden wir uns für die Form des «lean managements» und des «transparenten Managements». (For more efficient work, we have chosen the form of "initiative management" and "transparent

management")
- to describe employees (Unsere Mitarbeiter):
  o haben hohe Eigenverantwortung. / arbeiten mit großem Engagement / ganzem Einsatz. / sind qualifiziert und werden ständig geschult. / besitzen enormen Teamgeist. / identifizieren sich mit der Firma.
  (…have a high degree of personal responsibility. / work with great commitment / full commitment / are qualified and receive constant training. / have enormous team spirit. / identify themselves with the company);
- to speak about strategy (Unsere Zukunft):
  o Wir wollen uns vergrößern / expandieren. (We want to grow / expand)
  o Wir investieren in ... (We invest in…)
  o Wir suchen neue Partner, die ... (We are in search of new partners who..)
  o Wir wollen internationale Beziehungen knüpfen mit ... (We want to establishinternational relations with…);
- to describe a role in a company (Meine Tätigkeit):
  o Ich arbeite als ... in der Abteilung ... (I work ... in the department...)
  o Ich bin zuständig für ... (I am responsible for ...)
  o Zu meinem Aufgabenbereich gehört ... (My area of responsibility includes…)
  o Ich arbeite eng zusammen mit ... (I work closely with...)
  o Ich habe insgesamt ... Jahre Berufserfahrung. (I have a total of ... years ofprofessional experience).
- to describe a product (Unsere Produkte):
  o werden termingerecht produziert / geliefert. / sind von hoher / bieten höchste Qualität. / haben sich bereits bei vielen Kunden / in der Praxis bewährt. (…are produced / delivered on time. / are of high / the highest quality / offer the highest quality. / have already proven themselves with many customers / in practice).
  o Unsere Produktpalette reicht von ... bis zu ... / umfasst ... (Our product range extends from ... to ... / includes ...)

Product description is particularly important for a manager when it comes to external communication aimed at attracting new clients and investors which is extremely important forthe future of the company.

After the enterprise model is built, one can move to other tasks related to communication situation such as communication with company guests, business negotiations, signing contracts, recruitment and firing employees, etc.

3. Survey (Questionnaire)

In order to improve the quality of education, we conducted a survey among students asking then to give feedback on educational activities results, in particular, reflecting the success / failure of Training Firm project. 24 students of Master program B1 trajectory took part in the said survey upon the completion of Business German course (at the end of the thirdterm). Students were offered to vote for the option they consider more reliable as well as express their own ideas regarding the said issue (The questionnaire consisted of two types of questions: open-ended (questions that needed written answers from students) and closed (yes/no questions)).

Students were offered the following closed-type questions with options of answers «yes», «no», «not sure»:

1)   Do you consider the introduction of the Training Firm concept to be of practical significance? (21 people responded «Yes». (87.5% of respondents), «No» - 0 person, «Not sure» - 3 persons. (12.5% of respondents).

2)   Do you think your foreign language business skills have improved as a result of

taking part at this course? (23 people answered «Yes», (95.8% of respondents), «No» - 0 person. «Not sure» - 1 person. (4.2% of respondents).

       3)   Has this project increased motivation to learn a foreign language? (20 people responded «Yes» (83.3% of respondents), «No» - 0 person (0,04% of respondents), «Not sure» - 3 people. (12.5% of respondents).

Students were also asked to comment on the project.

The most thoughtful responses emphasized the fact that integration of Training Firm concept in Business German course:

- promotes motivation and develops students' communication skills in foreign language;
- helps to apply theoretic knowledge within practical activities;
- allows bringing theoretical education as close as possible to a real-life situation;
- enables one to master the elements of additional qualifications within major educational specialization (for example, a student majoring in Marketing can also act as a person employed in HR division or accounting department);
- teaches specialists to react quickly to changes in labour market requirements for a specialist;
- takes into account individual strengths of students;
- facilitates cooperation;
- gives a sense of belonging to a community that shares common values and ideas;
- makes educational process diverse and interesting;
- gives a sense of usefulness to one's activities.

The survey results show necessity and importance of using Training Firm as an educational technology in terms of teaching Business German, as well as demonstrate a high degree of students involvement in the process of learning a foreign language.

4. Empirical Results and Conclusions

Integration of Training Firm concept in the course of Business German has a number of features that need to be taken into account in order to improve educational process effectiveness. Training Firm as an educational technology has a number of advantages. First of all, it is important to emphasize that while it is integrated in educational process, its universal nature allows using various teaching techniques and methods, choosing the most appropriate form for organizing classes, solving various communicative tasks, applying different forms of work and forms of social interaction by students, etc. The integration of Training Firm within Business German course is an effective means of improving the professional communication and managerial skills of future managers, as well as significantly increases motivation for learning a foreign language and creative self-development and promotes active participation of students in the educational process. The advantage of the methodology also lies in the fact that educational process is based not only on simulation modeling, but also leads to the expansion of students' work opportunities in real business communication situations. Once the acquired skill becomes formed/transferable, it can be helpful in other projects and activities. Training Firm as a technology of teaching a foreign language has a high methodologic potential: not only it makes possible to develop and improve communicative competencies in the field of professional communication in a foreign language, but can also give a correct and complete view of a holistic professional activity (from goal setting to introspection of the process and results of activity), as well as help to master the ways of professional activities to such an extent that it can provide a smooth transition to the actual performance of professional functions.

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Language Practices and Issues at International Small Business Projects of the South-Eastern Coast of the Baltic Sea (on the Example of Cross-Border Cooperation Programs of the European Neighborhood and Partnership Instrument)

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Abstract:
The article deals with the main current issues and problems in SMEs in international small business projects on the Baltic Sea coast especially on south-eastern coast. In all main spheres of the economy of the South-eastern coast of the Baltic Sea – Trade, Agriculture, Tourism. On the example of cross-border cooperation programmes of the European Neighbourhood and Partnership Instrument reveals concrete examples of major difficulties and barriers faced by small and medium-sized business in the Kaliningrad region when engaging in international projects. Based on the author's practical experience, the specific features as well as typical difficulties of scientific, consulting and teaching activities in a foreign language in the field of sectoral economics and project management for small and medium-sized businesses are presented. The main foreign language of the author of this article is German. The author is a mathematician by profession. This is the author's first article in English.

Introduction and the background

For more than two thousand years, the history of the peoples and states of the south-eastern coast of the Baltic Sea has been one of the most pressing issues in SMEs. The region developed through international trade. For example, the ancient Prussians, Couronians, Letgals and other peoples mined amber here. They successfully traded it with the Vikings, Romans, Germans and Slavs. This unique stone was of great value during the Middle Ages, due to the fact that its volumes were much smaller than today. Industrial mining of amber in the town Palmnicken East Prussia (present Yantarniy Kaliningrad region) was discovered only in the 19th century. Viking, Germanic and Slavic-Pomeranian ships sailed along the coast of what is now Kaliningrad, Lithuania and Latvia, where they bought the sun stone. Then they sold it to Southern Europe - Byzantium, Rome, and also Asia, where various amber ornaments were very popular, both for living people and serving as objects of solemn burial for the dead (Pelka, 1920). The port of Koenigsberg became one of the largest in the Baltic, which made it possible for small businesses in East Prussia and other countries to develop dynamically in the field of trade, agriculture, fisheries, handicrafts, hotel, restaurant business, etc. After the end of World War II, the city and port of Konigsberg became part of the Russian Soviet Federative Socialist Republic (RSFSR), and on July 4, 1946, they were renamed Kaliningrad.

During the war, the capital and the main port of Konigsberg, as well as other major cities of East Prussia, including the seaport of Pilau, were virtually completely destroyed. It took them two decades to return to normal civilian life. Soviet servicemen played a huge role in clearing the territory of Kaliningrad, dismantling rubble, creating the first objects of the construction industry, restoring destroyed enterprises and residential buildings. Engineers were sent from Moscow to restore bridges, roads, communications, and power supply to the city. The restoration of the first destroyed enterprises became of great importance for the revival of

the city. It was they who breathed life into him. Soviet specialists came to restore them already in 1945: Waggonfabriek L. Steinfurt (the car building plant), Union-Gießerei/Schichau-Werke Koenigsberg (shipyards), Zellulosefabrik Koenigsberg (two big pulp and paper mills). In the first three years after the war, Soviet specialists worked together with German engineers and workers. The work was carried out with technical documents in German, where the special most important role of translators was manifested. And their lives in the war-torn city depended on the effectiveness of oral and written communication between Soviet and German specialists. (Stepanova, 2021. Scientific concept for the museum stationary exhibition "Time to build" Kaliningrad 40 – 60s. author Olga G. Stepanovamaterial prepared for the museum of the city "Friedland Gate").

The economy of the RSFSR had an administrative and planned nature, which did not imply the development of small business and business in general. However, the RSFSR had and developed international economic relations with various countries of the world, which led to the further development of the port of Kaliningrad and other cities on the coast of the Southeastern Baltic. Kaliningrad State University trained specialists in the field of Romano-Germanic philology. The work of an interpreter, as well as an engineer and a researcher who speaks a foreign language, was in demand in large state structures and institutions in the Kaliningrad region of the Ministry of Fisheries of the RSFSR, other ministries and departments, in research institutes -

AtlantNIRO and the Shirshov Institute of Oceanology, which had scientific and trade and production contacts with various countries of the world, including capitalist, for example, Finland, Spain, Sweden, where Soviet specialists, in particular, carried out engineering work in the field of ship repair, repair of machinery and equipment of the fishing industry.

In our work, we have also chosen one of the areas of the economy of the sea coast - in this case, the Baltic Sea, namely international small business projects, but in other areas: agriculture and reconstruction of cultural heritage sites and tourism on the South-eastern coast of the Baltic Sea. One of the most important examples of international small business projects are the projects of cross-border cooperation programs of the European Neighborhood and Partnership Instrument, which we consider as special objects of language practice and issues. Accordingly, we consider several other management specializations, namely investment analysis and project management, consider the problems of using the main methods of investment analysis and project management of the main foreign languages of the South-eastern coast of the Baltic Sea - English, Russian, Polish, Lithuanian.

The purpose of my research at this stage is to analyze language practices and problems in international small business projects of the southeastern Baltic Sea coast (using the example of cross–border cooperation programs of the European Neighborhood and Partnership Instrument). This tactical goal is a sub-goal of the strategic large-scale scientific goal "Development of scientific, practical and methodological recommendations for improving the management of small business projects in cross-border cooperation programs".

To achieve this goal , the author sees it necessary to solve the following tasks:

1) To analyze language practices and problems with so-called communication between managers from different countries who do not speak each other's native languages (this is, according to my data, an important and urgent problem in the language communication of international projects of the South-East of the Baltic),

2) Analyze: "how the tasks of language communication, interpretation and translation in projects were solved earlier. What are the main problems identified"

3) Using examples of typical international small business projects of the south-eastern Baltic Sea coast of three industries: trade, agriculture, historical and cultural tourism (industries that occupy a significant share of the economy in the Kaliningrad Region, regularly funded through cross-border cooperation programs) to present the main elements of the standard organizational structure of the international project, to identify the characteristic

difficulties in the overall and industry (terminological) communication (clear unambiguous correct understanding of each other) between customers, managers, participants and experts of the project (limited to the study of problematic communication within the group of project participants – citizens of one of the states of the international program). To show the possibilities of solving typical identified problems by applying the basic methods of project Management methodology (according to IPMA\PMI\Russian GOST standards).

Theoretical foundations The issues of language practice and problems in international small business coastal regions of Europe are the subject of research by many authors in the field of various sciences. Among them: Wilmot Natalie - Management of language diversity in international supply chain relationships of UK SMEs; Elena Cicchetti - Small- and medium-sized enterprises in a multilingual region; Ersilia Intelli - Foreign language management in Lazio SMEsLanguage Policy; Igor Rizhnar, Klemen Kavcic and Robert Rybnicek - Language Management Strategies in Austrian and Slovenian SMEs. The researchers considered the problems of using the language in the following areas of small and medium-sized business management: supply chain management; state and municipal administration; strategic management; management of small and medium-sized businesses in the multilingual region.

Briefly analyzing the tasks of the above-mentioned researchers, we see that at the same time in 2017, researchers in three different European countries devoted their work to two different sections of management at the SMEs - supply chain relationships and language management strategy (lms) in the field of logistics and export-import operations: "Although language has claimed a place in the field of international business studies, the vast majority of research in this area has focused on language management practices in multinational organisations, and has therefore largely ignored the question of how small organisations cope with linguistic diversity in their international supply chain relationships" (Wilmot, 2017). "In our article, we analyse how Austrian and Slovenian small and medium-sized enterprises (SMEs) adopt language management strategies (lmss). Our research directly addresses only some economic issues related to foreign language skills in exporting SMEs" (Rižnar & Rybnicek, 2017). A number of important differences between the project management knowledge system (project management) in small business compared to large business were investigated in 2019 by A.R. Koksharov in the article "Analysis of the state of project management in the realities of Russian business". The author focuses on the fact that, first of all, foreign experience and literature are used: "In a significant part of small and medium-sized businesses, when building a project management system, it is customary to borrow foreign tools, often designed for the implementation of large-scale projects." (Koksharov, 2019)

Method

We used scientific methods of interviews and observations: During 8 years of the author's participation in international projects as a developer of educational and methodological complexes, a teacher of the course "Fundamentals of Project Management", as well as a participant in scientific conferences, he conducted a continuous dialogue with various participants in international projects- teachers, consultants, translators, managers, economists, information technology specialists from the Russian Federation, the Republic of Poland, the Federal Republic of Germany, the Republic of Lithuania. Most of the participants in the projects covered by the dialogue were representatives of small and medium-sized businesses or university teachers, sometimes these roles were combined. There was also a dialogue and analysis of project implementation experience with scientific and administrative staff of museums, tour guides, taking into account the development by the author of the educational and methodological complex "Fundamentals of project management of museum and excursion activities" of the program of advanced training courses for tour guides and museum workers (the leading partner of the project - Immanuel Kant Federal University). In total, about 55

personal and group meetings and consultations were held, the main subject of which was the knowledge system in the field of project management (according to international IPMA, PMI and Russian state GOST standards), the value of its application in various sectors of the economy, the difficulties of communication and translation of special terminology in the field of project management, as well as the use of specialized computer programs.

During the interview, it turned out that approximately 15% of respondents used the project management knowledge system in their work according to international standards. To the question of the rest, "why don't you use the project management knowledge system?" I received the following answers: 15% - "we have only heard about this knowledge system, but we do not know its essence and effectiveness, please tell us more. We may be interested in using the project management system according to international standards " 25% - "we do not consider it appropriate to overload the organization and employees with schedules, calculations, mathematics, computer science. The effect stated in the system – saving time and cost up to 25% is unlikely to justify itself, and people's dissatisfaction or the costs of new employees who like and want to do it will be great." 10% - "we have a closed organization and our own management system, we are not ready to share it – this is the secret of the company." 35% - "we are convinced that management should be based on industry experience, if a person is a professional manager in the field of fisheries, then he knows and feels all the nuances and he has enough knowledge to correctly and effectively give instructions and monitor their implementation, he feels the progress of the fisheries project from experience the implementation of similar projects, overloading your head with excessive schedules, calculations, mathematics, computer science is absolutely unnecessary and even harmful." 15% - "we are the most professional managers, we can manage any organizations

and projects in all sectors from the education system to housing and communal services and information technology." At the same time, many of the respondents said that they solve all issues with colleagues on projects from Europe in English: "we work well with European colleagues in English, so specialists who speak the languages of our partners – German or Italian even at a high level, we don't need them in projects." The statistics of these responses clearly indicate that more than 50% of respondents in management are guided by their effective image, charisma, their experience of language practice with subordinates, colleagues and management, and are confident that they do not need additional tools. Therefore, a separate study of the problems of international projects caused by certain language practices related to effective image, charisma, managers' experience in language practice with subordinates, colleagues and management, psychological characteristics and results of such practices, and other issues, in our opinion, is also relevant. But in our study, we consider language practices and problems only from the point of view of unambiguity, correctness, accuracy and the importance of partners understanding the meaning of the transmitted information, in two types of dialogues:

1) the dialogue between the foreign partners of the project and the specifics of translation from one language to another;

2) a dialogue between project participants of the same country who have different specialties, which, as project practice shows, causes mutual difficulties in understanding the tasks and industry terminology.

Summing up the results of this dialogue, interviews and consultations, the author of the article was able to identify a number of typical and specific problems and difficulties in the implementation of international projects, to give recommendations for the resolution of some of them. I also used the method of deduction: moving from the general to the particular, I used the experience of my scientific work in the field of aquaculture project management in the period 2005 – 2016 and here in the article briefly and for the first time considered the issues of interpretation and translation, language communication for small business aquaculture projects.

Main body of the paper

International small business projects on the Baltic Sea coast present time are in most cases characterised by a high concentration of work in a foreign language. At the same time, small businesses do not have the financial means to have in-house interpreters or even call upon them on a regular basis. Therefore, most of the communication takes place in the languages spoken by the employees of the companies involved in the field of foreign economic activity that interact with each other. Sometimes it is a mixed language of communication, e.g. Polish-Russian, which was typical in the Baltic area due to the compulsory study of Russian in the republics of the USSR and Poland. But inhabitants of Kaliningrad region from 1991 willingly and quite successfully were learning Polish language because of slavic roots, encouraged by Polish TV, which was available free of charge in Kaliningrad houses for those who could not afford the satellite antenna. So it has been Polish-Russian business, where a Russian without Polish speaks can understand up to 75 percent of the Polish language, and a Pole who can understand up to 75 percent of the Russian language, but still speaks Polish. They understood each other very well. I can assume that there was a similar situation in business between Lithuania and Poland, although to a lesser extent, although to a lesser extent, given Lithuania's bilingualism.

Table 1 Main and subsidiary languages of International Small Business Projects of the south-eastern coast of the Baltic Sea

Main languages	Subsidiary languages
Russian	German
Polish	Swedish
English	Danish
Lithuanian	
Latvian	
Estonian	

But today, the Internet, fast text translation via computers and mobile phone applications provide completely new opportunities and a new impetus for the development of international small business projects on the Baltic Sea coast. A special role is played by social networks, which have become a real driver for small and medium-sized companies in the region - thanks to large- scale visualization through photo and video content, as well as fast translation using an internet translator, the efficiency of finding new partners increases, the effectiveness of interaction with existing ones increases: the effect of advertising; new advertising agents appear on the arket, people who have created interesting pages, personal images of people with physical, intellectual attractiveness, bright talents - music, painting, sculpture, etc. allow them to become an attractive platform for the advertiser on social platforms instagramm, facebook, twitter, etc.

Table 2 Examples of relevant sectoral small business projects of the south-eastern coast of the Baltic Sea as well as national and cross-national state support projects promoting small business development

Project	National level of state support Poland	Interethnic level of state support Russia - Poland	State support from the European Union
Trade trade in construction materials, food, household goods, household chemicals and more *Agriculture* Willingness of Polish businesses to invest in apple orchards in 2016 *Tourism* Development of private business in the field of historical excursions	The Polish authorities will extend until the end of March support to companies that have been hardest hit by the coronavirus pandemic. An additional 4.5 billion zlotys (about 1 billion euros) will be allocated for this purpose, Radio Polska quoted Polish Prime Minister Mateusz Morawiecki as saying. A)	Kaliningrad authorities are negotiating with the Polish side to lift the mutual permits for cargo transportation for 2021. 10 thousand additional permits have been issued to Kaliningrad companies. The main route for cargo deliveries without restrictions for road transport to the region from Russian regions runs along the Belarusian-Lithuanian route. B)	Projects of cross-border cooperation programmes. For example: 1) The European Neighbourhood and Partnership Instrument Cross-Border Cooperation Programme "Lithuania-Poland-Russia" 2007-2013 2) Poland -Russia Cross Border Cooperation Programme 2014-2020

A) https://kaliningrad.rbc.ru/kaliningrad/12/03/2021/604b77a99a79473479dbb73b

B) https://tass.ru/ekonomika/13264827

The aforementioned projects result in the demand for specialised Polish-Russian translation and interpretation in the fields of programming documents, various legal and financial documents, mutual transport permits, production, agriculture and other areas. It is a source of income for small businesses, translation agencies and independent translators, translating Polish-Russian and Russian-Polish.

Projects of cross-border cooperation program, as example:
I Lithuania-Poland-Russia cross-border cooperation program 2007-2013 of the European Neighborhood and Partnership instrument;
II Poland-Russia Cross-border Cooperation Programme 2014-2020 (The main objective of Programme is to support cross-border cooperation in the social, environmental, economic and institutional sphere).
Within the Poland-Russia Cross-border Cooperation Programme 2014-2020 support can be obtained by applicants, who are legal persons established in the Programme area or by the

international organizations with a base of operations in the Programme area.

Therefore the situation when, for example, a Swedish, French, Norwegian or Czech company becomes a participant in the programme is quite realistic - then depending on the capacity of the organisations employees and projects, the language of communication could be German, given that in the Czech Republic and Scandinavia there are people who speak fluent German and, for example, in the Kaliningrad region and Poland, there are also people who speak German but not English. An example of this situation is another project on the Baltic Sea coast, in the Kaliningrad region, which was funded by the European Union - Tuning environmental competences in Russian fishery education for sustainable development (TUNA). To participate in projects of cross-border cooperation programmes financed by the European Union and co-financed by the Russian Federation as in the examples described above, small businesses under separate Russian contracts perform works, provide services for Russian state institutions (e.g. universities), which are usually the main partners of such projects: Immanuel Kant Federal University – project "Crossroads 2.0"; "Greening fisheries education in Russia for sustainable development" (TUNA), a consortium of 14 partner universities and research institutes from 9 cities in Russia, Germany, UK, Italy and the Czech Republic, supported by the EU TEMPUS programme (Conference of the project Kaliningrad State Technical University, 25 January); project "Opportunities and benefits of joint use of the Vistula lagoon" VILA project and others. Projects of cross-border cooperation programmes funded by the European Union and co-funded by the Russian Federation presuppose a considerable amount of training for participants in current practices. In particular, considerable attention is paid to small business in such trainings, which are organised at universities (ImmanuelKant Baltic Federal University, Kaliningrad State Technical University).

However "management educators must adopt an approach to cross-cultural management training (CCMT) which leverages international cooperation and recruitment on university campuses by designing a holistic CCMT program" (Beeler, 2014) wrote Betty Beeler, Ph.D. her findings are based on the unpublished results of a trans-Atlantic cross-cultural experiment funded by the European Union (EU) and the United States (US) government from 2001 to 2005, the purpose of which was to explore and recommend effective methods for providing business school students with vital cross-cultural management skills thanks to close collaboration between network partners (Beeler, Prat, Roach, & Valtaranta, 2004). The project was part of the "Trans-Atlantic Mobility Program" managed jointly by the US and EU.

And this, as the experience of participating in trainings in Kaliningrad Region organized at universities shows, is clearly not enough. Therefore, the methods and mechanisms proposed from Betty Beeler and below are very relevant for specialized training projects in the field of cross-cultural management in small businesses on the Baltic coast.

"The purpose of CCMT is to prepare people for the kind of situations that arise when they work with or encounter people of other cultures (Brislin & Yoshida, 1994), providing them with opportunities to develop Cultural Intelligence mentioned in the preceding section (Earley & Peterson, 2004). The components of CCMT vary from traditional lecture format to interactive methods such as role-playing and web-based activities. They may be supported by computer-based individual learning and experiential methods such as mentored internships abroad (Smith et al. 2008)". (Beeler, 2014)

As well as application of universal engineering and economic methods, e.g. Project management methods according to international and national standards PMBOK® Guide PMI, ICB IPMA, Prince 2® and also Russian and Polish national standards. These methods have proven their effectiveness in the field of management - achievement of project objectives, reduction of time, cost with planned quality, reduction of risks. The main method according to the above standards is a system model and the formation of a functional structure of project tasks based on a system model developed by project management specialists more than 20 years ago. (Appendix 1). (Burkov, V. & Barkalov, S. & Voropaev, V. & Sekletova, G, 2005)

The method is very good, it can come to the rescue when no language practices in their

pure form help to maintain the quality of the project. Since we are talking about risks that are difficult to predict, it is difficult to foresee without many years of experience in implementing such industry projects. To illustrate, we will show the task that took place in the international project of additional education.

Let's mentally fast forward to 10 years ago to the city of Kaliningrad, where the events took place. So, in the newly renovated big auditorium of the university there was neither a classic wooden chalkboard nor a working electronic board, but only a projector on which you can show slides from a computer. Therefore, the teacher of the additional education project, after examining the auditorium, asked the manager, having recorded the request by e-mail: prepare and put a compact board in the auditorium on which the teacher can draw graphs and models by hand with a felt-tip pen. The manager agreed and informed the teacher that he would deliver such a board to the auditorium. These were refresher courses that took place during the week. Most of the teachers had only one lesson – 1.5 hours. The audience was international and there was simultaneous translation of lectures and practical classes. However, when the lecture began for 200 people, the legs of the compact blackboard were broken and it was lying in the corner of the auditorium. only a projector and a screen remained at the teacher's disposal. The occupation was the only one. The methodology of teaching the basics of project management, which has been tested for years, was disrupted, consisting of three stages:

1) The teacher shows the WBS - structural decomposition of the model works on theprojector, explains its essence and design methodology;

2) Draws a model "by hand" or with an electronic pencil, explaining the rules of itsconstruction

3) Students in project groups create WBS of the projects they develop on large sheets ofA3 format.

4) And this second stage is extremely important, because practice shows that for humanitarians, the correct construction of WBS causes difficulties and it is difficult for them to understand without demonstrating the "drawing" of the model.

The project manager was not trained in the basics of project management according to international standards and did not know the rules for building a functional project structure based on a system model. If the manager had been trained in the basics of project management and owned the functional structure of the project based on the system model, then the teacher, given the importance of the task, could duplicate it for the manager as a function: Organization and control of the implementation of H3 of the Subject area G1 on date F6 at the project implementation phase D3 for the project manager B1, project team members B2, functional project managers B3. Thus we get the function $W=(H3, G1, F6, D3, B1, B2, B3)$. Perhaps only such a special language practice, with the transformation of the project task block into a function, on the basis of which all the project tasks necessary and sufficient for its successful implementation are formed, allows you to effectively manage risks at the first stage, more precisely identify risks that are not typical, but unlikely from the point of view of project participants.

The task is included in the subject area. Determines the quality of the project. In the system model, in the functional control areas (G) block, we see G5 – risks. The model itself is designed in such a way that when a manager works with such a model, he remembers the risks better and hedges them. He has at his disposal a project team, functional managers, to whom he can instruct to keep the board intact or quickly deliver a new one in case of a breakdown.

Within the framework of international projects, training courses are being developed, which are studied in the participating countries of the international project. Many of these training courses are innovative and are being taught for the first time. This entails significant difficulties in teaching and effective understanding of subjects saturated with special terms, often completely unfamiliar to the audience of listeners. In our opinion, the methods and models developed in St. Petersburg will help to resolve these difficulties: «To foster the interdisciplinary course outcomes, we modeled the translation process from one disciplinary perspective with its scientific language

into a language that is understandable to members of different disciplinary expertise. The model stems from the definition of translation as an intralingual transformation process inherent in communication of diverse disciplinary groups in order to co-create new interdisciplinary meaning and achieve the shared goals" (Martynova, Orlova, Kitaeva, 2020)

Many of the projects of cross-border cooperation programs are innovative. Therefore, when implementing such projects, risks arise that are often also difficult to predict. As in the case of the additional education project described above. Here are examples of projects of the Lithuania-Russia 2014 – 2020 and Russia-Poland 2014 – 2020 programs. Some projects of these programs were completed in 2022, but taking into account the fact that a number of them are stationary scientific museum expositions, their life for society is just beginning, projects live, and therefore language practices live. Below we present a brief description of these museum expositions to understand the specifics of the museum project, its terminology.

Project: Adaptation of maritime heritage to promote culture and cultural ties for the purpose of tourism development. Lithuania-Russia 2014. Key parts of historical ships will be restored and museumized. These ships are the main exhibits of the organizations: Irbensky (floating lighthouse, Museum of the World Ocean), Dubingai SRT–3216 (fishing trawler, Lithuanian Maritime Museum).

Project: The museum stationary exhibition "Time to build" Kaliningrad 40 – 60s. (Museum cities "Friedland gate"). The scientific and exposition idea of the museum exposition "Time to Build" is to clearly express by museum means the historical features in which the city was restored, its population was formed, the first ideas of a new image of the ancient city were laid. The museum exposition "Time to Build" covers a certain period in the history of the creation of Kaliningrad and the region: the first decades of 1945 – 1965. (historian Olga Stepanova author of scientific concept for the museum stationary exhibition "Time to build" Kaliningrad 40 – 60s., painter Rosa Tkachenko is the author of the artistic solution of the museum exposition).

Scientific concept to the museum stationary exposition "Time to build" Kaliningrad 40 – 60 years. It consists of the following sections:

1. Historical relevance of the topic "Formation and development of Kaliningrad and theregion"
2. The main idea and the name of the exhibition
3. Scientific and exposition plan. Goals, objectives and the principle of the formation ofthe exposition
4. Thematic sections and cross-cutting themes of the exhibition
5. Content and artistic solution of thematic sections and cross-cutting themes of the museum exposition
6. Organization of the exhibition center and artistic solution of the I-th and II-th options
7. The final section of the exposition

The work on the creation of stationary museum expositions is of a project nature. The construction of special museum equipment, its purchase and delivery to the exhibition hall, the purchase and delivery of museum exhibits provided for by the scientific concept depend on the administration, financial, logistics department of the museum.

SMEs projects in agriculture and fisheries (organic aquaculture), as an example:

One of the examples of the achieved results of a long–term study conducted by the author of this article in the period 2004 - 2012 is the translation of the article "The formation of a risk management system for projects in the field of aquaculture innovative development in the Kaliningrad region" into English. The translation was carried out within the framework of the projects of the I. Kant BFU by professional translators. For the author, this is the first article published in English. Considering the innovativeness of aquaculture development projects for Russia during the period of preparation of the article: 2008 - 2012. For example, in the Kaliningrad region for the period 1991 to 2010, only one aquaculture enterprise was built (a scientific and

experimental workshop for artificial reproduction of Baltic whitefish on the Curonian Spit). The problems of specialized English-Russian translation were relevant and required significant attention and costs. Aquaculture projects in the Kaliningrad region correspond to the parameters of small and medium-sized businesses. Which gives additional opportunities for state support. Below are excerpts from our article, clearly showing the variety of new, probably unfamiliar to a certified philologist-translator of current terms of innovative aquaculture projects. Perhaps that is why the author of the translation of our article, Candidate of Philological Sciences, associate professor L.B. Boyko, in her new textbook on translation, gave a link to our article, citing it as an example of one of the projects relevant to herself and her students, special from the point of view of translation. (Бойко Л.Б. Приемы и методы обучения письменному переводу в вузе, издательство: Балтийский федеральный университет имени Иммануила Канта, Калининград, 2022)

"Given the state of aquaculture in our country today, the authors have developed a universal conceptual systematic approach to the formation of a risk management system related to breeding valuable aquaculture species. The approach proposes a number of advanced risk management techniques being parts of the integrated Enterprise Risk Management (ERM). The experience of big companies implementing large-scale projects with a high degree of risk, shows that ERM (the so-called integrated approach to risk management) nowadays is one of the most effective concepts of risk management. Identification of project risks, their structuring and analysis using the "risk tree." (McCarthy, Flynn, 2003). Based on the analysis of several aquaculture projects and expert interviews, the authors investigated and identified the most likely sources of project risks. Certain types of risk groups in aquaculture were analysed using the "risk tree" method, which provides a full and systematic process of identification of project risks". (Serbulov, Stepanov, Polyakov, 2012)

In order to estimate alternatives for a particular project the "decision tree" method can be used in any given aquaculture development project. In assessing the investment component of an aquaculture development project, a sensitivity analysis is important to study the change in the integrated project efficiency, net discounted income in the first place, rate of return, payback period; it is necessary to be guided by official guidelines of investment projects evaluation (Kosov and all, 2000; Serbulov, Stepanov, Polyakov, 2012)

Conclusion

Based on the above hypotheses, taking into account the practice of at international small business projects of the south-eastern coast of the Baltic Sea, it seems that despite the availability of on-line translation, while maintaining state and interstate support for small businesses in the region at different levels, live personal communication between small entrepreneurs of neighboring countries in the region in English, as well as the national languages of neighboring countries, will develop. At the same time, the appeal to professional translators who know the subject of the professional language of various sectors of the economy at a high level remains very relevant. This means that translation agencies and independent translators, especially specialized translators of national and rare languages, who are themselves small entrepreneurs, with proper management of their business, have chances to maintain profitability and development.

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Appendix 1 Fundamentals of project management methodology: a system model and the formation of a functional structure of project tasks basedon a system model

In strict accordance with the methodology of the IPMI standard of the International Project Management Association, a project is a purposeful, time– limited event aimed at creating a unique product or service. The project is a complex of interrelated works that ensure that a specific person or organization achieves the specified project goals within the framework of the established schedule and allocated budget, as well as compliance with other conditions and restrictions. The main characteristics of the project are: novelty, complexity, legal conditions for its implementation, the need to perform work in related fields of activity.

Figure 1 shows a generalizing project management model (PM), on its basis a functional structure of the project can be formed. The methodology of forming the functional structure of the PM allows the classification of tasks and procedures possible in the management of the project and project-oriented activities. This method makes it possible to identify the composition of problem-oriented complexes of project management processes and tasks, to determine methods of effective decision-making at all levels of management.

To determine and develop the composition of work on the implementation of processes and tasks of the PM, the bases of the generalizing model of the PM are used.

Management subjects (A). Project

management team (B).

Management objects – projects, programs (C).

Life cycle phases of management objects (D).Management

process (E)

Control levels (F). Control

functions (G).

Stages of the management process (H).

The generalizing project management model is a collapsed tree of an excessive set of tasks and procedures that can theoretically be performed during project management.

A Management entities						
1. Investor	2. Customer	3. General	Contractor 4. General Contractor	5. Performers	6. Co-executors	7. Others

B Project Management Team

1. Project Manager	2. Team members	3. Functional project managers

C Management objects		
1. Projects	2. Programs	3. Organizations and businesses

D Phases of the management object's life cycle

1. Concept	2. Development	3. Implementation	4. Completion

E Management process
F Control levels

1. Strategic	2. Year	3. Block	4. Month	5. Decade	6. Day	7. Shift	8. Other

G Control functions

1. Subject area	2. Time	3. Cost	4. Quality	5. Risks	6. Personnel 7. Communications 8.	7. Communications	8. Contracts	9. Changes	10. Other

H Stages of the assimilation process

1. Initiation	2. Planning	3. Organization and control of execution	4. Analysis and regulation	5. Closing

Figure 1.1. Generalizing Project Management model

The generalizing model of the PM makes it possible to define all the processes and tasks of the project through its components. By sequentially considering the elements of all levels of the generalizing model, the coordinator, analyst or project manager receives a statement of the project management task. The conditions of this task are determined by the levels and elements of the model. As can be seen from the system model of the PM, each process (task) is uniquely determined by the components of all levels of the system model, built and logically interconnected from the bottom up. (Burkov, V. & Barkalov, S. & Voropaev, V. & Sekletova, G., 2005

Managing Human Capital for Resilience

What Generation Z Brings to the Table in Family Business?

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Abstract:
Using the theory of generations, this paper explains how Generation Z contributes to family business affairs and to provide insights into the unique challenges and opportunities that this cohort brings to family businesses. Our findings reveal the importance of strong family identity, relevant education, opportunities for personal and professional development to the promotion of family business' prosperity and continuity. The study provides a theoretical contribution to family business literature by focusing on the intergenerational dynamics within FFs and highlighting the value of understanding the values, attitudes, and expectations of the younger generation.

Introduction

Family firms (FFs) play a significant role in the wider economy, both in terms of their contribution to GDP and their impact on employment. According to recent statistics, FFs account for a 70% of the global economy (PwC's 11th Global Family Business Survey, 2023). As FFs also represent a significant share of companies listed on stock exchange, understanding of their specifics could give valuable insights on investment opportunities (Credit Suisse Research Institute, 2022). As for other contexts, numbers are comparable. For instance, according to the Chamber of Commerce and Industry of Russian Federation (2022) today the share of family-owned companies among small and medium-sized enterprises (SMEs) is about 74%. Therefore, FFs tend to be the most widespread form of the business around the world.

To date many FFs researchers has devoted their attention to investigate different aspects of FFs. These include FFs succession (e.g., Gagne et al., 2021; Handler, 1990), internationalization (e.g., Cirillo et al., 2022; Mariotti et al., 2021), innovation activities (e.g., Bammens et al., 2022; Li et al., 2022), communication between family members (e.g., Helin & Jabri, 2016; Michael-Tsabari & Weiss, 2015) and conflicts between them (e.g., Radu-Lefebvre et al., 2022; Eddleston et al., 2008). For instance, FFs succession was massively investigated as the firm's transfer from one generation to another is a crucial element in FFs longevity and continuity (e.g., Birley, 1999). However, despite the fact that FFs transfer from one generation to another has a significant influence on family firms' risk appetite (Credit Suisse Research Institute, 2022; Lim et al., 2010), capital structure (e.g., Pittino et al., 2020; Molly et al., 2012), innovation (e.g., Bammens et al., 2022; Li et al., 2022), and other aspects, there is little known about the role of an exact generational profile of the firm. At the same time, PwC's 11th Global Family Business Survey (2023) shows that there is a great need for current family business owners to collaborate with new generations and to assure FF's professionalization in the times of geopolitical turmoil and instability. Therefore, we suggest that the theory of generations (Strauss & Howe, 1991, 1997) can shed a new light on our understanding of family firms' strategic behavior from different perspectives.

One of the major trends in a global labor market today is the beginning of an active search for job opportunities by people from Generation Z, who were born approximately from 1997 to 2012 (Dwivedula et al., 2020; Schroth, 2019). This generation is radically different from both previous Generation X and Millennials and has other attitudes towards work, values, and understanding of 'success' (Deloitte, 2018) and is expected to gain about 27% of the global workforce by 2025 (Zurich, 2023). This shift is going to have a significant impact on businesses all over the world. And as in the context of FFs generational issues are even more vital and

critical, it is important to understand what are the aspirations, expectations, and unique inputs of generation Z for these firms.

Thus, the main goal of this study is to understand how young people from Generation Z feel about family business, what are their expectations, and what is the unique value they can bring into the firm. This study seeks to answer three research questions: *(1) What personal traits and experiences of Generation Z undergird their intention to work for their family business? (2) What opportunities for personal and professional development Generation Z expects to have while working in a family business? (3) What are the potential business-related outcomes of Generation Z's involvement into family business?* The paper is structured as follows. First, we review the existing literature about family firms' foundation and the role of generations in these firms. Second, we describe theoretical foundations of our study. Third, we continue with the methodological approach applied in this study. Finally, we conclude with discussion and limitations, which our paper has.

Literature review and theoretical background
The role of generations in family firms
Generations as a "sociobiological pillar of today's organizations and society" (Magrelli et al., 2022) play an important role in FFs as main drivers of their development and continuity. Family members from different generations, who take over the firm at a certain time, predetermine FFs strategic development (Zhao et al., 2020). For the purposes of this study, we rely on the FF's definition, which was proposed by Litz (1995) and implies that "a business firm may be considered a family business to the extent that its ownership and management are concentrated within a family unit, to the extent its members strive to achieve and/or maintain intraorganizational family-based relatedness, and to the extent to which the family unit has strong family social capital" (Arregle et al., 2007: 74). This definition is particularly relevant for this study as it focuses on the FFs longevity and social capital. The strength of the family social capital and the intention to retain intrafamily control are dependent on successful interaction between family members. Therefore, to unravel the complexity of relationships within owning families and to better understand their influence on the decision-making process and major strategic business moves in FFs, it is important to dive deeper into generational issues.

Familial relationships start to matter most, when it comes to the succession issues and transfer of a FF to the next generation. Many studies were devoted to the investigation of succession in FFs (e.g., Ansari et al., 2021; Nordqvist et al., 2013; Mitchell et al., 2009; Sharma et al., 2003) and revealed factors, which assist FFs succession's success, such as formal succession planning (Lu et al., 2021), satisfaction with the succession process of both incumbents and successors (Sharma et al., 2003), knowledge transfer between generations (Dou et al., 2021), positive family relationships (Venter et al., 2005), strong family identity (Boyce, 2010; Lee, 2006), and intention of incumbents for an intra-family succession (Mackie, 2022; Sievinen et al., 2020). So that, FFs succession inherently implies an intersection and a close interaction between individuals from different generations and it is important to understand what is 'generation' and how generations differ from each other to better understand FFs succession mechanisms. And generational belonging of family members, who are leading the business, was found to be a "decisive characteristic" (Kriklivetc & Plakoyiannaki, 2022: 88) for FFs growth and development as generational idiosyncrasy in FFs context is reinforced by relationships, feelings, and family ties (Kontinen & Ojala, 2010).

Thus, by doing this research we expect to bring in the novelty into FFs research field by integrating valuable insights from the theory of generations, which shed a new light on the role of an individual in FF's success and longevity. Family business and management research would obtain a new understanding of managerial epochs, prevailing leadership styles, and dominant organizational trends by analyzing them through the lens of generations. Moreover, the application of this theory would significantly deepen our understanding of FFs strategic behavior

and decision-making process. We suppose that this theoretical lens would bring in another perspective even on the existing research results.

Generation Z in the workplace
Generation Z, also known as Gen Z or Zoomers, refers to individuals born between the mid-1990s and the early 2010s. As the youngest generation to enter the workforce, Gen Z is reshaping the workplace in significant ways. Namely, it is the first generation to grow up with technology as an integral part of their lives (Dimock, 2019; Leidner et al., 2010). They are 'digital natives' who are comfortable with technology and use it to communicate, study, learn about job opportunities, and work (Latukha et al., 2022b; Dwivedula et al., 2019). Gen Z also values diversity and inclusion practices at the workplace (Parker et al., 2019; Schroth, 2019; Goh, 2018), social responsibility of the company they work for (Dwivedula et al., 2019), work-life balance (Berge & Berge, 2019; Crumpacker & Crumpacker 2007), and non-hierarchical leadership (Chapman, 2023).

However, FFs face unique challenges in attracting and retaining Gen Z. The greatest one appears at the time of FFs succession, when it is needed to handover the business to the next generation, and currently, many family businesses are preparing to the full or partial transfer of FFs to Gen Z (Chapman, 2023). The key to successful handover lies in successful navigation of intergenerational differences, what could be an unusual task with Gen Z. It was found that Zoomers value a lot a possibility to be and stay authentic, what can contradict the necessity to represent a family-owned company (Chapman, 2023). Moreover, older generations tended to create hierarchical organizations and not to value a lot work-life balance principles, as horizontal management and desire to have a meaningful life outside the business were not their core values (Latukha et al., 2022b). They may also struggle to provide a comparable level of professional development opportunities for Generation Z as they are already considered as the best-educated generation in the workplace (Fry & Parker, 2018) and can receive more development in large corporations than in FFs. To address these challenges, family businesses need to create a work environment that appeals to Gen Z's values and interests. This includes promoting innovation and entrepreneurship, providing opportunities for professional development, and fostering a culture of diversity and inclusion. FFs also need to have a clear succession plan in place that outlines how leadership roles will be filled in the future. This plan should involve open communication between family members and should address issues related to governance, decision-making, and conflict resolution.

So that, Gen Z is playing an increasingly important role in the workplace, including in FFs. While there are challenges associated with attracting and retaining Gen Z employees, FFs can also benefit from the fresh perspectives and innovative ideas that Gen Z members bring to the table. To capitalize on these advantages, family businesses need to create a work environment that aligns with Gen Z's values and interests and have a clear succession plan in place to ensure the long-term success of the business. Moreover, trust and open communication in the family can also help to successfully engage Gen Z into family business affairs (Chapman, 2023).

Methodology
This paper applies a single case study methodology, which was widely applied in recent FFs studies (e.g., Fernández-Roca, & López-Manjón, 2021; Barbera et al., 2018; Amatori, 2016; Au et al., 2013). Single case study is a qualitative research method that involves in-depth examination of a single instance of a phenomenon, such as a company or a family business. This methodology has several advantages in management research, particularly in the field of FFs.

In this paper the role of Generation Z in FFs is explored empirically in an in-depth case study of a Russian FF, which was purposefully selected "because it is very special in the sense of allowing one to gain certain insights that other organizations would not be able to provide"

(Siggelkow, 2007: 20). For reasons of confidentiality, the real name of the company as well as names of family members are not to be disclosed. Throughout the article we will call the company FamilyCo and the owning family – the Johns family. We show details on FamilyCo's owning family in the Table 1. FamilyCo is operating in a new segment of hotel-industry, which name is *glamping* (portmanteau of "glamorous" and "camping", according to Wiki). It is a combination of camping outdoor recreation with hotel-style amenities, which allows to both enjoy the nature and live in comfort. The FamilyCo was founded in 2021 in Saint-Petersburg, Russia. The major and only juridical owner of the FamilyCo is father (Alex), while his sons are actively participating in the company's management and operations. The core business idea of FamilyCo glamping hotel was proposed by the first-born son (Ben), who was born in 1993. This idea has not received a desired appreciation from the father at the very first moment because his vision of a country vacation was totally different from glamorous houses with all the amenities. However, after several discussions and a trial of this kind of vacations, Alex agreed that it has potential and they started to search for a place to start the construction process. As for now, his main workplace is outside the FamilyCo, primarily because of lack of tasks relevant to his specialization – he has recently received a PhD in Finance. Nevertheless, he joins major meetings in FamilyCo, suggests ideas, and helps if some difficulties appear. And the second-born son (Paul) is working full-time at the FamilyCo. He is in charge of marketing activities, planning of business processes, and selection of sales channels.

Thus, FamilyCo is a revelatory and clear example of both a successful engagement of Generation Z into family business affairs and efficient interaction of three generations of family members in the business context. The uniqueness of this case provides us with a refined academic knowledge on the specifics of Generation Z as well as with a practical opportunity to learn how to engage Generation Z and collectively benefit from this collaboration.

Findings
In this part we present our findings regarding the role of Generation Z in FFs context, which includes their aspirations, experiences, and potential value for family businesses. Using the tenets of antecedents-behaviors-outcomes framework, which is widely applied in FFs research field for the organization of existing research (e.g., Feliu & Botero, 2015; De Massis et al., 2013; Lumpkin et al., 2011), we organize our observations of the Gen Z's involvement into FF's operations in a processual manner. In our case, antecedents are two-folded and relate to personal traits of a Gen Z's representative and the experience he/she had had before joining the FF. Behaviors are considered rather as activities and opportunities Gen Z is provided with during the work in the FF. And outcomes incorporate valuable business-related achievements and advancements, which happened by the virtue of Gen Z involvement. Moreover, as our study is inherently very context-sensitive we enrich this framework with an overarching contextual tenet.

So that, as a result of the present study, we present several propositions on the role of Generation Z in family business. Importantly, these propositions are rather 'contingent generalizations' made from our empirical evidence, which are valid under specific contextual circumstances (Gerring, 2007), which we have presented and discussed previously in this article.

Proposition 1: Personal traits of Gen Z such as flexibility, openness to constructive criticisms, and fast decision-making in a combination with strong familial connections and relevant education form a solid background for a young person to bring a high value for FF's development and modernization in the future.

Proposition 2: Values formed in the context of connected and cohesive family and shared by Gen Z are compatible with those of FFs what makes the involvement of Gen Z into FF's operations a 'win-win' situation and creates a synergy effect for both the family and the business.

Proposition 3: The involvement of Gen Z into the FF can help to fill in the gaps, which other generations have difficulties with (for instance, digitalization, social media

marketing, etc.). In other words, it allows the FF to capitalize on the diverse and inclusive working environment and, especially, from generation-diverse top management team.

By these findings we intend to contribute to both FFs research and studies on the topic of generational differences, especially, at the workplace. One of the key theoretical contributions of the study is its focus on the intergenerational dynamics within FFs, particularly the beginning of the transition from the Generation X to the Generation Z cohort as primary actors at the workplace. The study highlights the importance of understanding the values, attitudes, and expectations of the younger generation in FFs, and how these can impact business practices and outcomes. Moreover, we accentuate on the value that Generation Z sees in opportunities for personal professional development, a culture of innovation and flexibility, and leveraging technology to enhance FFs operations. Next, this study contributes to the literature about generational differences in the workplace as it focuses on the intersection of generational differences and family business dynamics. We highlight expectations and aspirations of younger generations can influence FFs development pathway.

In terms of managerial implications, the study provides important insights for FFs owners and managers on how to effectively engage and manage the younger generation in the business. The study suggests that FFs need to be proactive in identifying and addressing the needs and expectations of Generation Z, such as providing opportunities for personal and professional development, promoting a culture of innovation and flexibility, and leveraging technology to enhance business operations.

Overall, the study provides valuable theoretical insights and practical guidance for family businesses on how to effectively manage the intergenerational dynamics and leverage the unique strengths of the younger generation to drive business success.

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Effective HR-Ecosystem Management as a Priority for Achieving the Target Model of «Sustainable University»

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Abstract:
The study substantiates the priority role of effective management of the HR-ecosystem in improving the sustainability of a modern university in the new realities. The purpose of the article is to identify the integrated HR risks and to substantiate the HR ecosystem development strategy, aimed at ranking the identified risks. To achieve this goal, HR risks were analyzed and combined into the groups, and an expert survey of management personnel was conducted at a Russian and Chinese university. The methodological basis of the study is the innovation-cyclical paradigm of sustainable development. Research methodology provides a comprehensive analysis of the impact of new economic conditions on the strategic HR-management, substantiation of the Dematel toolkit that supports qualitative and quantitative parameterization of HR-ecosystem development strategy. The result of the study is methodologically substantiated and empirically verified components of HR ecosystem development strategy in the university management system.

1 Introduction

The agenda of increasing the sustainability of university management, which is relevant in modern conditions, makes the strategic policy of developing the HR ecosystem a priority in order to adapt to innovative, digital technologies and quickly and correctly respond to all kinds of exogenous factors.

In the era of knowledge economy and expanding digitalization of products, services and processes, the competition between companies is increasingly manifested in the competition of education systems and talents (Bai, 2022). By embracing digital technologies, education systems and institutions can accompany the dynamic socio-economic, technological and cultural shifts and, at the same time, can become themselves the drivers of growth. In light of these tendencies, education itself is changing fast and is about to change faster, what places considerable pressures on higher education institutions and their human resources management (HRM). Efficient HRM is critical to the success of higher education institutions (Paper & Kraft, 2006).

One study has examined the potential and perceived role of human resources management to alleviate inefficient management in public universities in Uganda (Kasule & Bisaso, 2019). The results show that top and middle-level university management recognizes the strategic importance of developing a strategic approach to human resources management in the context of technological revolution and knowledge-based economy but reveal that for now such strategic human resource management practices are barely practiced in the analyzed public universities (Kasule & Bisaso, 2019).

Some studies suggest that certain human resources management strategies can affect organizational commitment and potentially influence turnover, whereby an ineffective HRM may entail risks for the higher education institution itself (Buck & Watson, 2002). Thus, flaws and

failures in strategic human resources management may comprise broader risks for the institution in the long run. In this regard, Aboramadan et al. (2020) suggest that HRM practices have a significant impact on the organizational commitment of higher education employees and that they mediate the relationship between performance evaluation and organizational commitment. In this way, the university must be committed to competitive demand and attraction, based on intentional choices, which predict the performance of the teaching staff in streamlining teaching activities (Paper & Kraft, 2016).

Managing is important to support higher education institutions in times of change. According to Fayol (1949, as cited in Cole, 2004), "to manage is to forecast and plan, to organize, to coordinate and to control". These originally identified by Fayol five elements have evolved into four nowadays commonly accepted functions of management: planning, organizing, directing, and controlling, of which effective and efficient performance certain skills are required.

Management skills are a collection of abilities of the individuals in a managerial position to fulfil some specific management activities or tasks. Management skills allow professionals to better lead, communicate and budget, in other words, they support the management process in decision-making and problem-solving.

Specifically, McCaffery (2019) argues that today's higher education leaders need to know their environment, know their university, know their department, and know themselves, as individuals. Another approach is that proposed by Katz (1974), in which he approached skills as «what a man can accomplish».

Managing today's dynamic and fast-changing organizations is not an easy task. In pursuit of excellence in research and digitalization of teaching, universities frequently overlook the importance of back-office structures, such as HR services, needed to run complex organizations (Gajendragadkar et al., 2019).

However, despite ongoing efforts to modernize HR in the academia and to ensure agile and flexible human resources arrangements, higher education HR departments happen to be still seen as resources used solely to hire, measure and let go, this limited to their primary administrative role, rather than a service providing professional advice and support in line with employment legislation and as a vehicle for the advancement of science and knowledge (Watson & Thompson, 2018). In fact, effective and efficient work of these services can become a major factor in the attractiveness of an academic job offer and can play a pivotal role in a person's decision to apply for a job at the faculty. The reasons for that are threefold: (a) the perceived administrative burden of the teaching staff is still substantial, for instance, data from 2018 suggest that the administrative burden accounted for 44% of the workload and presented a growing tendency (Schneider, 2018, as cited in Gajendragadkar et al., 2019), (b) the administrative burden varies among institutions, and (c) the administrative burden is one of the major sources of stress (Stolzenberg et al., 2019, as cited in Gajendragadkar et al., 2019). Therefore, the administrative services can be for prospective hires a "huge selling point" and have more or less direct impact on the institution's reputation (Gajendragadkar et al., 2019). One possible solution to solve the limitations of the traditional model of human resources management in higher education institutions and in line with the technological advances has been proposed by Bai (2022) and relies on big data to develop a management innovation model and decision-making model. The solution is used to process the existing data, forecast future situations, and provide support for decision making, and operates with the 95.68% accuracy, which is about 10% higher than other systems providing a significant contribution to the development of HRM innovation of university teaching staff (Bai, 2022).

Failures in the motivational policy of the organization constitute an integrated risk in the functioning of the higher education institutions themselves and in the insufficient motivation and low commitment of their employees.

Employee motivation is intertwined with the satisfaction and professional growth, and has the ability to improve employee's perception of professional achievement. Employee motivation can be enhanced through a strategic approach to managing people and human resources

management policy in particular (Carlotto & Câmara, 2007). Still, in the specific case of higher education professionals, their productivity is a multifaceted phenomenon and relies strongly on their intrinsic motivation, thus reinforcing the importance of management policies focused on employee motivation (Moreno-Jiménez et al., 2010). It seems, therefore, essential for employees of higher education institutions to be satisfied with the direction of their professional career and with the possibility of career progression in the long term, in order to stay motivated.

The career progression of the teaching staff may also be associated with social status, another aspect of intrinsic motivation. Thus, taking the dimensions of intrinsic motivation into account in the organizational policies of higher education institutions can generate a better functioning of the institution as a whole (Carlotto & Câmara, 2007) and seems to be a way to achieve standards of excellence in the teaching and learning processes.

Hoffmann (1999) argues that the understanding of competencies depends on the perspective, and can refer either to the inputs, that is, person's attributes necessary to ensure specific performance, or to the outputs, that is, the performance itself (Hoffmann, 1999). Therefore, a competency can be regarded as a set of demonstrable characteristics, skills and capabilities required to perform work functions successfully and efficiently, and, in this understanding, manifests itself as a demonstrable behavior that an employee needs to present to do their job as outlined in the job description, or as a quality of the performance. Independently on the definition, the meaning of competency has evolved and will continue to do so (Austin, 2019).

A responsive education system, and education institutions in all its levels, allow students to develop knowledge, skills, and qualifications (Raitskaya & Tikhonova, 2019). To do so, education institutions need to provide the structures, processes, and people capable to support the knowledge transfer and competency development. In the current panorama, education and training of the teaching staff is essential for the teaching quality, yet it is insufficient from the strategic (that is, long-term) point of view, and needs to be accompanied by the institutional (and systemic) efforts to provide conditions for staff's life-long learning and training. With these, the teaching (as well as the non-teaching) can staff continuously update and improve their competencies, as well as strengthen their professional profile. Specifically, one study has conducted in 307 elementary school teachers from the Department of Education in the Philippines applied a mixed methodology to identify and examine the training needs for 21st century pedagogical skills and personal development. The results suggest that the most relevant pedagogical skills are content knowledge, use of ICT, strategies for developing critical and creative thinking, and research-based knowledge and principles in teaching and learning. On the other hand, the participants have recognized the need for personal development training in the areas such as stress management, communication skills and management of work and family life balance (Ganal et al., 2019). Likewise, a study of Bienkowska et al. (2019) has focused specifically on the skills needed in higher education and aimed to propose a comprehensive set of key competencies necessary in the work of academic teachers in higher education institutions, which they divided into four groups: teaching skills, leadership skills, communication skills, and personal development skills.

Despite a large amount of scientific research on HR risks and their implications for the sustainability of HR management in higher education institutions, many issues of integrated human resource management require further study. The model of building an HR ecosystem as a systematic approach to achieving the goals of sustainable development of universities requires further expansion.

The scientific novelty of the study lies in the proposal to take into account the combined risk groups and apply the Dematel tools for a systematic assessment of strategic decisions on the development of the HR ecosystem in the management of an educational organization.

The results of the study are of additional value, since the tools proposed by the authors not only identify and rank key HR risks, but also substantiate the development strategy of the HR ecosystem aimed at minimizing the identified risks. The results of the study can serve as a basis for the development of strategic and motivational policy measures aimed at the sustainable

development of an educational organization in a modern economy.

2 Materials and Methods

Despite a large amount of scientific research on HR risks and their implications for the sustainability of HR management in higher education institutions, many issues of integrated human resource management require further study. The model of building an HR ecosystem as a systematic approach to achieving the goals of sustainable development of universities requires further expansion. Achieving the goal of the study was carried out on the methodological basis of the innovation-cyclic paradigm of sustainable development, the implementation of which is based on the management of the organization, taking into account the achievement of not only its economic goals, but also the observance of the interests of society (Lazareva et al., 2023).

The scientific novelty of the study lies in the proposal to take into account the integrated HR-risks (Fig.1) and apply the Dematel tools for a systematic assessment of strategic decisions on the development of the HR ecosystem in the management of an educational organization. (Lazareva et al., 2021).
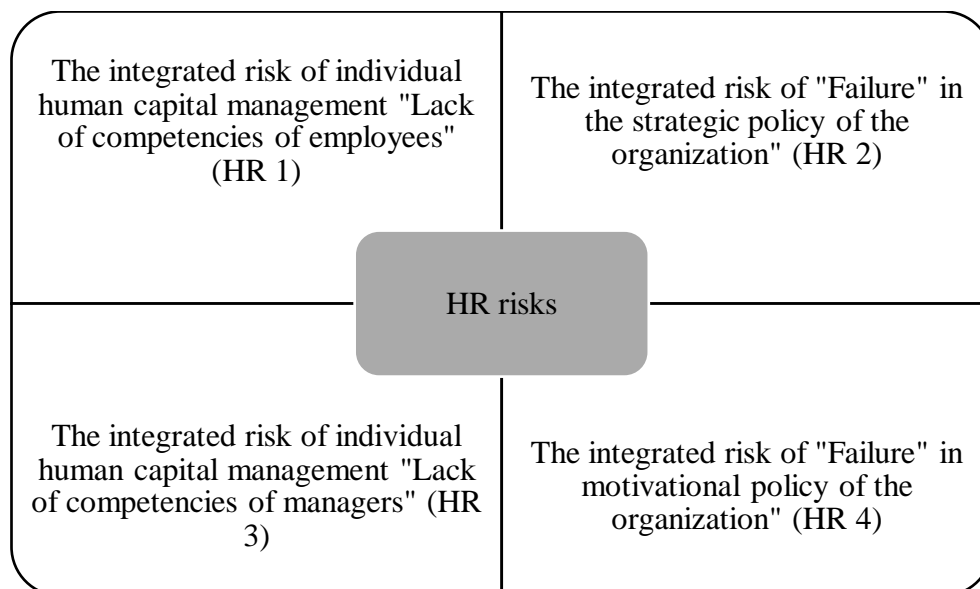
Fig.1. Integrated HR-risks
Source Developed and compiled by the authors

The results of the study are of additional value, since the tools proposed by the authors not only identify and rank key HR risks, but also substantiate the development strategy of the HR ecosystem aimed at minimizing the identified risks. The results of the study can serve as a basis for the development of strategic and motivational policy measures

aimed at the sustainable development of an educational organization in a modern economy.

In addition, given the holistic nature of the tools developed by the authors, an important place in the methodology was taken by the Dematel system analysis method, which makes it possible to form a complex relationship between the parameters characterizing HR risks and approaches to managing them (Fig. 2).
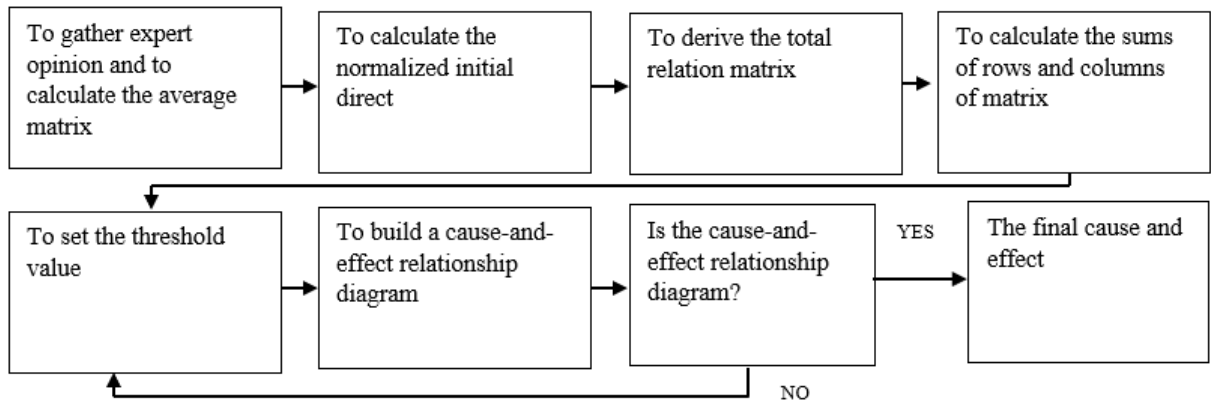
Fig.2. Procedure of identifying key HR-risks and justification of HR-ecosystem development strategy *Source* Peleckis, K. 2021. Application of the DEMATEL Model for Assessing IT Sector's Sustainability. Sustainability 2021, 13, 13866.

The study is based on a questionnaire survey of 18 experts - employees of Chinese and Russian universities. The Dematel method was applied to both Russian and Chinese expert responses. Unlike other methods of multi-criteria decision making, this method allows you to transform the relationship between factors into an understandable structural model of the system and divide them into a group of causes and a group of effects.

3 Results

Assessment of integrated HR risks in the university management system using Dematel method allowed to form a system of relationships between them in the coordinates of «cause-effect» and to identify on this basis the priorities of HR-ecosystem development (Fig 3).
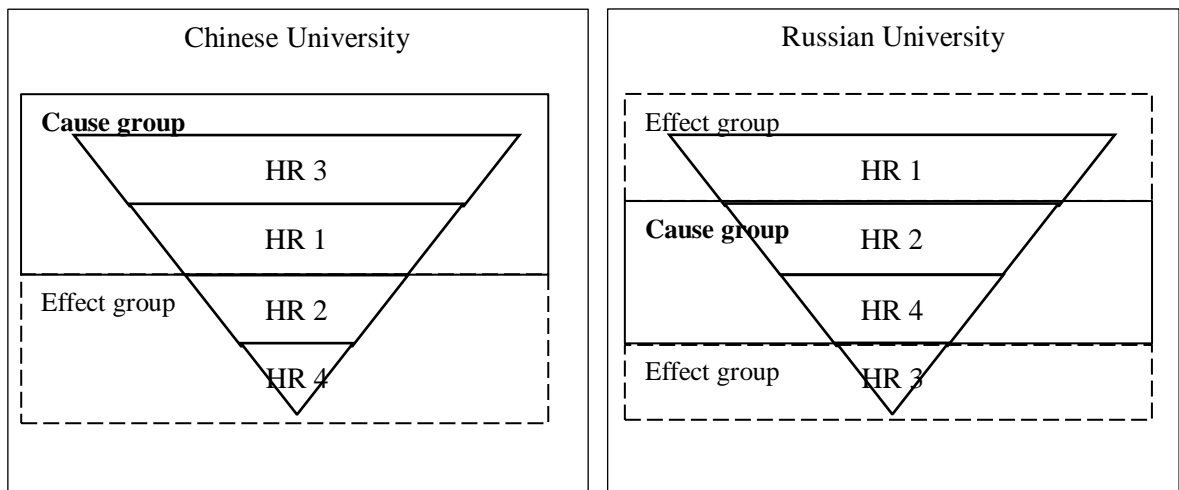
Fig.3. Results of comprehensive assessment of integrated HR-risks by Dematel method

Source: Compiled by the authors

According to the results of the assessment for the Chinese university, risk groups related to the group of reasons should be minimized first of all, they include the integrated risk of individual human capital management «Lack of competencies of managers» (HR 3) and the integrated risk of individual human capital management «Lack of competencies of employees» (HR 1). Measures for

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the strategic development of the HR ecosystem consist of professional retraining, internships for staff, planning a personal career path, developing competency assessment sheets, improving the system of professional and managerial communication competencies. For a Russian university, different results were obtained, first of all, measures should be implemented aimed at minimizing risks the integrated risk of «Failure» in the strategic policy of the organization» (HR 2) and the integrated risk of «Failure» in motivational policy of the organization» (HR 4), which implies staff motivation and a system of measures to reduce high staff turnover. Measures to overcome these risks update programs to attract specialists and help management, as well as stimulate creativity from aspects of employees, changing the systems of non-material motivation, university rebranding.

4 Conclusion

In modern conditions, a sharp increase in the role of a person in the production process highlights the problems of reproduction and management of human resources as a strategic resource of an enterprise to increase the competitiveness and innovative activity of organizations. An effective HR management system is one of the most significant sectors in the formation of a strategy for achieving the goals of sustainable and innovative development of an organization, since human resources are the main strategic factor source of innovative and active dynamics in all areas of the university. This fact actualizes the development of the HR ecosystem as a factor in increasing the sustainability of an organization's HRM.

A comprehensive assessment of complex HR risks using the Dematel method showed the relevance of a systematic analysis of HR risks for the formation of an adaptive strategy for the development of a university's HR ecosystem. The advantage of using Dematel tools is a qualitative and quantitative assessment of the characteristics of integral HR risks and substantiation on their basis of a sequence of management decisions aimed at minimizing them. A comprehensive assessment of the complex personnel risks of universities will make it possible to identify the unique characteristics of the university's personnel ecosystem and form an adaptive strategy for its development. Explaining the differences in the results of the risk assessment of Chinese and Russian universities, ranking measures to minimize HR risks, and prioritizing the development strategy of the HR ecosystem is the subject of further research, in particular, to find out whether the HRM of a university depends on the cultural characteristics of a particular country.

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The Impact of Flexible Work Schedules on Working Mothers' Time-to-Children

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Abstract:
Time is one of the key resources parents invest in their children's human capital development. It takes a lot of effort and time to raise a child so modern working mothers pose a challenge of seeking ways how to combine motherhood and employment. The paper discusses how the family-friendly workplace policy can facilitate juggling parenting and work-related commitments. Special focus is made on the positive impact of flexible work schedules on the working mothers' ability to allocate time to children. The author shares the findings of the pilot qualitative study regarding parents' attitude to remote employment in terms of combining work and parenting. It is concluded that to successfully combine parental and work responsibilities, working mothers should be entitled to flexible work schedules to ensure they devote to the children the time, necessary for their versatile development, health and safety. This can positively impact their stress levels and work performance.

Keywords: *motherhood; paid employment; human capital; family-friendly policy; flexible work schedules.*

The family makes an invaluable contribution to the development of the human capital of children, which is expressed in the labor and material costs of parents for the upbringing and education of children, as well as their physical, psychological and intellectual health (Bagirova, 2010). Among the main resources that parents invest in their children, the parents' own human capital, labor costs, time and financial resources play a special role in the formation of the human capital of children (Bagirova, 2009). In the context of theories about parental labor and the development of human capital, the analysis of the time spent by parents is considered as a reliable tool for assessing its content (Korolenko & Kalachikova, 2019). Russian and Western researchers recognize that the time resource can be considered as the foundation for the development of the human capital of children (Vyalshina, 2017).

The understanding of parental time as an investment in the development of the human capital of children gave impetus to the development of the ideology of intensive motherhood, according to which, for the development and health of the child, the quantity and quality of time that mothers spend with their children is of paramount importance (Milkie et al., 2015; Isupova, 2018), so a good mother should always be with her children (Milkie et al., 2010). The need to fulfill the demands of paid work, combined with intensive motherhood, causes mothers to experience severe stress due to the lack of time spent with children, which acts as a chronic stressor and negatively affects the physical and psychological health of parents and their well-being in general (Milkie et al., 2019).

The literature sharply raises the problems of combining motherhood with a career, the impact of motherhood on wages and opportunities for self-development and self-actualization (Tonkikh, 2021). Today's working mothers are challenged with the need not only to be able to allocate enough time for children, but also be actively involved in children's activities, being always "within easy reach" and ready to help. Balancing professional and family responsibilities becomes particularly important in a situation where both parents are engaged in professional

activities (Chernova, 2012). Despite the fact that the balance of professional, family and parental responsibilities largely depends on the individual choice of parents and the resources they have (Isupova & Utkina, 2016), to a large extent the success of combining a career with parenthood is determined by the policy of the state and employers in relation to working parents with children aimed to provide employment conditions that help increase not only the quantity, but also the quality of time that parents can devote to their children.

Data from empirical studies conducted in various countries of the world record an undeniably positive impact of "family-friendly workplace" policy on the perception of work-family balance by women with children. This policy is aimed at creating working conditions for working mothers that allow them to successfully combine the performance of maternal and professional duties (the opportunity to work part-time, guaranteed subsidies for childcare, flexible approach to the duration and planning of working hours, etc.) (Baxter & Chesters, 2011).

One of the most widely used family-oriented strategies by employers is the policy of creating flexibility in the workplace. Flexibility may include such flexible work arrangements as flexible working hours or the ability to have flexible start and end times, schedule control, etc. According to a survey of women working in organizations in the Sverdlovsk region (Bagirova & Blednova, 2021), the start/end time of work and the length of the working day are the main difficulties that hinder the fulfillment of parental responsibilities. At the same time, it should be noted that the choice of support measures and their effectiveness is largely determined by the family structure of working mothers.

At present employers provide a range of flexible work arrangements, most common include telecommuting, part-time work, compressed workweek and flexible working hours (Higgins et al., 2014). Employees entitled to flexible work schedules are allowed to telecommute, choosing the time and place for performing their job functions (Yadav & Sharma, 2021). A flexible workplace policy balances the time budget of working parents, which increases their job satisfaction and satisfaction with the time they can spend with their children. This policy, in combination with other employment parameters (number of working hours, full and part-time employment, hours of work during the day/week, standard/non-standard work schedule) can have a positive impact on the quantity and quality of time spent by working parents with children (Tonkikh & Chernykh, 2022).

The empirical basis of the article is the data of a pilot qualitative study conducted in Yekaterinburg in August 2022, the purpose of which was to develop and test qualitative methods for studying the impact of digital employment on various aspects of fertility and parental well-being. At this stage, the team of authors aimed to identify factors that influence the relationship between the type of employment and child rearing, motivation to have a child, and perceptions of parental well-being. We sought to understand how digital employment impacts perceptions of parental well-being, including what positive and negative effects teleworking makes on the time spent by parents with their children. The research project included a focus group study (n = 16) and individual in-depth interviews (n = 18). The analysis includes materials from focus groups and in-depth interviews with working mothers and fathers aged 15–49 years. Focus groups were held face-to-face (offline); individual in-depth interviews – online/telephone format.

The data obtained as a result of focus groups and individual in-depth interviews revealed how respondents assess the advantages and disadvantages of remote (remote) work in terms of the time that parents can spend with their children. The positive impact of remote employment is primarily reflected in the fact that parents spend more time with their children, have the opportunity to control their activities during the day; they have more direct contact and activities with children and opportunities to adjust to the children's schedule (pick up from kindergarten / school, bring in a circle, etc.) and, finally, parents can be more involved in the lives of children, not letting them take their course classes. Below there are some of the ideas the respondents shared during the qualitative study.

"At least you spend more time at home, with children. Even if you just think about the time you spend to get to work, even if it's half an hour that you drive, traffic jams in the morning, traffic jams in the evening. It is these two hours that you save to be with the children" (teacher).

"Situations such as when you need to take your child somewhere, it will be easier to do it in the daytime if you work remotely than when you are sitting at your workplace" (housemaid).

"When working remotely, you spend more time at home, so you have more visual contact with the child, you have more tactile contact, you can somehow interact with the child. I think that during the working day, per unit of time, much more attention is paid to the child, you interact more, you do better than during the standard work schedule, when you go to work in the morning, there you take the child to a kindergarten or to school, and then pick up in the evening" (engineer in a construction company).

"If I work outside the home, I may be missing something. Something that I don't see, don't know, don't react in time. I just do not help the child in time" (freelance painter).

On the other hand, the problematic aspects of the influence of the remote employment can be manifested in the fact that it is difficult for children to understand why, being at home and doing work, a parent cannot pay attention to them; there is a danger of hyper-custody, excess control over children and their activities:

"Perhaps working in an office is even better. Because, how is it possible- the mother is at home, and she does not talk to the child. The child will not be able to understand it" (teacher).

"I think there is a danger of hyper care. Constant observation, supervision of a child will not lead to anything good. He will not learn how to socialize, he will not make any mistakes, so that later they can be solved independently (online tutor).

In conclusion, the opportunity to telecommute (work remotely, from home), according to participants in focus groups and individual interviews, has more advantages than disadvantages for parents in terms of devoting the necessary time to children. Qualitative research has shown that this is the main area of positive effects of remote employment. The results of the pilot qualitative study also confirm the assumption that in order to successfully combine parental and work responsibilities, it is necessary to be able to flexibly build a work schedule and at the right time to be where it is necessary for the child. Thus, the government authorities should encourage businesses and organizations to introduce family-friendly workplace policies and emphasize the importance of providing flexible schedule arrangements for working parents, especially mothers who bear the main responsibility for child care and parenting. The promotion of workplace flexibility and remote work is to stimulate working mothers to devote to the children the time, necessary for their versatile development, health and safety. This can also lead to the working mothers' decreased stress levels and their enhanced work performance as they will not feel so much anxious about what their children do when parents are away from home.

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Development of Human Capital in FMCG Companies in Russia

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Abstract:

The fast-moving consumer goods (FMCG) sector continues to demonstrate positive dynamics, even during periods of economic crisis. At the same time, companies operating in the FMCG sector in Russia have shown resilience and continuous growth despite challenging socio-economic and political conditions. This phenomenon can largely be attributed to the systematic attention given to the development of human capital within these companies and their efforts to enhance their reputation as employers in a labor market experiencing a shortage of skilled personnel.

This study focuses on analyzing the contemporary practices employed by FMCG companies operating in the Russian Federation in developing human capital. The research methodology is based on conducting surveys of managers at various levels of management, including those in the FMCG sector, in the Russian market. The analysis of the collected data allows for evaluating the effectiveness of the applied practices, identifying key factors influencing the development of human capital in this sector, and formulating recommendations for improving personnel management processes and development strategies for FMCG companies.

Introduction

The contemporary business environment represents a sphere where companies face negative factors that exceed their existing capabilities to maintain sustainability. Companies operating in the Fast-Moving Consumer Goods (FMCG) sector in the Russian Federation also encounter a complex set of economic, political, and social challenges over the past five years. However, the majority of them have successfully managed these challenges, preserving organizational stability and effectively implementing their development strategies. One of the key reasons for the sustainability of FMCG companies lies in their systemic and strategic approach to human capital development, which not only ensures competitive advantages in relatively stable markets but also determines resilience in high uncertainty conditions.

The aim of this research is to examine contemporary practices of human capital formation in FMCG companies operating in the Russian Federation.

The study relies on a **methodology** grounded in general scientific principles such as synthesis, analysis, and comparison. The theoretical and methodological foundation of this research is the concept of company human capital, regarded as a key factor of competitiveness in the modern knowledge economy. The empirical basis of the study is derived from analyzing the survey results of top and middle-level management across various companies, including the FMCG sector.

Research findings have allowed for the identification of modern human capital development practices in FMCG companies in the Russian market. Additionally, based on these results, practical recommendations have been formulated for managers aimed at ensuring the sustainability of their companies in highly uncertain conditions.

2. Materials and Methods

Human capital is a key element that ensures the sustainability, development, and competitiveness of companies. Employees possess collective abilities, experience, and skills that, when effectively managed, transform into valuable assets and form the basis of the Knowledge Economy. In this study, human capital is understood as the aggregate competencies of a company that belong to it and contribute to goal achievement [1]. In the face of high uncertainty and stringent sanctions pressure on the Russian economy, human capital specifically determines the degree of companies' resilience and competitiveness in the markets.

For companies aiming to establish market leadership, it is crucial not only to preserve but also to continuously develop their human capital. The growing demand for skilled personnel in the Russian labor market poses a challenge and driver for a systemic approach to developing their human capital. Research indicates that nearly half of the organizations already face a talent shortage (47%) [3]. Moreover, Dmitry V. Kutyavin emphasizes in his article "Knowledge Economy as a Challenge for the Labor Market" that the worsening situation of a limited supply of highly qualified professionals in the Russian labor market leads to a "war for talent" [2].

Human capital represents the primary and most significant resource in organizations from both an economic and production standpoint. It holds high value as the costs associated with recruitment, hiring, and employee training are substantial for companies. Furthermore, the quality and effectiveness of an organization's work directly depend on the competence and qualifications of its employees. Consequently, the efficiency and performance of an organization are exposed to increased risks of failure due to changes in internal and external conditions related to the human factor.В организациях существуют два основных принципиальных способа формирования человеческого капитала:

Recruitment is the process of attracting candidates with the required level of competencies and skills from the labor market. Organizations seek and select suitable candidates who already possess the necessary knowledge and experience to successfully fulfill the tasks assigned to them.

Development is the process of training, preparing, and enhancing the competencies of employees already within the organization. Through training programs, retraining, and personnel development initiatives, organizations aim to strengthen and expand the skills and knowledge of their employees, enabling them to effectively perform their job responsibilities and contribute to the achievement of organizational goals.

Thus, effective formation and management of human capital involve both the processes of recruiting competent professionals and actively developing existing employees to ensure the sustainability and successful development of the organization in a dynamic and competitive environment.

Within an organization, two parallel processes related to human capital development can be distinguished: the development of employees' human capital and the development of the enterprise's human capital. Both of these processes are interconnected and essential for ensuring the successful development of the organization. The development of employees' human capital helps create a highly skilled and motivated workforce capable of effectively carrying out their tasks. In turn, the development of the enterprise's human capital creates conditions in which this capital can be fully utilized, yielding the best results for the organization.

However, in the context of a labor market crisis, both the quantity and quality of available talent have decreased. Simultaneously, the majority of companies are undergoing digital transformations, which naturally lead to workforce reductions in certain areas and increased demands for others. This presents corresponding challenges to the human capital development system, as it is an integral part of talent retention strategies [4]. Experts also highlight that the development system is focused on nurturing human potential to ensure companies' ability to meet future challenges successfully [5]. According to Hays company data, only 56% of

employers support employees in their competence development, while 44% either cannot allocate resources or consider additional training to be the employees' personal responsibility [6].

In 2022-2023, the authors conducted a study aimed at examining the modern human capital development practices of FMCG companies operating in the Russian Federation. The first stage of the research involved developing a questionnaire consisting of 34 questions, including both open-ended and closed-ended questions.

The questionnaire was structured into eight thematic sections, covering the following aspects of human capital formation in organizations:

1. General understanding of human capital in the organization.
2. Results of the organization's personnel policy and the challenges it faces.
3. Evaluation of human capital: evaluation criteria and frequency of assessments.
4. Personnel development strategy.
5. Training and development of personnel.
6. Employee retention.
7. Working with employee potential.
8. Company's position in the labor market.

The respondents participating in the study assessed and described the situation in their companies and the outcomes of their actions related to human capital formation in the specified areas.

During the second stage, from July 2022 to June 10, 2023, online surveys were conducted among senior and middle-level managers from various companies, including FMCG. The questionnaire was hosted on the Google Forms platform, and anyone interested could participate and answer the questions. The sample was random and non-representative.

The study involved representatives from companies in various industries, including major sectors such as oil and gas, raw material extraction, industrial and agricultural production, banking and insurance, telecommunications and communication, fast-moving consumer goods (FMCG), and others. The total number of respondents was 106, with 28% representing foreign companies with a presence in the Russian market and 72% representing domestic companies.

Within the research framework, only representatives of the managerial staff whose influence affects the formation of human capital were surveyed. Out of the total number of respondents, 8% were HR department managers, 23% were heads of line departments, 19% were middle-level managers, and 51% were top management of organizations.

Representatives from companies of various sizes were included in the survey (see Figure 1), which allowed for an assessment of the situation and various aspects of human capital development in companies of different scales.
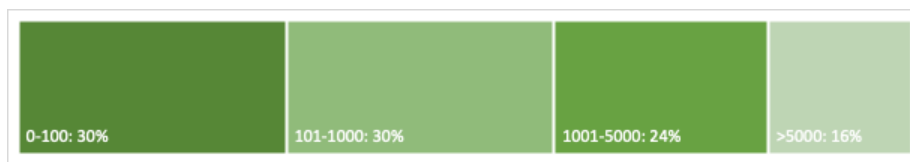
Figure 1 - Workforce Size in Companies whose Representatives Participated in the Study.
Source: Compiled by the authors based on the research findings.

Thus, the composition of respondents aligns with the objective of our study.

3. Results

The results of our study show that in FMCG companies, approximately 42% of respondents consider human capital to encompass all human resources within the organization, while an equal percentage defines human capital as the combination of employee competencies. In 4% of the companies, human capital is associated with talent, while 13% of organizations do not operate with this concept.

Furthermore, the research revealed that in 83% of FMCG companies, the personnel management policies contribute to the development of human capital, while in 8% of cases, managers at different levels identified explicit degradation. Based on this data, it can be concluded that the personnel management policies in the industry under consideration are relatively successful and comparable to the level in the domestic labor market (see Table 1).

Table 1 - Comparative Analysis of Data for All Respondents and FMCG
Source: Compiled by the authors based on the research findings

Question: "Personnel policy in the company leads to..."	Respondents' answers in %	
	In general	FCMG
Development of human capital	65,3%	90,9%
Retention of human capital	11,6%	-
Reduction (degradation) of human capital:	23,2%	9,1%

According to our research, over 70% of managers at various levels in FMCG companies believe that a policy promoting the development of human capital is being implemented. However, the opinions of HR managers are divided: half of them consider the policy to be "appropriate," while the other half believes that the implemented policy leads to the degradation of human capital.

The study also identified the most common challenges that companies face in shaping human capital (see Figure 2). More than a third of respondents indicated that the main difficulties are related to the lack of mechanisms for objective assessment, insufficient funding for development programs, and low employee motivation for learning.
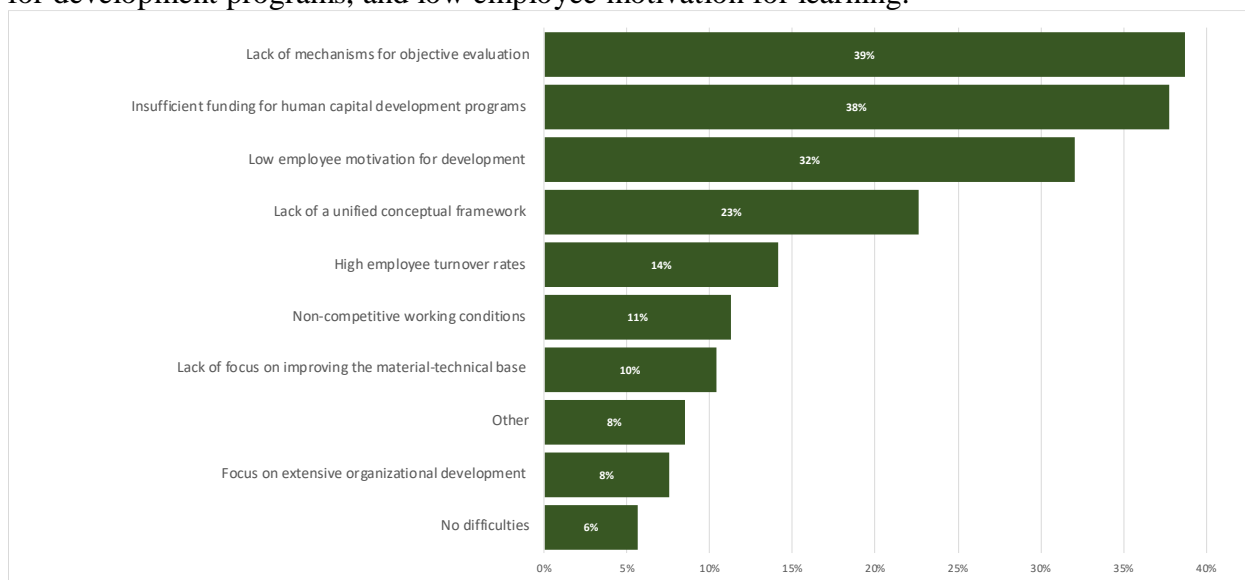
Figure 2 - Most common challenges in shaping human capital in FMCG companies.
Source: Compiled by the authors based on research findings.

According to the research findings, 23% of companies lack a unified conceptual framework, which means there is no shared understanding among management regarding what needs to be addressed and what results need to be achieved. This has a negative impact on all processes related to the formation and development of human capital.

To ensure the stability of a company, it is important to systematically assess the development of human capital. The assessment of human capital is necessary to understand the

current state and develop an action plan, as well as to evaluate the effectiveness of ongoing efforts. In Russian companies, including FMCG companies, assessing human capital is a common practice. More than half of the surveyed companies conduct assessments annually or more frequently (see Table 2).

Table 2 - Assessment in the system of formation and development of human capital for all respondents and FMCG.

Source: Compiled by the authors based on research findings.

The frequency of assessing human capital (HC)	Respondents' answers in %	
	In general	In general
The assessment is conducted	29,2%	8,3%
Annually or more frequently	58,5%	70,9%.
I find it difficult to answer	12,3%	20,8%

Indeed, the research results indicate a problem of lacking assessment practices in a significant number of companies in the market, including FMCG companies. Approximately 42% of companies in the market and 29% of FMCG companies do not conduct an evaluation of human capital or respondents do not have a clear understanding of its implementation and frequency. The absence of assessment can pose a serious challenge for the preservation and development of human capital in these companies. Without evaluating the effectiveness of their initiatives and basing their planning on the current situation, companies may rely on subjective opinions of management or employees, leading to significant errors and failure to achieve desired results. In conditions of high uncertainty, such practices become destructive factors for a company's sustainability.

To achieve effective management of human capital, it is recommended to implement a systematic evaluation that will enable companies to assess the current situation more accurately, identify necessary measures, and develop plans based on objective data. This can contribute to improving performance and stability of companies in the market.

The conducted research identified the most popular approaches to evaluating human capital used in FMCG companies (see Figure 3):

- Assessment of employee loyalty and satisfaction level: 15.5%
- Comparison of salary levels with similar companies: 14.1%
- Evaluation of training costs: 11.9%
- Evaluation of labor costs, bonuses, and other payments: 10.1%
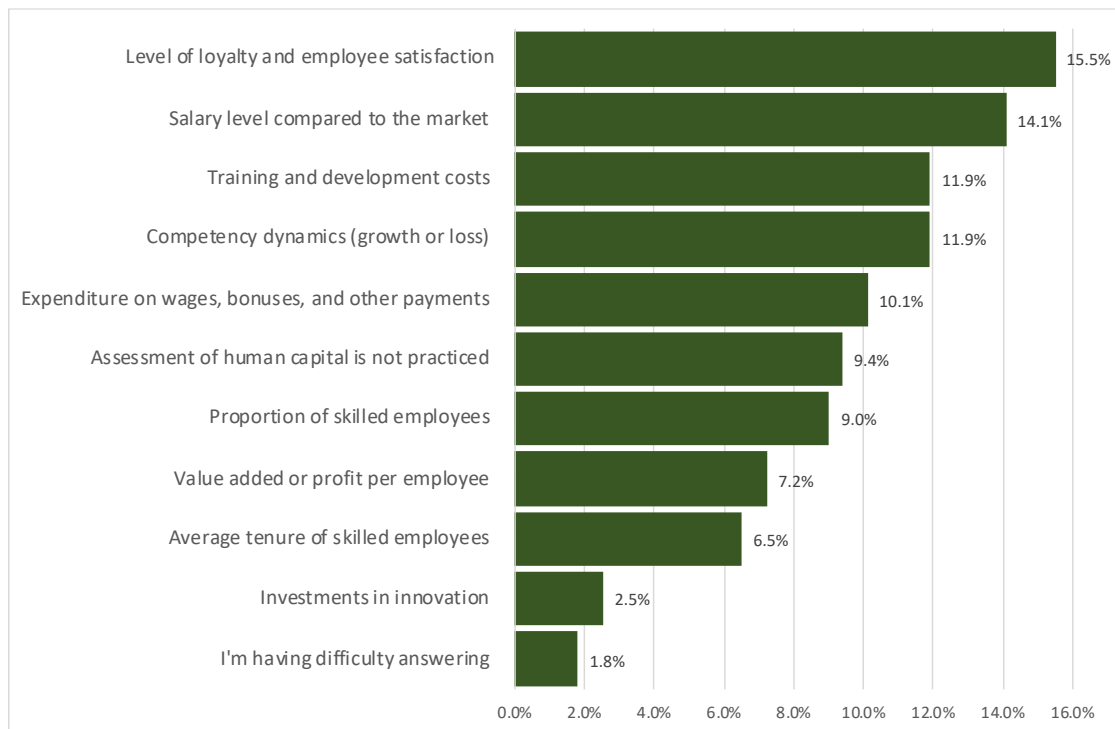
Figure 3 - Approaches to evaluating human capital or the effectiveness of its development
Source - compiled by the authors based on the research findings

Based on the obtained data, it can be concluded that companies predominantly utilize cost-based evaluation approaches when assessing human capital.

The sustainability of an organization is closely linked to its development, which includes the need for a human capital development strategy. The survey results among FMCG companies indicate that 83% of companies have a developed strategy for developing their workforce, with 67% of them incorporating this strategy into the overall business strategy. This confirms that having a qualified and trained workforce is essential for companies operating in this industry.

However, in 13% of cases, respondents were unable to explicitly indicate the presence of a workforce development strategy or noted its absence in their companies (4%). This represents an area that requires improvement and presents an opportunity for enhancements. It is necessary to develop and implement a workforce development strategy in these companies, which will enable them to better adapt to market changes, enhance their efficiency, and strengthen their competitiveness. This also contributes to attracting, developing, and retaining talented employees, which is a key factor for success in the dynamic FMCG industry. Within FMCG companies, own training centers or corporate universities/departments responsible for employee development play a significant role (28% compared to 13% overall in the market). Additionally, 28% of strategies include the development plans for specific departments or categories of employees, while 20% of programs incorporate organizational development plans. Employee retraining receives limited attention, being included in only 11% of strategies.

As expected, the workforce development strategies in the overall market primarily focus on current employees, with only 12% of strategies including development plans for individuals outside the organization, such as school students, students, or employees of partner companies. Furthermore, specialized educational institutions' training plans are considered in only 9% of strategies. In FMCG companies, the development of potential employees receives even less attention, with development plans for individuals outside the organization included in only 9% of strategies, and training plans in specialized educational institutions accounted for only 2% of strategies. The low level of inclusion of external (including future) candidates in development programs indicates that companies may miss the opportunity to leverage this category of individuals as potential sources for shaping the organization's human capital.

It is important to note that the majority of companies with a workforce development strategy incorporate more than two components, both in the overall market and FMCG companies.

The nature of FMCG business, characterized by low scientific complexity of processes and a large number of employees with varying levels of training and motivation, is reflected in the fact that the main focus of training (in 50% of companies) is on developing soft skills, including leadership competencies. In contrast, the market average places a primary emphasis on developing technical skills - hard skills (46%). (see Figure 4)
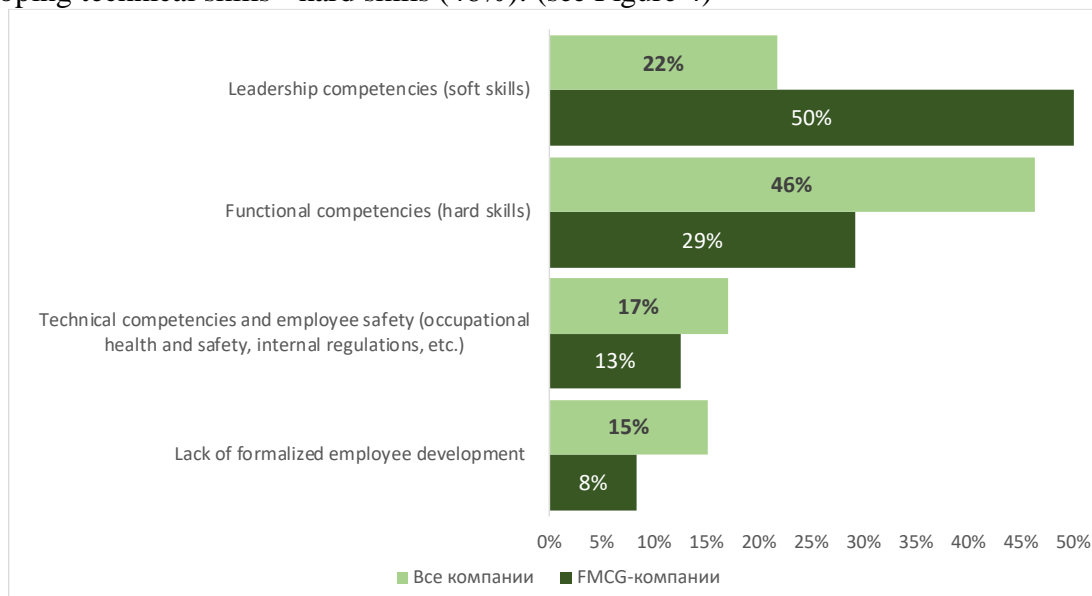
Figure 4 - Focus Areas in Employee Training and Development
Source - Compiled by the authors based on research findings.

In the considered industry, companies attract qualified employees for specialist positions and help them develop into managerial roles. At the same time, some complex processes are delegated to outsourcing organizations, which require advanced soft skills such as negotiation skills, critical thinking, teamwork, and the ability to set and monitor task execution.

The research results showed that companies employ a comprehensive approach to training their employees. On average, respondents indicated the use of four training tools within a single company. The most popular training and development tools in FMCG companies are on-the-job development (used by 17% of companies), mentoring (15%), and corporate portals or online learning (15%). Training in specialized educational institutions related to the organization's field is hardly utilized (2%).

The research also helped identify that nearly all companies in the market face a range of difficulties in the training and development process of their employees. (See Table 3)

Table 3 - Comparison of Difficulties in the Training Process for All Respondents and FMCG
Source - Compiled by the authors based on research findings.

Questions	Respondents' answers in %	
	In general	FMCG
Insufficient time for employee training and management.	18%	19%
Lack of accountability for personal development.	12%	12%
Low level of employee engagement and initiative.	12%	14%
Employee development does not impact their career advancement.	12%	9%
Varied attitudes towards development processes among departments in organizations.	11%	16%

The sequential resolution of identified problems represents the potential for companies to ensure their sustainability in conditions of uncertainty.

One of the key challenges for companies in maintaining sustainability is employee retention. For skilled personnel, the main motivations to continue working in a company are: engaging work that utilizes high-tech workstations for professional growth, a competitive rewards system, favorable working conditions, benefits, and career development opportunities. According to respondents, 36% of companies improve working conditions to achieve leading positions in the industry in this aspect, 53% of companies maintain conditions at an acceptable level, and 7% of companies rate working conditions worse than their competitors. In the FMCG segment, a higher percentage of companies (58%) strive for leading positions in the industry, while an additional 38% of companies maintain competitive working conditions. This indicates that the FMCG segment is becoming more attractive to employees. To facilitate employees' professional development, organizations need to create high-tech workstations. The actual "quality" of these workstations was not evaluated within the scope of the study, as it was important to obtain the employees' assessment since, despite its subjectivity, it plays a decisive role in choosing a company. Thus, over 70% of respondents stated that the situation in their company in this aspect corresponds to the industry as a whole: 75% in FMCG and 72% overall in the market.

Employees in FMCG companies highly value their reward systems. Among them, 83% noted that the compensation system in their companies is attractive or superior to others in the industry. Since the result exceeds 50%, it indicates the employees' trust in the provided conditions. Although it is a subjective assessment, it reflects the employees' perception of the personnel management policies. Overall, 71% of employees in the market considered the reward conditions as the best or competitive compared to the major industry players.

It should be noted that in over a quarter of companies in the market (26.4%), respondents mentioned the absence of additional benefits such as meal allowances, medical insurance, and mobile communication. No such responses were recorded among employees of FMCG companies, which further confirms the high level of employee support and the focus on the key asset of the company - its personnel.

One factor contributing to employee retention is the transformation of personal development accompanied by increased compensation into career advancement. Overall, 58% of respondents identified a connection between personal development and career progression, while in the considered industry, this figure reached 67%. It is important to note that for a personnel-oriented industry, 33% of respondents who do not see a direct link between employee development and their career consider it a negative outcome. Therefore, this factor represents an area for further development and improvement.

Maintaining the stability and development of companies largely depend on ensuring workforce continuity, which also contributes to the development of human capital. As a result of our research, typical problems in this area were identified, as shown in Figure 5:

1. Over a third of respondents, regardless of the industry (34% in FMCG, 30% in all companies), highlighted a high workload on employees. This implies that employees in companies are not given enough time for development and career planning.
2. 22% in FMCG and 17% in all companies indicated a lack of competence and professional maturity among young (junior) employees.
3. Professional burnout was noted among 17% of FMCG employees and 19% in the overall market.
4. 9% of companies expressed concerns about experienced employees' unwillingness to share knowledge, which could be related to a lack of motivation to pass on their knowledge or concerns about competition from younger employees. It is worth noting that this factor was not identified among FMCG industry organizations.
5. In 7% of companies (including FMCG), low motivation development was observed.
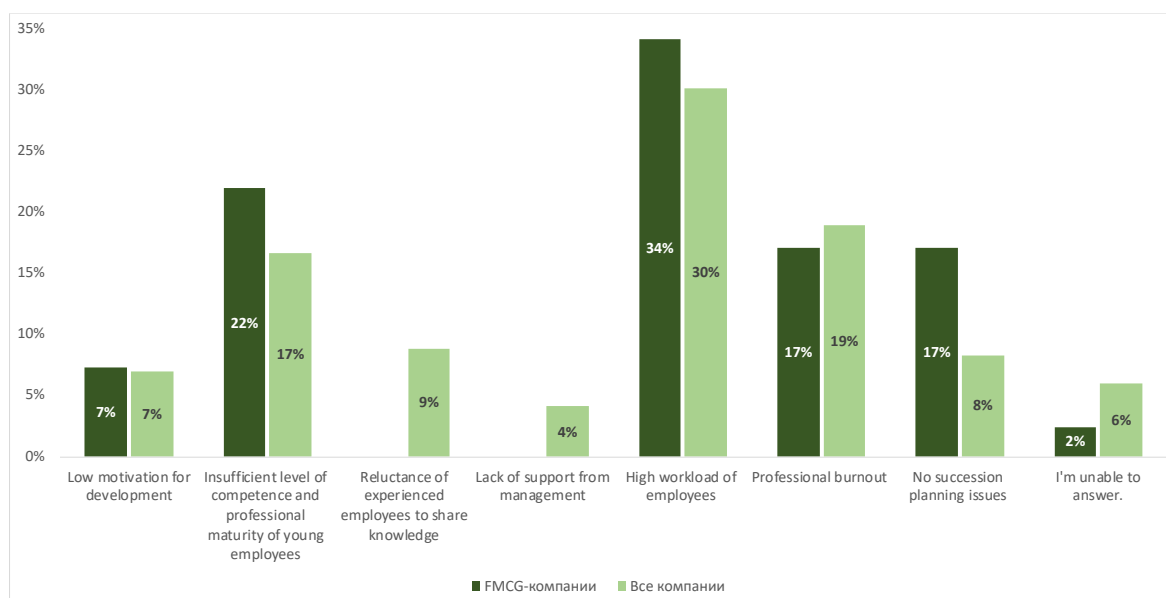
Figure 5 - Challenges of Succession Planning
Source: Compiled by the authors based on research findings

The preservation and development of human capital in a company, which contributes to its sustainability, is largely determined by its attractiveness as an employer. The majority of surveyed managers in the FMCG industry (92%) reported that their organization is an attractive employer, while the overall market average is 69%. According to the author, despite the subjective nature of the assessment of company attractiveness by employees, the difference in values between FMCG companies and the overall market is significant, exceeding 30%. This indicates the management's trust in the company and its adopted policies.

According to the conducted research, the majority of FMCG companies (65%) meet their needs for highly skilled employees through internal development and succession programs, while the market average is around 40%. These results indicate that internal human capital development is a priority for companies in the considered industry and contributes to their resilience in times of crisis.

4. Discussion

The results of our research have revealed typical problems associated with the formation and development of human capital, which directly undermine the internal sustainability of companies and pose significant threats in the face of external challenges. In fact, inadequate attention from management to the process of forming and developing human capital creates an internal VUCA environment. In a situation of growing skilled labor shortage in the Russian labor market, this can lead to serious problems for both the company and the industries and economy as a whole.

Our study has shown that companies in the FMCG sector take a more consistent and systematic approach to the formation and development of their human capital. This enables them to better cope with the challenges of the modern world and approach the future with optimism. However, FMCG companies need to continuously improve their practices in the field of human capital development.

Within the scope of the research, the following areas have been identified to which companies in the considered industry should focus their attention to strengthen their positions in human capital management:
1. Lack of objective assessment and financing mechanisms for development programs.
2. Irregular or nonexistent practice of human capital assessment, which hinders the development of development plans.

3. Focus on cost evaluation, with insufficient attention to other aspects of human capital assessment.
4. Low engagement level in development programs of external (including future) candidates.
5. Difficulties in organizing training due to limited time and low employee engagement.
6. Insufficient connection between individual development and career growth, which can negatively affect employee motivation.

Our study did not cover all aspects related to the formation and development of human capital and its impact on ensuring company sustainability in high uncertainty conditions. According to the authors, particular importance lies in studying the role of leaders' thinking and management styles, which can either contribute to teamwork or hinder it, serving as factors of human capital and company sustainability.

5. Conclusion

The results of our research focus on the issues of formation and development of human capital in the FMCG industry. We have identified specific practices that either contribute to or hinder human capital development, and also have an impact on the sustainability of companies in markets characterized by high instability.

The systematic and strategic approach of FMCG companies to managing their human capital plays an important role in making these companies attractive in the labor market and explains the reasons for their successful implementation of development programs, even during periods of crisis.

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The Ethical Capital of an Educational Organization in the Context of Digitalization

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Abstract:
The organizational resilience of educational institutions is a key factor in their development in a transforming environment. School digitalization presents a new challenge for managers: it is necessary to adapt analog educational rituals to the digital environment and establish qualitatively new principles of interaction among educational stakeholders. It can be assumed that the resource for these changes is the ethical capital of the organization, which encompasses agreed-upon norms, practices, and value orientations that shape the organizational culture and facilitate the balanced adaptation of all participants in educational relationships to the changed environment. Ethical capital is realized by employees through the professional etiquette that is agreed upon within a specific organization. When transitioning to a digital environment, the ethical capital of an organization is enhanced through the updating of digital etiquette, which defines the behavioral norms in the new conditions.

The aim of our research is to determine the level of consistency in digital etiquette in schools as a potential resource for organizational resilience. Empirical data is presented in the form of materials from contextual research, thematic analysis of literature, and results obtained from focus groups.

As a result of the conducted diagnosis, the following preliminary findings were obtained: (1) Digital etiquette in schools is an unexplored phenomenon and consists of a list of inconsistent spontaneous interactions; (2) Educational stakeholders (teachers and students) are not prepared to formulate norms and rules for digital educational interactions and are not ready to harmonize them among themselves; (3) The ethical capital of educational organizations is not actualized for use in the conditions of the digital economy.

Keywords: *ethical capital, educational organization, digital ethics, digital etiquette, educational digitalization.*

Introduction

In recent years, the education system has faced significant challenges due to the global COVID-19 crisis, updated standards [10], and federal experiments [4, 8, 15]. One such experiment was the project to create a digital educational environment for schools, which needs to be universally implemented by 2024 [7, 11]. The instability of the external environment has made it evident that the organizational resilience of educational institutions needs to be considered, especially in the inevitable digitalization of education since educational organizations "can be more easily affected by any crisis or changing policy" [24].

Organizational Resilience

Organizational resilience was first defined by A. Meyer as the ability of an organization to respond to failure and restore the previous order [21]. We consider this definition more broadly, believing that the goal of any organization is not just to maintain a stable order but to develop a level of adaptability that enables the organization's recovery and growth. We understand organizational resilience as the "process of positive development in a risky and uncertain environment throughout the organization's lifespan" [3]. Resilience is an important factor in successfully dealing with unexpected threats and crises [19].

The formation of resilience can be achieved through both direct practices [1] and indirectly through interactions and everyday behavior of employees [17]. These include "behavioral and contextual capabilities" [11], such as a "healthy culture" [25], which requires a focus on strengthening employees' teamwork skills and creating an organizational culture that promotes team spirit during challenging times [20]. A healthy culture encompasses values and behavior models that support the well-being of employees and enable effective interactions among them.

Interaction rules based on the values of a specific organization can serve as a resource for resilience. Systems of rules that regulate employee interactions help understand the principles, essence, and outcomes of these interactions. It is known that the interaction of the same people with the same abilities and motivations under different systems of rules leads to completely different aggregate results [2]. In educational organizations, the role of moral rules becomes even more relevant due to the relational nature of their activities [2]. However, the process of digitization in educational organizations is occurring spontaneously, and the participants of educational relationships (N=1486) overwhelmingly (82%) do not understand "the rules by which the school will operate in the digital era" [5].

Ethical Capital

Rules and norms of behavior fall within the realm of ethics, which serves as the foundation for an organization's ethical capital. Currently, the concept of ethical capital is not well-established in research practice and evokes "a forceful and emotional response" [22]. This concept is not mentioned in the six capitals model but passes in a straight line through two or three of them [23]. Researchers define the capacity of ethical capital as the ability to "not just create value, but to define and refine values that an economy possesses" [17]. Ethical capital is a "collective value" [23] that determines an organization's behavior, decisions, and strategy. It also becomes an institutional condition for "employees to realize their human capital" [9]. In the context of this study, we understand the ethical capital of an organization as the combination of aligned norms, practices, and value orientations that shape organizational culture and ensure the balanced adaptation of all participants in educational relationships to the changing environment.

In the context of digitalization of education, the ethical capital of a school becomes a managerial resource, as the updating or transformation of analog rituals can significantly change educational interactions, helping all participants in educational relationships adapt to the new environment. We believe that the content of ethical categories in the digital environment remains unchanged; however, the form and order of implementing ethical norms and rules change. The "aligned order of actions in the digital environment" [14] is defined as digital etiquette.

Digital etiquette is a relatively new phenomenon that is "currently in the stage of its formation and development, and thus, it has been little studied" [6]. If we consider that established rules and norms of analog interactions significantly reduce costs associated with aligning positions, decision-making, and achieving goals, then the effectiveness of digital interactions will also be influenced by the presence (or absence) of aligned norms. Therefore, we hypothesize that the level of consensus on digital etiquette as a means of implementing the school's ethical capital is a factor in organizational resilience.

The aim of this research is to identify the level of consensus on digital etiquette in educational organizations.

Methodology

Due to the uncertainty surrounding the concept of digital etiquette and the absence of a standardized ethical code for educational organizations, empirical data compilation was conducted through collecting data for thematic analysis of research materials and subsequent work with focus groups in educational institutions.

Thematic analysis of the literature was conducted following the PRISMA[1] model and divided into three stages. Initially, research studies relevant to the topic were identified. The search was performed using keywords such as "digital ethics," "digital etiquette," "online communication rules," and "online interactions" in both Russian and English languages, within the RINC and Scopus databases. After removing duplicates during the screening stage, 112 materials remained for review. The screening process applied the following criteria: academic research published no earlier than 2010, addressing digital ethics and etiquette in the context of individual interactions (excluding artificial intelligence, mass media, and other unrelated areas). Subsequently, 64 materials were selected for review, and their texts were reviewed to identify components of digital etiquette. In total, 32 research materials were included in the final sample.

All elements of digital etiquette found in the selected texts were classified into a table presented to a pilot focus group. The purpose was to determine the level of consensus on these elements within the pedagogical community and identify the components that are inherent to educational interactions. The pilot focus group consisted of 12 staff members from various educational institutions in St. Petersburg, aged between 22 and 40 years. The following discussion topics were addressed: (1) the current stage of development of digital etiquette in schools; (2) whether there is a shared understanding of digital etiquette within the pedagogical community; (3) and the consensus on norms of interaction in the digital environment in educational relationships. The results of the focus group revealed significant discrepancies within the pedagogical community regarding the essence of digital etiquette. However, there was unanimous agreement among the respondents on the necessity for its development and the alignment of norms for digital educational interactions. Through the discussions, unanimously agreed-upon components and those that did not receive unanimous definition (30%) were identified and not considered as aligned.

Based on the focus group material, specifically the elements agreed upon by the participants, we created a table (Table 1) with the provisional title "ethical portfolio" that includes 35 ethical norms in digital interactions. We define the ethical portfolio as " a list of etiquette elements that it is advisable to agree on in institutions to foster digital ethics" [13].

Table 1. Ethical Portfolio of a School [13]

1	Use your real name when signing up for accounts.
2	Represent individuals who may not be familiar to your primary recipient, if they are copied in the message.
3	Choose appropriate photos and backgrounds that align with the context of professional communication.
4	Adhere to the rules of professional correspondence.
5	Avoid excessive use of emojis.
6	Proofread messages for errors before sending.
7	Avoid writing messages in all capital letters or breaking words (e.g., LiKe ThIs).
8	Join classes and events without delay.
9	Maintain a professional dress code when participating in online events.
10	Start conversations with greetings and end with farewells.
11	Seek permission from individuals before forwarding their emails or making reposts.
12	Avoid immediate callbacks if you have called but received no answer.

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[1] Preferred Reporting Items for Systematic Reviews and Meta-Analyses

13	Refrain from sending emails during non-working hours.
14	Keep personal accounts private and avoid adding teachers as friends.
15	Maintain separate personal and student accounts on social networks and email.
16	Use file names that make it easy for recipients to locate them on their computers.
17	Follow the "one topic – one email thread" rule.
18	Keep emails as concise as possible.
19	Reply to emails only to the main recipient, rather than to everyone copied in the email.
20	Include a subject line in your emails.
21	Avoid sending files that require special programs to open.
22	Avoid sending large files unless necessary, and provide explanations or specific sections if applicable.
23	Maintain confidentiality and refrain from disclosing entrusted information to others, except as required by law.
24	Do not post materials of friends and classmates without their consent.
25	Respect copyright when using content from the internet.
26	Scan sent materials for viruses.
27	Verify the accuracy of information found on the internet.
28	Set boundaries for online interactions in terms of time.
29	Manage and resolve conflict situations.
30	Define objectives for online meetings/events.
31	Use visual aids during presentations.
32	Allow all participants to express their views.
33	Clarify and demonstrate interest.
34	Respect the dignity of each participant.
35	Maintain appropriate distance between students and teachers.

Results

The materials from the pilot focus group were presented for consensus in educational institutions. Since ethical capital is specific to each school's development program and "hidden curriculum" [12, 16], it can vary significantly across educational organizations. Therefore, we selected two institutions in St. Petersburg (referred to as School #1 and School #2). These schools are located in different areas of the city (residential and historical). School #1 is a general education school with minimal use of digital tools in the learning process, while School #2 is a general education school with an emphasis on certain subjects, where a digital educational platform has been developed, and interactions in the digital environment between students and teachers are characterized by us as intensive.

During the empirical stage of the research, four focus groups were conducted (two with teachers, n = 24, and two with students from grades 8-9, n = 24) in each educational organization. Each group was presented with a set of cards containing fixed elements of digital etiquette (35). The groups were required to assemble a consensus-based "ethical portfolio" from the provided set, i.e., to choose the elements that the focus group participants deemed necessary to use in their school.

Subsequently, the participants commented on their choices and their personal attitudes toward the phenomenon of digital etiquette. Both target groups (teachers and students) highlighted the need for establishing a system of rules for interactions in the digital environment, particularly online. Teachers often emphasized the importance of specific elements (e.g., "checking sent materials for viruses") but marked them as "unnecessary" because "no one does it that way." Similarly, students relied more on the real context rather than normative or ideal contexts. As a result, we obtained two different ethical portfolios: one for teachers and one for students. The summarized quantitative results of the focus groups are presented in Diagram 1.

Diagram 1. Summarized results of the focus groups on the consensus of digital etiquette components
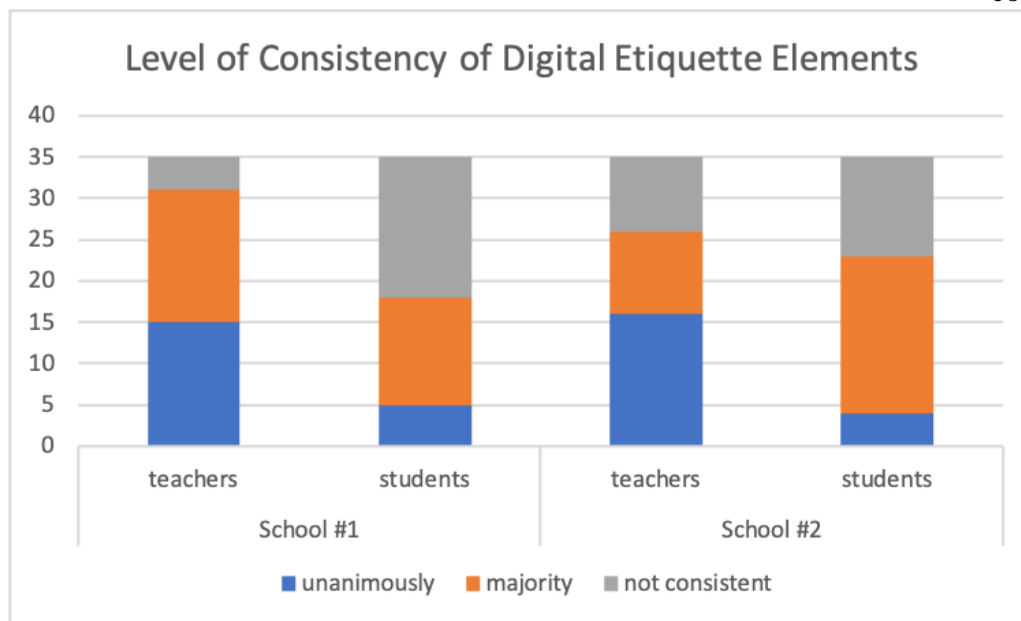
Analysis of the overall results from the target groups (teachers and students from both institutions) showed that teachers reach consensus more frequently than students, although less than half (43%) of the positions were unanimously accepted. Students do not reach consensus even on a third of the points (14%).

Participants in educational relationships do not express doubt that technology is an irreversible phenomenon in their lives. However, there is a lack of rules in school digital interactions. The school is in the process of forming hidden norms of digital interactions and communicative practices. Within the research framework, a lack of consensus on digital etiquette components was identified in the investigated schools. We can conclude that in the process of transforming familiar processes and formats of educational relationships, there is still no conventional agreement on the essence of digital etiquette. At this stage of development of the digital educational environment, we note that the ethical capital of educational organizations is not actualized for use in the digital economy and is not utilized as a managerial resource by organizational leaders in shaping organizational resilience.

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Marketing in the Era of Turbulence

Approaches to the Estimation of Personalization Effectiveness in Online Retail

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Abstract:
This paper investigates the approaches to the evaluation of personalization effectiveness in online retail. As the process of personalization in online retail is associated both with advantages and disadvantages, as proven scientifically and statistically, the ability to untangle the communications from various personalized touchpoints with the customers becomes crucial, especially in the markets where companies with more first-party data become more prominent than those focusing on the third-party data (and cookies) and cross-platform advertising. This research analyses more than 400 articles to define the factors, influencing personalization, and the ways to evaluate the factors, thus developing an integrated framework, and further using the framework to evaluate the activities of the top 50 online retailers in Russia. As a result, the transaction focus outcomes and purchase funnel focus outcomes were defined and narrowed down, as well as behavioral outcomes measures and attitudinal measures.

Keywords: *online personalization, consumer behavior, online retail*

1.   Introduction

Whenever the customer, or potential customer, accesses the online retailer's website or online marketplace, they are most likely to be exposed to personalization.

The term "personalization" covers an extensive range of aspects from a marketing perspective, even to the point of customer behavioral pattern forecasting and prediction. For this paper, I utilize the definition offered by [McKinsey & Company, p. 1]: "personalization is when seller organizations use data to tailor messages to specific users' preferences". This definition focuses on data usage and the ways these data are utilized for the creation of messages based on the needs of a particular user. There is a quite evident question on how to properly determine these needs and preferences as they are influenced by a variety of antecedents: the user's prior experience [Matz et al., 2019], technical awareness and innovativeness [Hanson et al., 2019], socio- demographic aspects [Lemon, Verhoef, 2016], and others. Moreover, these antecedents are combined with the interfaces' differences, data anonymizer solutions (for example, virtual private networks (VPNs)), as well as users' expectations and motivations. Moreover, for online retailers, there is an additional layer influencing personalization effectiveness – the specificity of the product they sell: personalization may work differently if the brand is of high or low equity, the product is specific or broadly used, hedonistic or utilitarian.

With the variety of factors, influencing the personalization perception by customers and the objective effectiveness in, for example, increased sales or retained high levels of loyalty, the effectiveness evaluation approaches and their applications are also evidently expected to vary and refer to different stages of personalization and its levels [Wedel, Kannan, 2016; Reinartz et al., 2019; Huang, Rust, 2021]. The ability to evaluate personalization is highly required because even though personalization is expected to lead to better results, there are drawbacks in its implementation. This duality is evident both in literature and in statistics. In Russia, 69% of consumers are shopping online on a monthly basis, and the e-commerce activities are growing and developing at one of the highest growth rates worldwide, as well as they pay close attention to speed and security of website, as well as their simplicity to use and clear payment options [PWC, 2018]. However, at the same time people are not much aware of their country's data

protection and privacy rules, in Russia only 7% are listed as very aware, and 43% as somewhat aware [Statista, 2019].

The aim of this paper is to develop the structured framework based on the determined ways of evaluating the effectiveness of personalization in online retail along the stages of the customer experience journey model. To achieve this goal, there are several objectives: first, it is required to analyze the literature on how the authors perceive personalization in retail, and what factors they determine and define; second, it is needed to identify the possibilities to structure the obtained factors with the possibility to estimate them; third, the framework is developed to unite the influencing factors and their estimation in the personalization process and checked based on the top- 50 online retailers in Russia.

2.   Relevance of the paper to the track topics

This paper directly refers to the track's topicality as it is focused on a very prominent topic in marketing, especially with the changes in the available retailers: in Russia, big platforms, for example, such as ASOS or Farfetch, no longer operate, hence, the businesses that operate in the same or similar niche may focus more on the possibilities to attract the customers with comfortable levels of personalization that the customers are gotten used to.

Moreover, Russia is a developing country, and hence the analysis of its biggest online retailers will provide interesting results as same or different from the results reported and developed by other countries' representatives.

In addition to that, the trend of limitation of third-party-based and cookies-focused cross-platform advertising in general, and the absence of possibilities to use Google Ads and Meta (prohibited in Russia) ads platforms make it crucial for businesses to learn about their customers and engage in the loyalty creation based on the first-party data that they collect themselves.

3.   The research question(s) and methods

This research is aimed to develop a structured framework on the ways to estimate the effectiveness of online retailers along the stages of the customer experience journey. This approach is theory-rooted and hence requires a thorough literature review. For these purposes, more than 400 articles are analyzed and evaluated on how to distinguish the factors influencing personalization and the ways to estimate personalization's effectiveness. Further, as the theoretically sound framework is developed, it is further tested against the structure and activities of Top-50 online retailers in Russia (based on the rating of DataInsigh.ru).

The research questions are the following:

RQmain: How to estimate the effectiveness of personalization in online retail?

RQ1: How personalization is structured in the scientific literature and how are personalization tools spread across the stages of the customer experience journey?

4.   The results to be reported

The results of the paper are in the form of the developed framework based on the literature analysis and the table of the evaluation of Russian online retailers against this framework.

According to the research, there are several ways to address the evaluation of personalization:

- Transaction focus outcomes: level of sales, number of visitors (customer), return on investment;
- Purchase funnel focus outcomes: customer awareness. customer experience, open rates, and purchase intentions;
- Behavioral outcomes: behavioral avoidance, reactance to use, perceived clutter, customer responses;
- Attitudinal measures: click-through intentions, persuasive effectiveness,

engagement rates.

- Moreover, there are approaches to the sources of evaluation, which can be subjectiveand objective:
- Subjective evaluation (by the customer): Surveys, on-site UX feedback;
- Objective evaluation (by the retailers): net promoter score (NPS), customer satisfaction score (CSAT), customer effort score (CES), and customer path analysis.

These approaches have quite thorough literature foundations. The importance of data collection is supported by the establishment of path data sets [Hui, Fader, Bradlow,2009]. Such a concept lies in the assessment of users' movement on the web page of thecompany in terms of web-browsing as an example of grocery shopping and tracking thein-store movement. Analysis of the behavioral path of the consumer, as well as the understanding of the information allocation, may lead to the analysis and utilization ofpersonalized recommendations, which appear in the companies' internet stores [Gai, Klesse, 2019; Lambrecht, Tuckerm 2013]. An additional crucial aspect refers to the factthat as personalization is rooted in customer (or user) data, and hence privacy concernsinfluence the consumer decision-making process. Privacy concerns are defined as the "ability of the individual to control the terms under which personal information is acquired and used" [Westin, 1967, p. 7].

The analysis focused on the analysis of Russian companies was broken down in accordance to the personalization tools, such as chatbots (in messengers, script-based or artificial intelligence-based), personalized recommendations of various types (user- based, item-based, hybrid), and framings (based on other's preferences, own preferences, previous purchases, previous searches, etc.), virtual try-on, and others.

In terms of personalization management, it was determined that the application of the customer experience journey model provides a clear overview of how to apply numerous types of personalization tools based on the user's needs along the purchase process. In order to help the customer to use the personalization tools properly, the companies utilize customer learning in the form of comments on the tools (for example, explanation on the virtual try-on). A very important part is related, as was mentioned earlier, to the privacy communications in the forms of privacy policies published on the websites and the clarifications on cookies. The companies present their privacy policies (also referred to as the "confidentiality policies"), which are the publicly freely accessible documents presented on the companies' web pages. These documents can be amended based on changes in federal laws, internal norms of the company, and the decisions of the companies' managers, as well as when there are changes in the aims of the personal data collection, changes in the structure of the informational and/or telecommunication systems (or the introduction of the new ones), introduction of new technologies of the personal data processing (including their transfer and storage), and based on the results of the interim company checks, and such amendments are reviewed at least once a year [Bonprix.ru, Policy on the personal data safety].

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International Social Networks Ban Influence on Consumers' Attitude to Russian Social Media:the Case of Zennials perception of VK

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Abstract:
The main goal of the research is to identify how Zennials' emotional reaction to the international social networks ban in 2022 influences their attitude to Russian social networks (based on the case of VK). The study relies on generations theory, consumer behavior theory and prior research on social network users' behavior. The mixed-method research included in- depth interviews (Summer 2022) and a survey (Spring 2023). This research proves that there is a spill-over effect of emotional reaction to international social networks ban on remaining available social media platforms, VK particularly. Specifically, those who perceived VK as a valuable alternative to the blocked platforms had a more positive attitude towards VK, leading to a higher intensity of engagement and greater satisfaction with VK. The results emphasize the significance of attitude in shaping social media engagement and offer an understanding of the elements that impact user satisfaction with particular platforms.

Keywords: *social networks, emotional attachment, Zennials, international social networks ban, emotional reaction strategies, attitude towards VK, intensity of engagement with VK, satisfaction with VK*

1. Introduction

In today's society, social networks have become an integral part of modern life, with the number of online users growing at a rapid pace. As of January 2022, Russia had a total population of 145.9 million, with 129.8 million of them being internet users, representing an internet penetration rate of 89%. According to DataReport (2023), the number of active social media users in Russia has been steadily increasing over the past five years and reached 106 million people in 2022. However, the development of social networks faced new challenges in February and March 2022, with the official block of Meta** products and TikTok's refusal to serve Russian users. Consequently, there is a need to analyze the changing behavior patterns and preferences of Russian consumers.

The goal of this study is to investigate how blockage of the popular social networks affected Russian Zennials as most active users and what is the spillover effect of this attitude on the perception of the remaining local networks and more specifically VK as the biggest one in Russia.

2. Zennials and emotional attachment to social networks
2.1. Attitude to social networks

With the growing role of social networks in people's lives, users develop emotional connections and attachments to their preferred social media platforms (Harrigan P. etc., 2017). An attachment could be defined as a system of internalized representations that are based on previous

experiences with notable figures. They mediate close relationships, reflect specific insights and emotions, and influence how an individual interacts with other people (Mikulincer M., Shaver P. R., 2012).

Research examining emotional connections with social media platforms gained momentum in the 2010s. Variety of emotions that users experience when using social networks were studied, ranging from healthy and controlled use (Brailovskaia J. etc, 2022) to addiction and problematic use (Servidio R. etc., 2021). A good example could be a study done by Chiu and co-authors in 2013 when Facebook* (*considered an extremist organization in Russia) users demonstrated a positive relationship between a sense of well- being, pleasant emotions related to the visit to the Facebook* platform and increased users' loyalty to this social networking platform (Chiu C.M., 2013). A similar study was conducted by Köhl and Götzenbrucker in 2014. They concluded that if end-users interact with their favorite social network, they tend to encounter comfort and warmth, positive emotions in other words (Köhl M.M., Götzenbrucker G., 2014).

2.2.   Zennials as a micro-generation

According to a global customer engagement software company Khoros the most active users of social networking sites are people aged from 18 till 29 years old (Khoros, 2022). As digitalization continues to grow, businesses must reconsider how they segment and effectively communicate with their customers. The traditional method of separating generations with a 15-year gap is becoming outdated and inaccurate due to rapid technological progress and innovation. People born at the beginning and end of this 15-year period exhibit different behaviors and attitudes, making it obvious that Millennials born in 1980 and 1996 cannot share the same outlook and habits due to their vastly different experiences with technology.

Currently, the trend is towards studying micro-generations, which can help in better understanding users' emotions, feelings, and behavior within a given area of exploration. This

understanding can be further enhanced by comprehending the available technology and how it influences the perception of purchase, money, and communication. Instead of a 15-year gap, micro-generations experience shorter periods that occur at the end of one generation and the beginning of another. An example of such a micro-generation is the Zennials. Zennials are individuals who demonstrate characteristics of both Generation Y and Generation Z, representing consumers with mixed expectations (WGSN, 2020). In this paper, we will refer to individuals born between 1993 and 2000 as Zennials (PYMNTS, 2023).

2.3.   Effects of disconnection from social media

Great changes that occurred in the Russian market of social networking sites were unique for our country, however on a worldwide level such a scenario is not totally new. People from different countries experienced a disconnection from particular social networking sites. Blockage of popular social network platforms caused distinct reactions from end-users. While analyzing open sources and materials we can get examples of people's attitudes and opinions in a lot of many forums.

There was an interesting case when three of Meta*'s most popular social media companies went down on October 4th of 2021. This failure caused a worldwide "outage" for 6-7 hours when billions of people were not able to access the social media accounts of Meta* company that include Facebook*, Instagram*, WhatsApp, and Messenger. During this lack of access, users

experienced different levels of stress. Discomfort, annoyance, boredom, happiness, relief and feeling of separation from the world were just a plethora of feelings that occurred (Israeli Internet Report, 2022). During this disconnection users experience different feelings. Eitan and Gazit conducted an online survey in two days following the shutdown to examine what was the emotional experience that end-users underwent (Eitan T., Gazit T., 2023). Based on the content analysis researchers pointed out 4 main feelings that were common to the users of social networks blocked: (1) people that felt anxious at first due to the unexpected shutdown but then realized that it's a problem worldwide and started just waiting till this issue will be resolved; (2) users that had strongly negative feelings, felt disconnected from the entire world and all pivotal information that they could check through social networks; this group was very worried that they are separated from their family members, friends, colleagues, and communities; (3) people that encountered the joy of missing out and were glad that at least today it wasn't necessary for them to scroll through social media; (4) users indifferent towards what was going on, they were more apathetic.

3. The research approach
3.1. Research hypotheses

The VK is a Russian social network headquartered in St. Petersburg, which was founded and officially registered in 2006 by Pavel Durov. This social network was created as an analogy to the social network Facebook *. For the last couple of years VK has undergone tremendous changes in interface and functionality. Right now, VK is more like an ecosystem that includes such functions on its interface as my page, news, messenger, calls, friends, photos, music, video, clips, stories, games, advertising, mini-apps, VK pay, job, bookmarks, files, etc.

While choosing whether to stay on or shift to any social network, users assess their attitude to this platform. According to the Theory of Planned Behavior, an individual's attitude towards a particular behavior is one of the most significant predictors of his or her intention to engage in that behavior. Attitude is a person's positive or negative feeling that is influenced by the convictions required for action (Mahmoud A.B., 2013). Attitude refers to the evaluation by an individual of how favorable or unfavorable an act is. Researchers Ajzen and Fishbein showed

that attitude depends on an individual's beliefs and the evaluation of those beliefs (Ajzen I., Fishbein M., 1969). For the purpose of this study, the attitude was defined as a consumer's evaluation (positive or negative) towards VK social platform as the main alternative to banned social platforms. By the behavior we comprehend the intensity of engagement with VK based on the technographic scale that was developed by Center for Strategic Marketing and Innovations, GSOM (Center for Strategic Marketing and Innovations, 2018).

Baker and White supported the classical theory of TPB that attitudes towards social media predict use of it (Baker R. K., White K. M., 2010). Group of researchers conducted a study based on the Facebook * platform and proved the same (Raza S. A., Qazi W., Shah N., Qureshi M. A., Qaiser S., Ali R., 2020).

H1. Attitude towards the VK positively influences intensity of engagement with VK.

Based on the previous research that stated satisfaction of the client is generally considered as an assessment after experiencing the purchase or the usage of some product or service proposed (Oliver R. L., 1981) we focus on satisfaction with social network VK after engagement with it. The use of social networks allows users to connect with friends, family, and like-minded individuals; share information, ideas, and experiences with others; entertain through videos,

games, virtual events and so on.

All these activities, whether a user is having a positive experience or a negative one, can therefore lead to an increase or decrease in satisfaction level with this social networking platform. Engaging with social media is known to provide users with satisfaction, social support, and a sense of increased importance (Verswijvel K., Heirman W., Hardies K., Walrave M., 2018). However, behaviors such as a self-centered attitude or exaggerated behavior towards peers, for example, only seeking validation through "likes" or reacting negatively or not at all, can have a detrimental effect on user satisfaction (Moqbel M., Kock N., 2018).

H2. Intensity of engagement with VK influences satisfaction with VK.

Recent study done by Curras-Perez, Ruiz-Mafe, and Sanz-Blas demonstrated that attitude is a crucial factor in enhancing satisfaction. A study was conducted to examine the relationship between the uses and gratifications of social networking sites, attitude, perceived risks, satisfaction, and social networking site loyalty, using structural equation modeling. The sample was comprised of 811 Spanish social networking site users who participated in a personal survey (Curras-Perez R., Ruiz-Mafe C., Sanz-Blas S., 2013).

H3. Intensity of engagement with VK mediates the relationship between attitude towards the VK and satisfaction with the VK.

H4. Attitude towards the VK positively influences satisfaction with the VK.

The context of the current situation in the Russian market of social networks leads to the necessity to add extra variable. The blockage of Instagram * and Facebook* was perceived by end-users differently (Statista, 2022). It can be proposed that the change in the attitude towards, intensity of engagement with, and satisfaction with domestic social media sites and especially VK occurred. The great shift of audience affected the end-users' minds, indifferently, whether they shifted to VK or were already there and met "newcomers" with a different set of behavior patterns, beliefs, personal opinions, and views or outlooks. As soon as there is no academic proof for it currently, several propositions could be formulated:

P1. Emotional reaction to the international social networks ban will influence the attitude towards the VK.

P2. Emotional reaction to the international social networks ban will influence the intensity of engagement with VK.

P3. Emotional reaction to the international social networks ban will influence the satisfaction with the VK.

3.2. Methodology of the study

The empirical study was performed in a mixed format and consisted of a qualitative and a quantitative stages.

The qualitative study targeted to determine the respondents' emotional reaction strategies towards the ban of some popular social networking platforms and investigate how the ban influenced them. In addition, one of the tasks of in-depth interviews was to figure out the motives of respondents to stay or shift to another social network after the ban. This method was chosen because it allows us to identify the main emotional reaction strategies, which in turn makes it possible to formulate hypotheses about how the user's attitude towards the VK, intensity

of engagement with VK, and satisfaction with VK were influenced based on the emotional reaction strategies. In-depth interviews were conducted in July and August 2022. Thematic analysis was applied for data processing.

The quantitative study aimed to determine the patterns of behavior in social media in general and identification of the attitude towards the VK platform, intensity of engagement with the VK platform, and the level of satisfaction with this social networking site as the most used one particularly. Also, a quantitative study allowed us to measure these changes after the ban of Facebook *, Instagram*, TikTok, and Twitter*. This method is an online survey, the results of which have been analyzed and discussed. All model variables were operationalized as latent variables. Data was collected in Spring 2023, a year after the ban. A sample of 254 Zennials was covered. The quantitative model was calculated with PLS-SEM in Smart PLS.

4.   Results and discussion
4.1.   Data analysis

The in-depth interviews allowed to identify and confirm the emotional reactions of users towards social networks ban and additionally confirmed the need to further investigate the formulated propositions.

Further analysis of the quantitative data was performed along the following process: first factor structure was assessed and items with low factor loadings were excluded. Then, AVE and Internal consistency reliability were checked and confirmed for the identified factor structure. Discriminant validity test was carried out by looking at the Fornell-Larcker Criterion, cross-loading, and Heterotrait-Monotrait Ratio. The reliability of the variables was also checked by values of Cronbach's Alpha, Composite Reliability, and AVE. All indicators of validity and reliability of the testing measurement model were satisfied.

The result of testing the structural model provides support for 4 hypotheses. Table 1 and Fig.1 display the results of structural modeling.

Related to the first hypothesis (H1), the results of the analysis show that the Attitude towards VK has a significant and positive influence on the Intensity of Engagement with VK (β=0.626, p-value <0.001). This implies that when users have a positive attitude towards the VK platform, they tend to use VK platform features more. Users read more news feeds, watch photos and videos, put likes, watch and read bloggers, and interact with friends in private messages, blogs, and chats.

The results of the fourth hypothesis (H4) also show a positive effect of Attitude towards VK on Satisfaction with VK (β=0.629, p-value <0.001), basically meaning that more positive attitude of end-users towards VK platform leads to greater satisfaction with VK.

The result also confirms the prediction of H5 and H7 that Emotional reaction to the international social networks ban influences Attitude towards VK and Satisfaction with VK (β=-0.181, p-value <0.001 and β=-0.121, p-value <0.001 correspondingly). This implies that more negative end users are with the situation of Instagram *, Facebook*, Tik-Tok and Twitter* being banned, less positive attitude and satisfaction with the VK platform they have.

Hypotheses H2, H3, and H6 were rejected as the significance level is above 0.05.

Finally, the type of relationship between variables was checked using the Quadratic effect of PLS Smart 4 features. The model indicated that all relationships do not hold any significant non-linear relationship. To confirm the double check was applied through the "Confidence Intervals

Bias Corrected". The value zero falls in between the lower bound of 2.5 % and upper bound of 97.5% of all quadratic effects in the model. Thus, it can be concluded once again that relationships in the tested model are linear.

4.2. Discussion of the findings

The study's findings have both theoretical and practical implications. For researchers, it offers a deeper understanding of how international social networks ban influenced consumers' attitude to Russian social media in the eyes of borderline generation Y-Z (Zennials).

It was confirmed that for users who experienced influence of international social network ban more positive attitude towards VK leads to more intensive reading of news feed, watching photos and videos, following the bloggers' content, putting "likes" and interaction with friends through private messages, chats, and groups on VK as well as overall greater satisfaction with VK. At the same time, more negative users are with the international social networks ban less positive is their attitude towards VK and satisfaction with VK.

Intensity of engagement with VK did not demonstrate direct significant effect on satisfaction with VK and it does not mediate relationship between attitude towards VK and satisfaction with it. In other words, more frequent usage does not always correspond to higher satisfaction with the platform.

It means that there could be other factors that influence satisfaction and need to be further investigated. For example, content that does not meet users' interest, difficulty in navigation, or dissatisfaction with visual appealing of VK could be the reasons to explain this insignificance. Therefore, the future research should be focused more on how the quality of content and users' experience influence satisfaction with VK.

Emotional reaction to the international social networks bans also did not affect the intensity of engagement with VK. Potential reason for it could be the fact that prior to most participants already used VK platform and continue to use it after March 2022. It means that VK was already essential for users and the current situation in the Russian market of social media did not significantly change their behaviour.

The findings of this study contribute theoretically to the understanding of how Zennials met restrictions of some social networks. This research proves that there is a spill-over effect of emotional reaction to international social networks ban on remaining available social media platforms, VK particularly. This study revealed a new area of academic development by being the first basic research on the topic under analysis.

The study highlights the importance of understanding user behavior in response to international social networks ban that affects the availability of social media platforms, and how this behavior can shape attitude towards VK, intensity of engagement with VK, and satisfaction with VK.

The measurement and structural models were tested, revealing that emotional reaction to international social networks ban have an impact on the attitude and satisfaction towards VK. The study found that Zennials' attitude towards and satisfaction with VK were influenced by their emotional reaction to the block of other social media platforms. Specifically, those who perceived VK as a valuable alternative to the blocked platforms had a more positive attitude towards VK, leading to a higher intensity of engagement and greater satisfaction with VK. The results emphasize the significance of attitude in shaping social media engagement and offer an understanding of the elements that impact user satisfaction with particular platforms. Intensity of

engagement with VK did not show significant impact on satisfaction with VK. The further research should be done to investigate other factors that can contribute to satisfaction with VK. Content quality and user experience seems to be the most possible ones.

The study found that Zennials switched to alternative domestic platforms even though their reaction to the international social networks ban was negative. But they switched with the hidden unsatisfaction and transferred it to the domestic social networks. Basically, it means, that whatever developers of alternative social networks do, hidden negativity and biases towards remained platforms will be there.

From a managerial perspective, the study 1 identified different emotional reaction strategies towards the ban of social networks, ranging from indifference to strong negative emotions. Additionally, the qualitative research highlighted reasons why people still use banned media, such as unique content and alternative points of view. Moreover, spill-over effect is important for taking into consideration for companies, content producers, add-owners, and developers of social networks because it allows more effective implementation of some new features and communicate with audience.

4.3. Limitations and further research

The present study has identified several limitations that could be addressed in future research investigations. One of the key limitations is that the study sample was predominantly made up of individuals who were 23 years old and from Saint-Petersburg and Moscow. To overcome this limitation, future studies could be done to collect data from a more diverse and representative sample that includes representatives from a wider range of ages and geographical locations, thereby providing a more comprehensive understanding of the research topic. Although certain technographic characteristics were found insignificant, it may be advantageous to incorporate the entire spectrum of technographic factors in order to arrive at more profound insights. Ultimately, it is recommended that forthcoming research take into account the incorporation of the Telegram platform and conduct a comparative analysis with VK to provide a more extensive examination. As soon as the size of non-users sample is small further solid analysis was not feasible. It is suggested that in future research, a more in-depth examination of this particular group could provide valuable insights.

Table 1. Results of testing Structural Model

Path coefficients - Mean, STDEV, T values, p values					
	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Attitude towards VK <-> Intensity of Engagement with VK	0.629	0.627	0.071	8.865	0.000
Attitude towards VK <-> Satisfaction with VK	0.626	0.628	0.042	15.047	0.000
Emotional reaction to the international social networks ban <-> Attitude towards VK	-0.181	-0.194	0.058	3.122	0.002
Emotional reaction to the international social networks ban <-> Satisfaction with VK	-0.121	-0.124	0.045	2.696	0.007

Emotional reaction to the international social networks ban <-> Intensity of Engagement with VK	0.009	0.007	0.054	0.173	0.863
Intensity of Engagement with VK <-> Satisfaction with VK	0.119	0.121	0.065	1.831	0.067
Attitude towards VK <-> Intensity of Engagement with VK <-> Satisfaction with VK	0.075	0.076	0.042	1.784	0.075
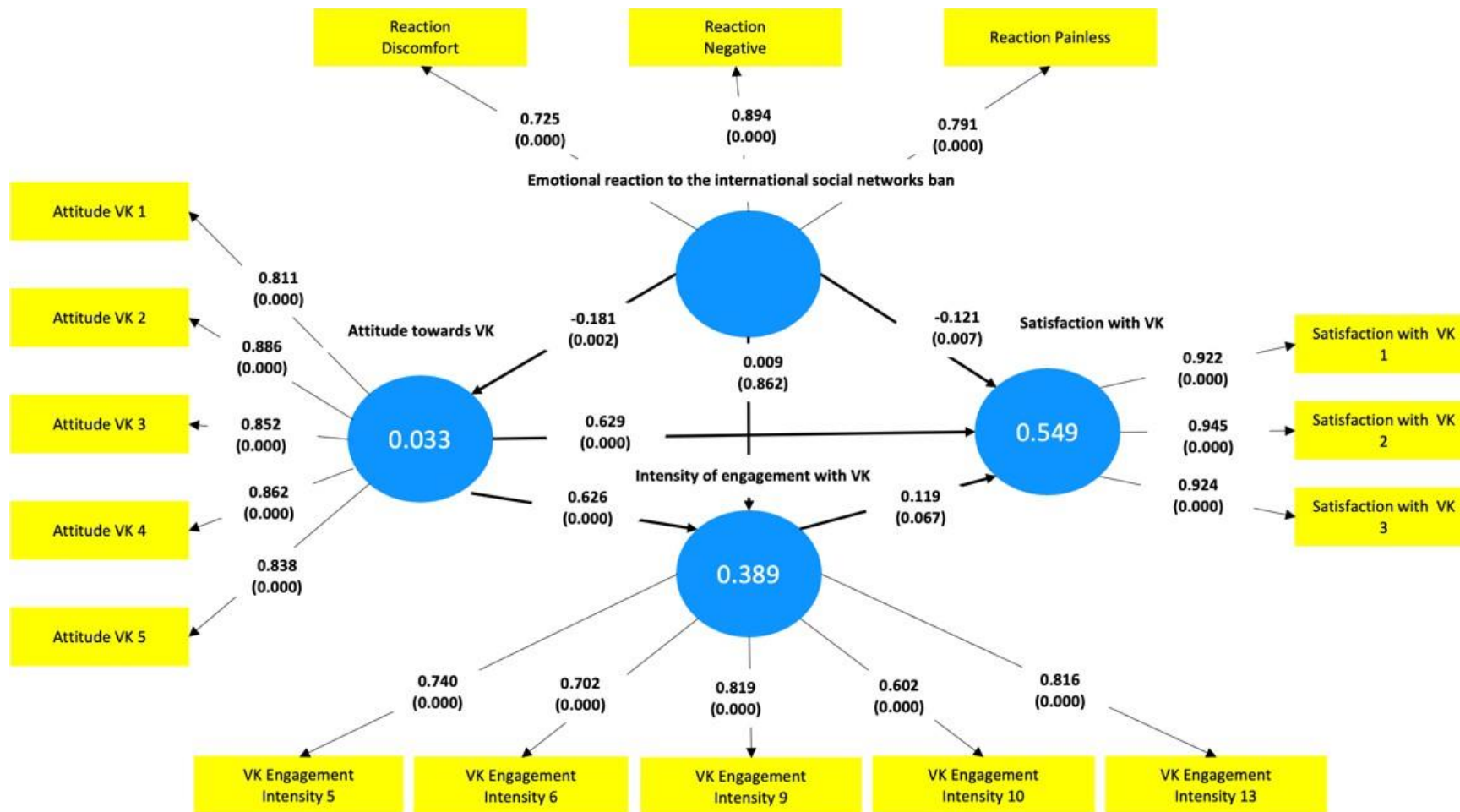
Goodness of fit values: SRMR = 0.067; d_ULS = 0.616; d_G = 0.281; Chi-square = 395.074; NFI = 0.826

Fig. 1. Structural Model

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Platform Business Model as a Core Coordinator of Inter-firm Cooperation

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Abstract:
The Russian market is currently undergoing a significant transformation in the inter-firm interaction of its participants. A large number of value chains have changed or are on the verge of ceasing to function. This makes it important for companies to strengthen their inter-firm relationships and to look for ways to develop them further. Interfirm unbalances can weaken the entire chain, so companies need tools to *stabilise and coordinate them*. One such solution could be to move towards *platform models*. In this study it is proposed to consider the value chain and interfirm interaction of its participants on the example of the Russian watch market. This market has been chosen because of the features that define it, such as the dominant role of communicating the value of the sold product to the consumer, as well as the high proportion of influence of the dominant parts in the chain on the other participants, which can lead to devastating consequences in a fairly narrow and specific market, where price is not the main criterion in making the customer's purchasing decision. The results of the study contain practical recommendations and can be extended to other markets.

Keywords: *value chains, business models, platform, IMP.*

1. Introduction

1.1. Relevance and research question

The Russian market is currently undergoing a significant transformation in the inter-firm interaction of its participants. A large number of value chains have changed or are on the verge of ceasing to function. This makes it important for companies to strengthen their inter-firm relationships and to look for ways to develop them further. Interfirm unbalances can weaken the entire chain, so companies need tools to stabilise them. One such solution could be for businesses to move towards platform solutions.

The underlying *problematic* of this study is the hypothesis that disrupted interactions between value chain actors destabilise the value chain and reduce the ultimate benefits for all participants. The main *research question* is whether the development of a platform business model can strengthen inter-firm network interactions. The purpose of the study is to identify the direction of inter-company cooperation and to develop recommendations for its improvement. In order to achieve this goal the following research tasks were set:

- To analyse the parameters of efficiency of inter-firm interaction;
- Construct a typical value chain in the industry;
- To identify the specifics of inter-firm interaction in the market in question;
- Identify areas of imbalance and agreement between individual participants in the value chain through content analysis of expert interviews, identify dominant and dependent parts;
- To justify the potential for transition to platform-based business models;
- Conduct a quantitative survey research to verify the proposed recommendations.

The conclusion provides recommendations for business and justifies the relevance of the transition to platform solutions as a way to strengthen inter-firm collaboration.

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2.   Method and research sources

The paper used theoretical methods, desk research methods (secondary data analysis), and semi-structured interviews followed by content analysis.

In the first stage, the authors collected and analysed information by means of desk research, including an assessment of the state of the market, its current trends, analysed inter-firm interactionsof its participants and constructed typical value chains.

In the second stage, in order to identify trial zones in the described inter-firm interactions, interviews were conducted with representatives of two parts (dominant and dependent).

The criteria for the selection of respondents were their positions (top management in distribution representative companies and owners of partner retail companies). In order to look at the relationship in more detail, one representative from each of the different existing business modelson the market was asked to be identified.

In the third step, the highlighted solution proposals for levelling problem areas were tested using quantitative methods.

3.   Main body of the paper

3.1 Inter-firm interaction in the value chain

It is proposed to adopt the IMP (Industrial Marketing and Purchasing) group approach as the theoretical basis for looking at inter-firm interactions in the watch market. The approach is based on the assumption that the development of business processes takes place within a complex system of long-term relationships between companies, changing and improving over time [Håkansson, 1982; Möller & Halinen, 2018].

Consistency of the partners leads to the stability of the network formed by them, while the presence of points of inconsistency leads to instability of the relationship and reduction of its economic efficiency.

3.2.   The mechanism of inter-firm interaction in the watch market

The Russian watch market is represented by the retail segment. Its main participants are: representative-distributor (a company managing a portfolio of brands or one independent brand), dealers (companies participating in the chain owning their own retail chains), authorised service centres (manufacturer-owned or authorised partners). An important trend is the growing influenceof platforms as a new sales channel. In addition, partners providing logistics, legal or marketing services are present in the market. The market is regulated by public authorities.

The value chain
Interaction between participants

I	II	III	IV	V	VI
Suppliers of materials	Suppliers of manufactured components	The manufacturer, HQ	Distributors	Sales channels	Consumers

VII — Platforms

Partial production
Or
In-house manufacturing

Subsidiaries
Or
Partner companies

Own sales points
Or/and
Partner sales points

Service centres   Logistics companies

Government
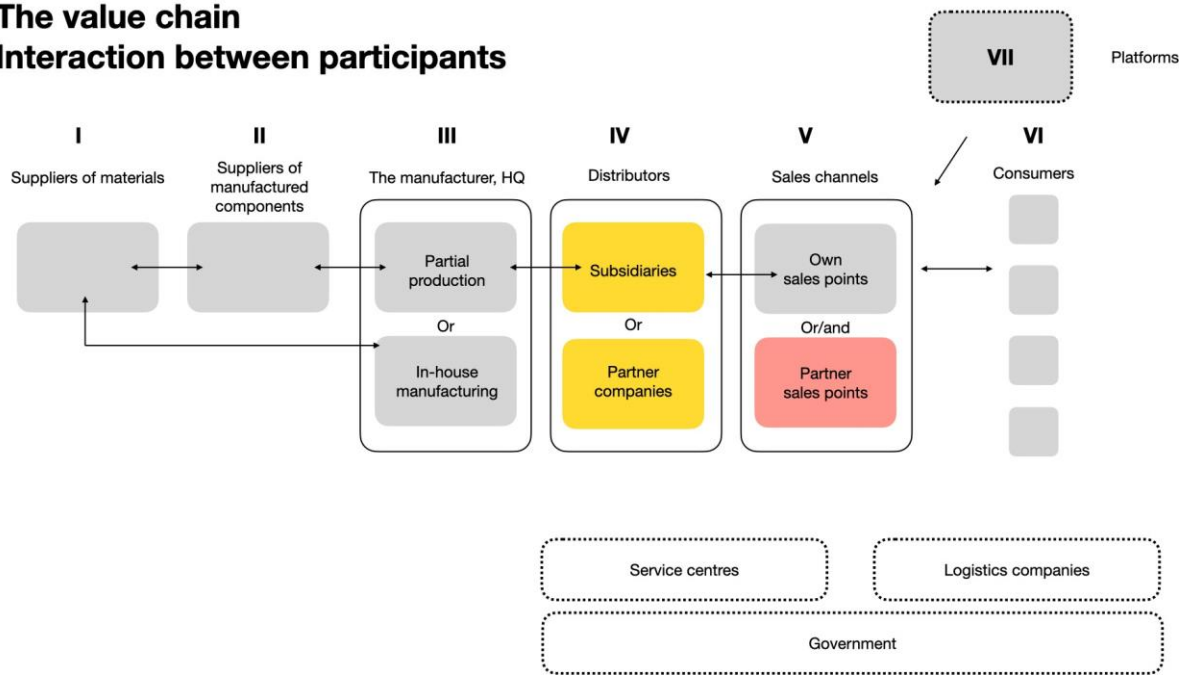
Fig. 1. The value chain in the watch market

The presented scheme shows the main actors of inter-firm interaction. This chain is typical and doesnot include interaction options such as the secondary or grey market, as these are outside the legal framework and underdeveloped in the industry.

3.3. *Identification of unbalance and coordination zones*

Let us look more closely at the triad of Parts IV, V and VI in the chain we have constructed and consider the relationships between the allocated market players, as Parts I - III (manufacturing companies and their suppliers) are outside the Russian market and are not of interest for detailed consideration in the context of this study.

Part IV, distributors, is represented by manufacturers' subsidiaries or independent companies that perform the tasks of selling and distributing goods on the market, as well as controlling the representation of the products they sell. By control, we mean the following priority business tasks:

a)   selecting and certifying partner retailer-owner companies, liaising with them on the purchase and sale of goods, setting sales plans and the composition of goods to be purchased, and equipping sales outlets with the necessary equipment and reference and training materials;

b)   training employees of partner companies, increasing their knowledge of the product being sold;

c)   accompaniment of marketing activities and joint distribution of marketing budgets, organisation of promotional activities for the brands represented;

d)   presentation of recommended prices and control of product matrices presented at points of sale, control of product neighbourhood at points of sale;

e)   legal support of transactions concluded with partners on the territory of the Russian Federation;

f)   selection and authorisation of partner service centres, supplying them with necessary equipment and spare parts, personnel training;

These market participants, in addition to the above functions, can also act as a retailer, in case they have their own retail or online shop. Part V, sales channels, is represented by actors who perform the function of distributing goods in the market. Sales channels also include e-commerce, which can be owned either by the representative or by the partner, on exclusive or non-exclusive rights. The last part in the triad is the end consumers, individuals who purchase the product either from the partner or their own retailer, offline and online. Schematically, the business model and interaction of the participants is shown in Figure 2.
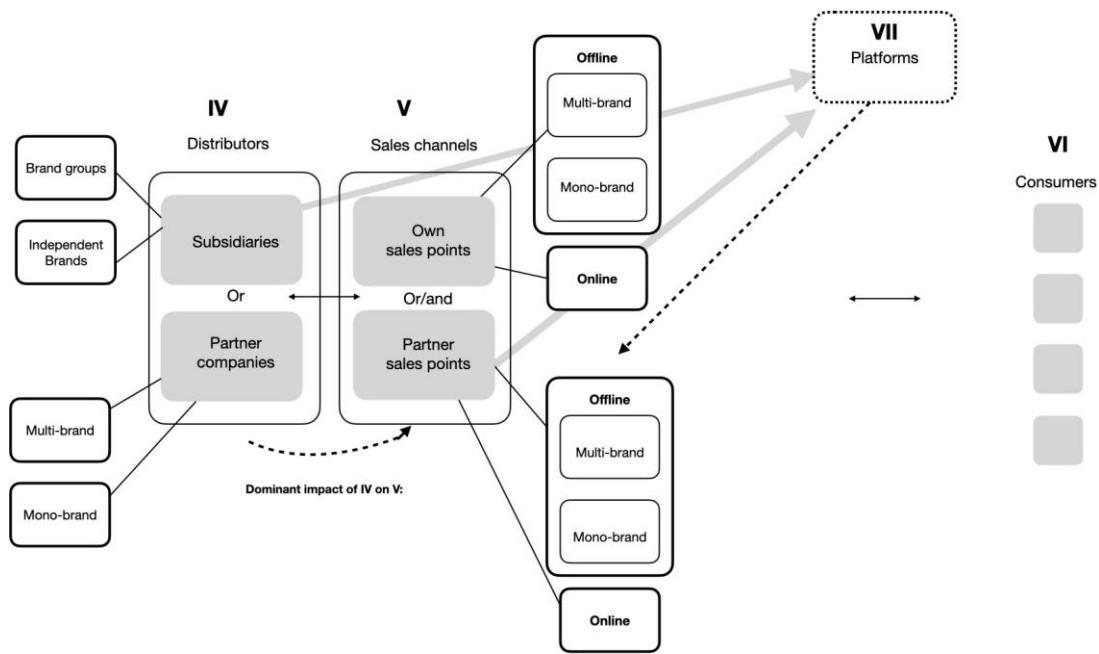
Fig. 2. Model of interaction in the value chain actors in the Russian market

3.4.   Dominant and dependent parts: conducting qualitative research, building a conceptual model

The identification of dominant and dependent parts in the inter-firm interaction makes it possible to determine how stable, and therefore economically promising, the existing model of interaction of its participants is in the market. The hypothesis is offered, that excessive dominance of one part and consequent weakening of another part, which is in partnership relations, can reduceeffectiveness of all participants of the chain, the ultimate purpose of which is economic effectiveness. If one of the parts weakens to such an extent that it ceases to fulfil its function as a chain participant or even withdraws from it, the whole process of delivering value to the consumeris disrupted, and hence the whole chain collapses. Such problem areas need to be identified, and points of agreement need to be identified, so that tools can be developed to strengthen relationships and normalise the market situation. Criteria for evaluating participants include:

1.   Deciding whether or not to partner;
2.   Adjusting the price in the market;
3.   Establishment of product presentation rules;
4.   Having the right to unilaterally change the terms and conditions of cooperation, suchas the quantity to be purchased, its price and margin, and the minimum purchase volume;

5.   Regulation of access to product categories.

An assessment of the criteria identified shows that the dominant Part in the Russian market at present is Part IV, distributors. The dependent part, on the other hand, is the partner retail organisation V, whose poor performance, however, can have an extremely negative economic effecton all participants in the value chain.

3.5.   *Conducting qualitative research*

In order to find solutions to strengthen the value chain, and thus the effectiveness of all its participants, it is necessary to identify unbalance and coordination zones in the inter-firm interaction of its participants. In-depth interviews with representatives of the two identified Parts (dominantand dependent) are proposed to identify these zones.

The criteria for the selection of respondents were their positions (top management in distribution companies and owners of partner retail companies). In order to look at the relationship in more detail, one representative from each of the different existing business models on the market was asked. Respondent A, representative of company 1, is the co-founder of a distribution organisation in the Russian market. The company is one of the largest in terms of turnover among private representatives and is responsible for the development of 5 independent brands on an exclusive basis. Respondent B, representative of Company 2, is the CEO of the Russian subsidiary of a European independent watch brand. Companies A and B belong to Part IV. Respondent C, a representative of company 3, is the founder and CEO of one of the largest dealer networks, a partner retailer located in the western part of Russia. Respondent D, from Company 4, is the co- founder of another large retail chain, Partner Retail. The company also works with most of the brands on the market and is located mainly in cities with a million inhabitants, excluding thewestern part of the country. Both organisations also have their own e-commerce channels. Companies C and D belong to Part V. All 4 selected companies show stable growth and have a high level of management according to experts, are active market participants and have contacts with local professional associations. Participants were asked to follow an interview guide designed to identify the challenges and perspectives facing their companies.

3.6.   *Results & building a conceptual model*

•   Identified coordination zones:

•   The dependence of one part on the other in Russian market conditions and therefore theneed to increase communication between the participants of the different parts;

•   The need for communication between distributors and partner retail owners in order toachieve more accurate financial planning;

•   The need for uniformly high standards of product presentation and the possibility ofexchanging experiences between distributors and dealers;

•   The search for new sales channels, among which can be e-commerce.

•   Identified unbalance zones:

•   Lack of consolidated financial planning and inadequate assessment of market capacity;

•   Inter-brand cannibalisation at the point of sale;

•   Unfair competition;

•   Errors of local distribution managers pursuing short-term high performance;

•   Violations in negotiation processes, lack of unspoken rules and ethics, directive management "from a position of strength";

- Economic inefficiency of partner retailers, negatively affecting the results of distributioncompanies and manufacturers in the long run.

The conceptual model of inter-firm interaction is shown schematically in Figure 4.

Conceptual model of inter-firm interaction
based on data from expert interviews
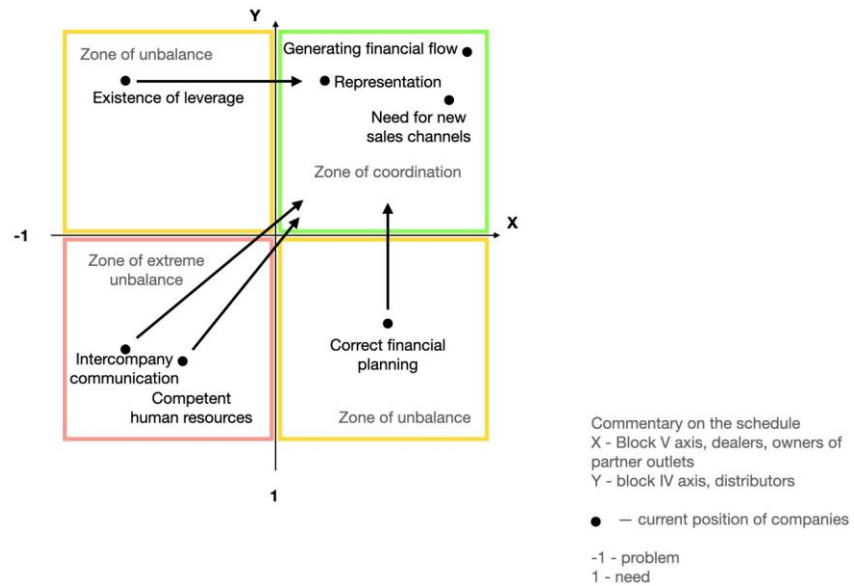
Fig.4 Conceptual model of inter-firm cooperation

3.7.   Platform business model as a direction for strengthening inter-firm cooperation

Consideration of inter-firm interactions of companies in the Russian market and subsequent expert interviews allowed to identify certain areas of imbalance that lead to an overall decrease in value created within chains. It is proposed to assess inter-firm interaction in four planes within the approach described by Y.F. Popova [Popova, 2014].

Characteristic	Evaluation
Functioning of the network infrastructure	Strong performance
	Training centres; Counselling departments; Training programmes; Joint exhibitions; Trainings; Associations
Functioning of network institutions	Poor performance
	No consulting; Weak co-management; No ethics rules
Communication dimension	Unstable performance
	Informal communication is developed; Weak coordination and density; Low level of security of participants
Functional and structural characteristics of the network	Unstable performance
	Weak expertise; Failure to keep up with new technologies; Often low sales staff qualifications; **High potential for relationships if established**

Fig. 5. Characteristics of inter-company cooperation and their evaluation

It is the capacity of the relationship that remains an important aspect, as the participants are interdependent. A distinctive feature is that finding sub-partners is also difficult for both parties: the market is characterised by extremely high barriers to entry, requires professional competencies and informal relationships to work effectively. All these factors suggest that the only way out is for partners to find solutions to minimise problem areas and, at the same time, ways to strengthen the tools to meet their needs. The presence of strong dominance and directive policies on the part of distributors leads to their short-term financial benefit, but acts as a serious threat to the whole market in the long run. The solution may be to weaken the dominance of some players while strengthening others. This, in our view, is the key aspect in finding a balance: the dependent Part should be allowed to gain additional leverage, or market power. One way to achieve market power for Part V could be to move to a platform-type *business model* and develop new sales channels, such as e-commerce, on its basis.

Firstly, e-commerce mitigates the risks associated with investment in inventory: the platform allows for aggregation and the introduction of goods that are not in stock. Secondly, the development of the platform model allows for reaching new markets where opening physical outlets would not be economically viable. Thirdly, it will allow companies to build the capacity of their own, already existing outlets by providing an omni-channel approach to their customers. To test the proposed decision to transform the business model, quantitative research is needed with a target group of consumers who are active market participants (customers) or with consumers who are about to make purchases of goods from the industry. The purpose of the study is to identify how willing or unwilling the consumer is to interact with merchants through e-commerce as compared to classic, offline sales channels.

3.6. *Hypothesis testing: results of a quantitative study*

To test consumer perceptions, a quantitative survey was conducted in partnership with Yandex, a division of Yandex Premier.Service and «Vzglyad». Yandex, with its broadest range

of consumer data, drew a sample of respondents according to the following criteria: men and women, income above average, living throughout Russia in cities with a population above 1,000,000 inhabitants (evenly), currently in active search of a retailer to purchase goods from the "watch" category. The sample size was 300 people. The data obtained were anonymised and transmitted as asummary presentation with brief conclusions and panel data to enable analysis in SPSS. Data analysis was carried out through the derivation of frequency tables and contingency tables. Methodsused: Chi-square test, Cramer's V and correlation analysis.

H1: "Consumers are interested in buying watches online.

Among the respondents, 45% are willing to place an order online if they are confident in the seller, and 15% will look offline and buy online. The hypothesis is confirmed, a total of 60% want to buy the product "watches" online.

H2: "There is a significant relationship between the criteria for choosing an online shop.

The more important for the person in the interaction with the platform is that he or she does not have to go to the shop, the more important for the person is the convenience of comparisonbefore purchase. The more a person cares about the convenience of consulting at any time, the more the anticipation of waiting for a package is important to them. The more the convenience of consulting at any time matters to a person, the more the convenience of comparison before purchasematters to them.

H3: "Those who shop online once a week (are advanced online shoppers) are more likely to be willing to place an e-commerce watch order, as opposed to those who shop twice a month.

Indeed, the analysis showed that the more often a person buys online, the more likely they are to choose an online watch ordering platform, they will not be intimidated (38% vs. 42%), although the difference is not as large, indicating a high potential for online watch shopping even among "unadvanced" users.

In summary, the analysis of the survey data shows that the development of an electronic sales channel (platform) is not only potentially interesting to consumers, but that they are willing to use it as a meaningful alternative to offline shopping. At the same time, sellers need to inspire trust, confirm guarantees of product originality, and provide the opportunity to pay after trying theproduct on. One of the most important factors in consumers' interest in buying watches online is the purchase of products that are not available in their region. In addition, consumers view online marketplaces as an important part of communication with the retailer. The study concludes that the development of a new electronic method of trading in watches will enable Part V members, dealers currently in a dependent position, to significantly increase their market power by reaching consumers directly, significantly expanding their geographic reach and reducing costs, thus reducing their dependence on Part IV members (distributors).

4.   Conclusions and further research

1)   The following conclusions can be drawn from this study:

2)   A network structure can be stable and economically attractive if there is a balance ofpower between the participants;

3)   Platform-based business becomes the core coordinator of inter-firm interaction;

4)   There are dominant and dependent parts in the inter-firm interaction in the Russian market. Representatives of both parts emphasize the importance of finding ways to normalize the balance between the parts.

5)   The development of a platform-based e-commerce channel is proposed as one way to establish such a balance.

Further consideration of platform business models as a core coordinator of inter-firminteraction in other markets is envisaged in further researches.

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Sustainable Marketing in Germany: Consumer Behavior and Sustainable Approaches of Supermarket Food Chains

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Keywords: *sustainability, marketing, consumer behavior*

The marketing landscape in Germany, like many other countries, has been significantly impacted by the COVID-19 pandemic. Turbulent times lead to increased uncertainty and consumer caution, which can affect purchasing and spending patterns. In such an era of turbulence, marketers must adapt to new challenges and opportunities.

One significant change in Germany has been the shift to digital channels due to lockdowns and social distancing measures. Companies have had to accelerate their digital transformation to meet changing consumer needs and preferences. Digital marketing, including social media, email marketing, and online advertising, is more important than ever. Another trend is the increased focus on value and sustainability. Consumers in Germany are more conscious of their impact on the environment and want to support brands that share their values. Marketers can leverage this trend by emphasizing their sustainable practices and initiatives in their marketing campaigns.

Sustainability has become a significant focus in Germany, both corporately and culturally. As a result, sustainable marketing has emerged as an essential facet of successful business strategy. Companies operating in Germany have realized that prioritizing environmental, social, and economic sustainability is not only crucial for their long-term success but also for maintaining their social license to operate in the country.

Sustainable marketing can be defined as the use of marketing strategies that promote environmentally friendly and socially responsible products or services to consumers. In Germany, corporate social responsibility (CSR) is deeply ingrained in the culture. For this reason, transparency and authenticity are essential for companies that want to establish themselves as sustainable brands. As a result, businesses that are transparent about their sustainability practices often gain the trust and loyalty of German consumers. Furthermore, companies that support social causes, such as climate change, gender equality, and racial justice, are also recognized and appreciated by German consumers. Therefore, a company that demonstrates that it operates in a socially and environmentally responsible manner is often highly valued by German consumers.

German consumers are increasingly aware of their impact on the environment and social issues. As such, they prefer to buy products and services that align with their values and beliefs. According to a survey conducted by eco-business.com, 70% of Germans are willing to pay more for sustainable products and services. This highlights the growing demand for sustainable and environmentally friendly solutions in the country.

In addition, a report by Nielsen found that sustainable products are experiencing significant growth in Germany, with sales increasing by 19% in the first half of 2020 compared to the same period in 2019. For this reason, companies that are socially and environmentally responsible, or have environmental certifications, have become more attractive to German consumers.

Furthermore, German consumers also increasingly demand that companies operate sustainably throughout their supply chains. Therefore, sustainable marketing must address these concerns and communicate how products and services have been produced with sustainable practices in mind.

Based on the information studied, examples of sustainable consumption by German shoppers can be highlighted:

1. A growing number of German consumers are opting for organic and locally sourced food products to support sustainable agriculture and reduce carbon emissions associated with transportation.

2. More and more consumers in Germany are choosing eco-friendly clothing made from organic cotton or recycled materials, as well as supporting companies that follow fair trade practices.

3. German consumers are becoming more vocal about the need for companies to reduce their plastic packaging and eliminate single-use plastics, with many preferring products that use minimal packaging or are packaged in recyclable materials.

4. There is a rising trend in Germany of consumers buying electric or hybrid cars to reduce their carbon footprint and support cleaner energy.

5. Many German consumers are choosing to bank and invest in companies that prioritize social and environmental responsibilities, such as investing in renewable energy or offering fair financial products.

6. There is increasing demand in Germany for renewable energy, with many households and businesses opting for solar panels or wind turbines to reduce their reliance on traditional sources of energy.

7. German consumers are also more interested in circular economy models that promote reuse and recycling, such as repairing or repurposing old furniture or electronics.

8. Increasingly, consumers in Germany are pushing for sustainable and ethical tourism, opting for eco-friendly accommodations, local tours, and volunteering opportunities that benefit local communities and the environment.

As for marketing strategies, companies in Germany are increasingly incorporating sustainability into their messaging and branding. For example, many companies are using eco-friendly packaging, promoting their carbon-neutral status, and investing in renewable energy sources. Notable examples of supermarket chains include REWE, Edeka, Aldi and Lidl. These are the leading supermarket chains in Germany that apply and successfully implement sustainable marketing strategies in their operations.

1. REWE: One of the biggest retail groups in Germany, the REWE group has committed to reducing its greenhouse gas emissions by 50% by 2022. They have also been focusing on reducing food waste and promoting regional products to support local farmers. REWE has been consistently implementing sustainable practices in their supply chain and packaging. They promote their sustainability initiatives through advertisement and marketing campaigns, such as their "Fairtrade" and "Bio" product lines.

2. Edeka has been promoting sustainability through their "Naturally Edeka" campaign. They aim to reduce plastic waste in their stores and promote locally sourced and seasonal produce. In addition, Edeka partners with fair trade organizations to ensure ethical and sustainable manufacturing practices.

3. Aldi: Aldi has been focusing on reducing its carbon footprint by optimizing energy use in its stores and distribution centers. They have also been promoting products that are sustainably sourced and have implemented a palm oil sourcing policy.

4. Lidl: Lidl is committed to reducing its carbon footprint by 20% by 2025. They have been focusing on reducing energy consumption and have implemented various measures to reduce food waste. Lidl has been promoting sustainable products and environmentally friendly practices. Lidl has been reducing plastic packaging and working to reduce food waste.

Lastly, German regulations have made sustainable marketing a legal requirement for companies operating in the country. The German Corporate Social Responsibility Act (CSR-Richtlinie-Umsetzungsgesetz) requires companies with more than 500 employees to produce non-financial reports outlining their sustainability practices. These reports must be verified by an independent third-party auditor and published on the company's website. Therefore, companies

that market their sustainability practices in Germany must be able to provide evidence that their practices are legitimate and meet legal requirements.

In conclusion, sustainable marketing has become essential for companies operating in Germany. Considering CSR and sustainability practices in all aspects of business strategy can lead to success and long-term success in the German market. Companies must be transparent, authentic, and meet legal requirements to establish themselves as sustainable brands that gain trust and loyalty from German consumers.

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Touchpoints Effectiveness Evaluation of the International Students and the Russian University

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Abstract:
The paper proposes an approach to evaluate the consumer experience of the international students studying at the Russian universities. In the approach, an evaluation algorithm is defined, online and offline touchpoints of the international students and the university are identified at all stages of the decision-making process. The proposed approach has been approved on the example of the Far Eastern Federal University. The effective touchpoints at the different stages of interaction between the Chinese students and FEFU are determined. The results of the study can be applied to develop management decisions on interaction with the international applicants and students.

1. Introduction.

Despite the difficult situation in the world, as part of the export of education [De Keyser et al., 2015; Priority 2030 program] the Russian universities continue to pursue the internationalization strategy to recruit talented young people from foreign countries to study on the higher education programs at the Russian universities. A marketing strategy to recruit consumers, focused on the evaluation and management of the consumer experience, is an effective and modern approach.

2. Relevance of the paper to the track topic

The successful consumer experience management of international students depends on their existing consumer experience evaluation, that becomes possible to develop an effective influencing strategy for the emerging consumer experience to recruit more international students to study at the Russian universities in the current unstable international circumstances.

2.1. Purpose and objectives of the study.

To highlight the effective touchpoints of the international students and the Russian university (on the example of students from China studying at the Far Eastern Federal University (hereinafter referred to as FEFU). According to the purpose, there are the following objectives in the study:

- to determine an approach for the consumer experience evaluation through touchpoints evaluation of the international students at different stages of decision-making process to choose the Russian university.
- to approve the purposed approach to the consumer experience evaluation on the example of the Chinese students studying on the higher education programs at FEFU to identify the most effective touchpoints to develop the further management decisions to recruit the international students.

3. The research question(s) and methods.

The measurement and evaluation of the consumer experience meets the theoretical request of the study, that is caused by the lack of common methods and tools for the consumer

experience evaluation in general and the consumer experience of the international students in particular in science.

3.1.The scientific novelty and author's contribution.

To develop a methodology of the consumer experience evaluation of the international students by measuring the touchpoints at each stage of the decision-making process to choose the Russian university.

3.2.Methodology.

The methodology of the consumer experience evaluation is based on the author's understanding of the content and a structure of the consumer experience, which includes affective, cognitive, and behavioral elements [Komogortseva, 2023]. During the development of the author's approach to the consumer experience evaluation of the international students, the existing theoretical and empirical approaches to the analysis and evaluation of the consumer experience were systematized and generalized, as a result of which three existing main approaches to evaluate the consumer experience were identified (the first approach is associated with observation and analysis of data, obtained directly and indirectly when interacting with consumers, the second approach is associated with the decomposition and measurement of individual indicators of the consumer experience or related categories, the third approach is based on the consumer's journey mapping, indicating all touchpoints of a consumer with the company/product/service/brand).

However, some scientists [Shilovsky, 2017, Yuldasheva et al., 2017; Shvets, 2019; Matvienko, Aleshina, 2020; Luneva et al., 2020; Meyer, 2007; De Keyser et al.,2015; Rebrova, Luneva et al., 2021; Lemon , Verhoef, 2016] single out tools that belong to different approaches, which indicates the existence of the fourth one – the combined approach (tools of the first and second approaches [Meyer, 2007; Lemon , Verhoef, 2016] the first and third approaches [Shilovsky, 2017; Yuldasheva et al., 2017; Shvets, 2019; Matvienko, Aleshina, 2020; Luneva et al., 2021; De Keyser et al.,2015], the combination of all three approaches [Rebrova , Luneva E. A., 2021] . The authors of this study suggest to use of a combined approach to the consumer experience evaluation that allows to obtain the comprehensive evaluation of the consumer experience based on qualitative and quantitative data.

According to the combined approach to evaluate of the consumer experience, this paper proposes to apply the following tools: 1) consumer journey mapping (CJM) indicating all existing touchpoints (the third approach); 2) conducting a survey (questionnaire) to obtain quantitative results (the first approach); 3) evaluate the consumer loyalty (the second approach). Since this paper studies a specific market of the educational services, which has a number of features (the high risk for the consumer, delayed results of the purchase, the educational product / service is not only the acquisition of the theoretical and practical knowledge, for the international students it is also the consumption of the infrastructure of the university, campus, city and countries, interaction with employees, teachers, other students), then when consumer journey mapping, the decision-making process of the international students to choose the Russian university are divided into six stages (awareness of the need, information search, evaluation of alternatives, choosing a university (purchase), consuming of the educational service/product, post-purchase evaluation). In view of the digitalization of a modern university, at each stage of the decision-making process to choose a university, existing online and offline touchpoints are identified.

In the proposed approach, a questionnaire is being developed to conduct a survey of respondents; the questionnaire includes an evaluation of the importance of the touchpoints and the satisfaction with the touchpoints in the university. To determine the loyalty of the international students to the university, the questionnaire also contains questions aimed to evaluate the general satisfaction and readiness to recommend this university. It is important to

note that the questions of the developed questionnaire cover emotions (affective element of the consumer experience), rational and logical components (cognitive element of the consumer experience) at different stages of the decision-making process (behavioral element of the consumer experience) of the international students to choose the Russian university.

Then, the questionnaire survey of the Chinese students of FEFU is carried out. The purpose of the questionnaire survey is to obtain quantitative estimates of indicators of importance and satisfaction of the touchpoints at different stages of the decision-making process to choose the Russian university by the Chinese students studying on the higher education programs (bachelor's, master's, postgraduate degrees). A Likert scale is used to evaluate the touchpoints, where 1 - absolutely not important / not satisfied, 2 - rather unimportant / not satisfied, 3 - rather important / satisfied, 4 - important / satisfied, 5 - very important / absolutely satisfied.

To determine the effective touchpoints, there are calculations of the importance of the touchpoints at a specific stage of the decision-making process to choose the Russian university (percentage of total estimate) and the satisfaction of the touchpoints at the particular university for each segment of the international students (bachelor's, master's, postgraduate degrees); the analysis results are proposed to be presented in the following form (Table 1)

Table 1. Evaluation of the effectiveness of online and offline touchpoints of the Chinese students at different stages of the decision-making process

Stage	Online / offline touchpoints	Bachelor's degree			Master's degree			Postgraduate degree		
		Importance (share)	Satisfaction (average score)	Effectiveness (score)	Importance (share)	Satisfaction (average score)	Effectiveness (score)	Importance (share)	Satisfaction (average score)	Effectiveness (score)
Information search										
Evaluation of alternatives										
Choosing a university (purchase)										
Consuming of the educational service										
Post-purchase evaluation										

4. Results.

Based on the purposed methodology, the conducted questionnaire survey allows to evaluate the indicators of importance and satisfaction with online and offline touchpoints at different stages of the decision-making process for each of the three segments of the FEFU Chinese students.

Some touchpoints were equally rated as the most important by all three segments of the respondents. For example, at the stage of information search, the most important online touchpoint is the university official website, the least important touchpoint is advertising in the

Chinese media. At the stage of evaluating alternatives, the most important offline touchpoint is the security system of the Russian university, the least important one is the physical maps of the campus and the location of the buildings. At the stage of choosing a university, the most important touchpoint is confirmation of the availability of all the necessary documents for issuing an invitation for a visa, the least important one is the transfer to / from the airport. At the stage of consuming of the educational service, the most important online touchpoint is WiFi on campus. At the stage of post-purchase evaluation, the most important offline touchpoint is a diploma of higher education.

Most of the matches in the estimates of the most important / least important online / offline touchpoints are observed in the bachelor's and master's degrees segments. At the stage of information search, the least important offline touchpoint is the university admission office. At the stage of choosing a university, the least important offline touchpoint is payment in foreign currency. At the stage of consuming of the educational service: the least important online touchpoint is a food ordering service, the least important offline touchpoint is a beauty salon on the campus. At the stage of post-purchase evaluation: the least important offline touchpoint is other graduates and students at the Russian university.

After calculating the effectiveness of touchpoints, it has become possible to identify the most effective online and offline touchpoints for each segment of the Chinese students (bachelor's, master's, postgraduate degrees) at different stages of the decision-making process to choose the Russian university: information search, evaluation of alternatives, choosing a university (purchase), consuming of the educational service, post-purchase evaluation. Table 2 provides summary information for three segments of the Chinese students studying at FEFU.

Table 2. Effective online and offline touchpoints at the different stages of the decision-making process of the Chinese students to choose a university

Stage	Touchpoint	Segments of the Chinese students		
		Bachelor's degree	Master's degree	Postgraduate degree
Information search	Online	University official website	University official website	University official website
	Offline	International office at the Russian university	Open days at the Russian university (including international applicants)	Students and graduates of the Russian university
Evaluation of alternatives	Online	Confirmation the documents well received	Official email of the Russian university	Notification of entrance examinations timetable
			Notification of admission documents well received	Entrance examination reminder
			Confirmation the documents well received	Providing of instructions to take entrance examinations
			Notification of entrance examinations timetable	
	Offline	Security system of the Russian university	Security system of the Russian university	Issuing pass office
			Issuing pass office	Providing instructions to pay for tuition fee and other services
Choosing a university	Online	Confirmation of the availability of all the necessary documents for issuing an invitation for a visa	Confirmation of the availability of all the necessary documents for issuing an invitation for a visa	Confirmation of tuition fee and other services payment well done
				Confirmation of enrollment
	Offline	Finance office	Finance office	Visa and Migration registration office

Consuming of the educational service	Online	Providing classes timetable and notifications of any changes in the educational and organizational process	Security pass system of the university	Providing classes timetable and notifications of any changes in the educational and organizational process
		Security pass system of the university	Service of issuing of student certificates	Visa and Migration registration notification
				Notification of tuition fee and other payment
				Official student's account
				Service of issuing of student certificates
				Hybrid-learning format platform
	Offline	Mentors and tutors at the Russian university	Outdoor sport area on the campus	Teachers, professors, and lecturers at the university
		Outdoor sport area on the campus		Medical Center of the university
		Swimming pools on the campus		Navigation system in the Medical Center
		Athletic tracks on the campus		Mentors and tutors at the Russian university
		Parks and parking area on the campus		Classrooms
				Classes timetable
				Final examinations
				Final research paper defense
Post-purchase evaluation	Online	Online channels to get information for alumni	Online channels to get information for alumni	Possibility to submit review on the official website of the university
		Possibility to submit review on the official website of the university		
	Offline	Service to send graduation documents in case of the distance learning	A diploma of higher education	Events for alumni
				Alumni association

At the stage of the information search, the most effective online touchpoint is the official website of the university for all three segments of the international students. The most effective offline touchpoints at the same stage are the international office at the Russian university for respondents of the bachelor's degree segment; open days at the Russian university for respondents of the master's degree segment, other students and graduates for respondents of the postgraduate degree segment. At the stage of the evaluation of alternatives, all segments identified several effective online touchpoints, however, the most effective offline touchpoints are the university security system (respondents of the bachelor's, master's degrees segments), and the issuing pass office (respondents of the master's, postgraduate degrees segments). At the stage of choosing a university (purchase), there are several effective online touchpoints –the financial office (respondents of the bachelor's, master's degrees segments) and the visa and migration registration office (respondents of the postgraduate degree segment). At the stage of the post-purchase evaluation both bachelor's and master's degrees segments highlighted a possibility to submit review on the official website of the university and online channels to get information for alumni as the most effective touchpoints. The respondents of the postgraduate degree segment highlighted the alumni association and events for alumni as the most effective offline touchpoints at the stage of the post-purchase evaluation.

The study specified that at the stages of information search, evaluation of alternatives, choosing a university (purchase) different segment of the Chinese students studying at FEFU have a dominant cognitive element of the consumer experience according to importance of

receiving urgent information from the Russian university, importance of the security system at the Russian university. At these stages, there is a bias in the predominance of online touchpoints over offline touchpoints among respondents of the master's and postgraduate degrees segments.

Since the stage of consuming of the educational service is characterized by the largest number of online and offline touchpoints of the international students and the Russian university, the scores of effectiveness of the online and offline touchpoints are mostly evenly distributed. Meanwhile, each segment can be divided into several online and offline touchpoints with the highest score. Based on the data obtained, it can be concluded that the international students of the bachelor's and master's degrees segments have a dominant affective element of the consumer experience, according to the effective offline touchpoints (outdoor sport area, swimming pools, park areas, etc.), while the postgraduate degree segment is dominated by the cognitive element of the consumer experience.

At the stage of consuming of the educational services, all segments of the international students have the largest number of the effective offline touchpoints, in contrast to other stages of the decision-making process. Presumably, this is due to the international students staying on the campus, in the country.

5. Conclusions
During the study there are some scientific results are obtained:
- the approach has been developed to evaluate the consumer experience of the international students, who choose studying at the Russian university; this approach includes effective tools of three identified approaches (consumer journey mapping (CJM), evaluate consumer loyalty, conducting a survey (questionnaire) to test the study hypothesis put forward; the author's approach covers three elements (affective, cognitive, behavioral) of the consumer experience [Komogortseva, 2023], and also allows to adapt the selected tools to the specifics of the educational services market (higher education) unlike the existing approaches;
- the developed approach of the evaluation of the consumer experience was approved on the example of the Chinese students studying on higher education programs at FEFU; the study allowed to identify the most effective online and offline touchpoints at the different stages of the decision-making process to choose the Russian university, to determine a stage/stages, where different segments of the international students (bachelor's, master's, postgraduate degrees) have dominant elements of the consumer experience; the study result allows developing some management decisions to recruit the international students of various degrees to apply to the Russian universities.

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Influencer Marketing in Russia and China: Influencers' Parasocial Relationships with their Followers

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Abstract:

This study examines the influencers' parasocial relationships with their followers in China and Russia. We have proposed a research model based on the theory of parasocial relations with influencers, which has been tested. The results revealed that consumers' parasocial identification depends on social attractiveness (both in Russia and China), physical and lifestyle attractiveness (in China). We have found that para-social interaction with social media influencers contributed to credibility (both in Russia and China), perceived usefulness and expertise (in China). The findings are interpreted in terms of theoretical and managerial implications. This study helps firms understand how the para-social interaction, physical, social (homophily attitude) and lifestyle attractiveness of the influencer (blogger) are related and affect the purchase intention and attitude toward the advertising on blog or vlog through credibility, perceived expertise, perceived usefulness or directly. The findings indicate that influencer marketing increase brand awareness, to stimulate sales, to attract new customers to the brand, to create a base of user-generated content.

Keywords: *influencer marketing; perceived brand control; influencer; blogger; parasocial interaction; consumer attitudes*

Introduction

Influencers are considered a powerful marketing resource due to their perceived audience trust, authenticity, and relevance (Djafarova, Trofimenko, 2014). Recently research showed that marketers capitalize on the popularity of influencers by addressing them as proven tastemakers and behavioral influencers who recommend products and brands to their followers and command the trust of the audience (De Veirman, Cauberghe, Hudders, 2017). The results of research by K. Sokolova, H. Kefi (2019), Dee Weirman, Cauberghe, Hudders (2017) and others have shown that digital celebrities or opinion leaders in social media can successfully influence the purchasing intentions of their audience, becoming even more powerful than traditional celebrities. Much attention in the empirical studies of Hughes (2019), Ki, Kim (2019), Martinez-Lopez (2020), Reinikainen (2020) was paid to how brands can profit from attracting opinion leaders, including increasing brand awareness and purchase intention.

However, social media influencers promote not only brands and products on their channels, but also values and their lifestyle. The audience size of some influencers can be comparable to the reach of traditional media, and social media content consumption among younger audiences is high and growing. Therefore, influencer marketing plays an important role in the development and implementation of a digital marketing strategy.

Influence marketing (or influencer marketing) is a promotion of a product or brand through an opinion leader (expert, blogger, public figure, artist, etc.) as a result of his influence on the audience. Influencer marketing is considered as an integral part of the marketing mix, and, consequently, as a marketing tool. Brands use influencer marketing for a variety of purposes: to increase brand awareness, to stimulate sales, to attract new customers to the brand, to create a base of user-generated content.

Influencers' (parasocial) relationships with their followers

Researchers apply various theories to describe the model of interaction between opinion leaders and consumers. Social cognitive theory emphasizes that the process of observing a model (opinion leader) can influence the observer's behavior through attention, retention, cost-benefit assessment, social comparison and self-efficacy assessment, personal standards assessment, etc., and accordingly has strong motivational effects that can lead to the appearance of the corresponding behavior (Bandura, 2001). The two-stage communication flow theory assumes that the audience will be more influenced by the opinion leader than directly by traditional media (Katz, 1957). The theory of parasocial interaction describes the process of interaction with a media personality, which is perceived as personal and "real" due to the body language of the communicator (Horton, Wohl, 1956). Parasocial relationships can be defined as "illusory" relationships created between viewer and performer. Such relationships can be observed between celebrities, famous faces and their fans who feel close to their idols, like a real relationship. However, parasocial interaction is self-established and asymmetric, since relationships and interactions are not mutual (Horton, Wohl, 1956; Dibble, Hartmann, Rosaen, 2016; Kelman, 1958). Such relationships can be established between bloggers and their social media followers, such as Instagram, VK, Facebook, Tik Tok, or YouTube. Viewers subscribe to video channels or accounts to regularly follow those who host them. The establishment of such relationships in social media can be facilitated by parasocial interaction (Martínez-López and etc., 2020).
According to Dibble, Hartmann, Rosaen (2016) parasocial relationships have the following feature: during interaction with social media, viewing content, long-term associations with the influencer arise, which continue beyond the media exposure. Parasocial relationships will develop if the contact with the influencer is repeated, there is an immersion in the opinion leader's content, which means a complete acquaintance with the person, her lifestyle, and an increase in the importance of the influencer for the follower (Dibble, Hartmann, Rosaen, 2016). The key to a successful marketing campaign is leaders who have top brand ratings among their clients.

The research based on para-social interaction theory applying for influencer marketing concept has studied various topics on the subject (fig 1). But at the same time, there is not enough research that has studied the impact of para-social interaction on the intention to buy brands/services and attitudes towards advertising from a blogger/influencer in general.

Schramm, Hartmann, 2008	Develop a set of scales that can be applied directly after TV exposure in order to measure a users' parasocial processing during media exposure
Labrecque, 2014	Empirical investigation of consumer–brand relationships on social media platforms by exploring the theoretical underpinnings that drive relationship development and the value they offer for companies.
Jung Eun Lee, Brandi Watkins, 2016	Using para-social interaction (PSI) and social comparison theory, study proposes a model that assesses the influence of physical attractiveness, social attractiveness, and attitude homophily of video blogger (vlogger) on PSI; and PSI effects on luxury brand perceptions (i.e., brand luxury, luxury brand value, and brand-user-imagery fit) and luxury brand purchase intentions.
Dibble et al., 2016	Test the performance of measures of parasocial interaction and parasocial relationship, as well as to perform further construct validation testing for the Experience of Parasocial Interaction Scale (EPSI-Scale)
Gong Wanqi Li Xigen, 2017	Study the fan–celebrity parasocial interaction (PSI) to explore the celebrity endorsement mechanism within a microblog context.
Lim, Choe, Zhang, Noh, 2020	Examine how a viewer's wishful identification with an online video game streaming personality and emotional engagement with other viewers lead to behavioral loyalty through PSR with their favorite live-streamer
Karina Sokolovaa, Hajer Kef, 2019	Investigate how the para-social interaction (PSI) the audience creates with the online influencer, along with their perceived credibility, are related to the purchase intention and how they are, in turn, related to the social and physical attractiveness and attitude homophily

Fig 1. Applying Para-Social Relationships and PSI Theory

Determining such interaction is an important goal, as parasocial interaction generates loyal behavior of consumer / follower that is based on trust, perceived usefulness, and perceived expertise.

The research question(s) and methods

This study aims to examine how the para-social interaction, physical, social (homophily attitude) and lifestyle attractiveness of the influencer (blogger) are related and affect the purchase

intention and attitude toward the advertising on blog or vlog through credibility, perceived expertise, perceived usefulness or directly.

Based on the content analysis of literature on the research problem, we proposed the following research questions:
1. How can the parasocial interaction between consumers and influencers be measured?
2. What factors influence the parasocial interaction when consumers chosing brands?
3. How does parasocial interaction influence the attitude of consumers towards the influencer and the attitude towards brand advertising through the influencer?
4. How does the attitude towards the influencer and the attitude towards the advertising of the brand through the influencer influence the intention to make a purchase?
5. Is the behavior of Chinese and Russian consumers different when interacting with key opinion leaders?

Our research approach was based on the model of parasocial interaction and we developed the following hypothesis:
- H1: Social attractiveness of the influencer increases PSI
- H2: Physical attractiveness of the influencer increases PSI
- H3: Influencer's lifestyle attractiveness values increases PSI
- Follower–influencer PSI is a positive predictor of credibility (H5), perceived expertise (H4), perceived usefulness (H6)
- Credibility, perceived expertise, perceived usefulness of the influencer is a positive predictor of attitudes toward the advertising on blog or vlog (H7), purchase intention of the endorsed product (H8)

The development of the theoretical research model includes independent predictor factors, the constructs for measurement (attitude homophily, physical attractiveness, lifestyle attractivenes) and the predictable factor (attitude toward advertising, purchase intention) (Fig.1).

To test our hypotheses we developed measurement items by adopting measures, modifying them to fit our context.

Data and sample. Data collection took place between September 2022 and May 2023. The sample size includes 384 Russian and 380 Chinese respondents.
The volume of the Russian influencer marketing market, according to IAB Russia, grew by 63.6% by 2020 and amounted to more than 12.6 billion rubles, although in 2018 it did not exceed 8 billion rubles. At the same time, Instagram accounts for 7 billion rubles, and YouTube - 4.1 billion rubles. According to ADinBlog, influencers in Russia earned almost 6 billion rubles in 2020. on advertisements. Also, according to the IOM Anketologist, 73% of Russians read bloggers, 46% of them visit blogs daily, another 35% - several times a week, 53% of readers have a good attitude towards bloggers, and 60% trust the information received from them. Russian advertisers are increasingly choosing influencer marketing as the main communication channel for launching and building knowledge of new brands. (ARIR, 2021)
In 2020, advertisers' spending on this channel increased by 63% to RUB 11.1 billion. Interest in influencers is growing as brands develop approaches to communicate with the Alpha generation, integrate into bloggers' commercial products, and expand influencer presence beyond social media (ARIR, 2022).
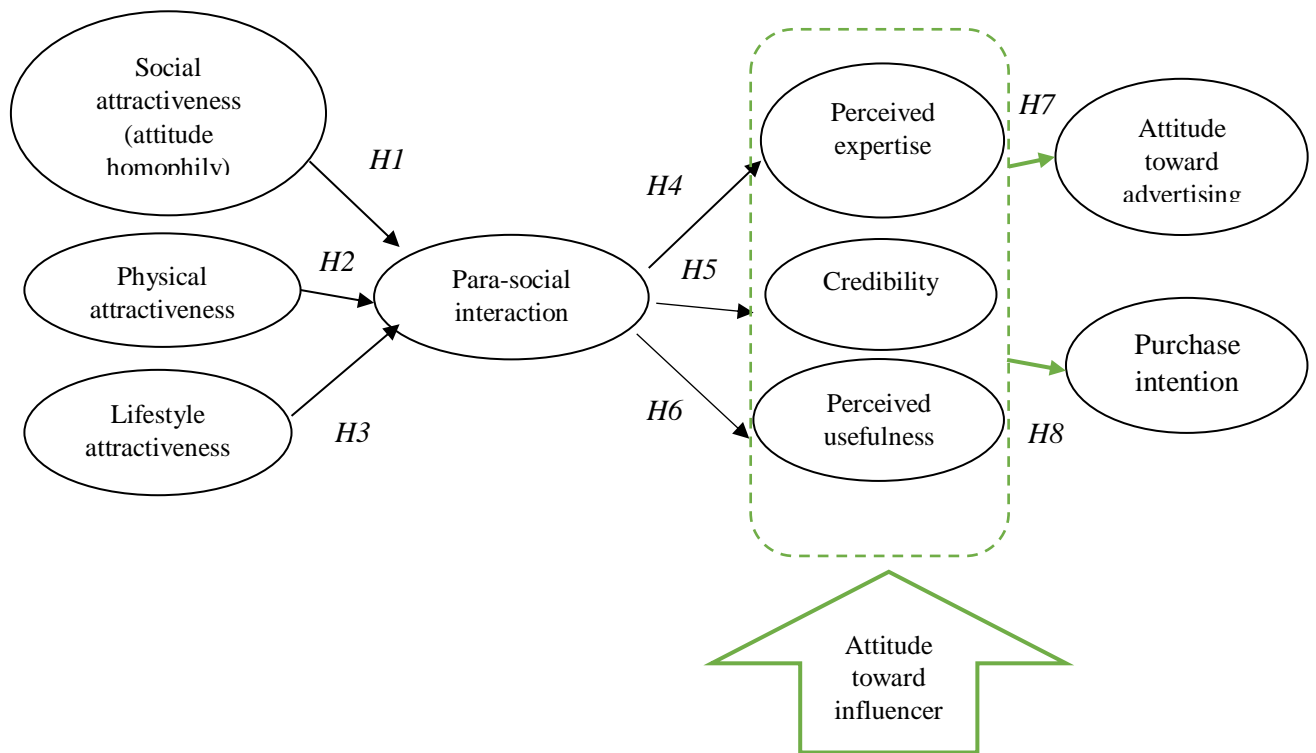
Figure 1. Research model

Influencer marketing in China (KOL marketing) is constantly evolving. Influencers influence Chinese markets to such an extent that the term "Wanghun economy" has appeared: a huge sector of social media advertising and sales through influencer accounts isolated from the rest of the world. The Chinese prefer to associate themselves with a popular attractive person (or a group of people), so they find their role model on social media. KOL's marketing in China has moved from text and photos to live streaming, short videos and social commerce (Daxueconsulting, 2021). As the number of internet users increases, the target audience of influencers also prefer to visit more channels, which allows brands to reach more consumers.

Influencer marketing will only grow in importance in the future. According to Data Bridge Market Research, the influencer marketing platform market (infrastructure for influencers) was valued at USD 7.36 billion in 2021 and is expected to reach the value of USD 69.92 billion by 2029, at a CAGR of 32.50% during the forecast period of 2022-2029 (Data Bridge Market Research, 2022).

Empirical results and conclusions. A Confirmatory Factor Analysis (CFA), using AMOS 22.0, was first employed to assess the properties of the constructs. Relevant loadings were significant, and construct reliability values ranged from 0.6 to 0.75. The Structural Equation Modelling was conducted for examining the model.
According to the results of the research, not all hypotheses have been confirmed.
It has been found that Chinese users on almost all different platforms are more and more attached to influencers (KOLs), who may not have as many followers. But those who follow them tend to be very loyal. The audience looks for authenticity in the content they create and looks to influencers they trust and connect with. Most of the surveyed Chinese respondents trust brand advertising from a blogger/influencer, value useful information from this blogger, trust the opinion of a blogger when choosing products, trust bloggers more than brand advertisements. Russian consumers, compared to Chinese, are less influenced by bloggers, but nevertheless,

there is a target audience that is receptive to the recommendations of an opinion leader when choosing a brand.

The novelty of the presented results lies in the testing of a new research model, which has not previously been used to study the interaction of Chinese and Russian consumers with opinion leaders.

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Transformation of Marketing Practices under Restriction on the Pharmaceutical Market in Russia

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Abstract
The article is devoted to the identification and systematization of transformations of marketing practices (MP) under restrictions on the pharmaceutical market caused by three main «drivers»: the sustainable development agenda, the COVID-19 pandemic, and international sanctions in 2022. Based on the theoretical justification, analysis of specialized industry reports, and the conducted empirical study the authors try to illustrate the impact of critical situations on changing the marketing mix (MM) by testing the key findings on the pharmaceutical market. The methodology is based on two stages of research. The first stage is dedicated to conducting a series of in-depth interviews with representatives of pharmaceutical manufacturing companies. The second stage clarifies and reveals the insights obtained at the interview stage using the fuzzy-set QCA method. Thereby, three key directions of MM changes were identified and systematized in accordance with the conceptual model of the study.

Keywords: *transformation of marketing practices, marketing mix, pharmaceutical industry, restrictions.*

1. Introduction

The main «incentives» for the transformation of MP implying an effective response to market changes [Dibb et al., 2014] were three key drivers: the impact of the sustainable development agenda (ESG practices), the COVID-19 pandemic and the current geopolitical situation.

The relevance of the study increases due to the emergence of restrictions, the reaction to which becomes primary. First of all, it was assumed that the sustainable development agenda as a global driver would also have an impact on the Russian economy through the introduction and popularization of ESG policies of companies. Indeed, slightly more than 60% of pharmaceutical companies have already developed their sustainable development policy by 2022, and about 70% of representatives of pharmaceutical companies believe that consumers are already paying or will pay attention in the near future to following a sustainable agenda by the manufacturer [EY, 2022]. However, the COVID-19 pandemic and the 2022 sanctions have significantly transformed the landscape of companies' functioning in the market, changing not only inter-firm interaction, but also consumer behavior.

In this regard, the emphasis in this paper is on identifying changes in MP of companies in the post-pandemic and unstable time with a focus on the pharmaceutical market. This industry has been greatly transformed because of the digitalization during the COVID-19 pandemic, and today it undergoes significant changes due to the sanctions and disruptions in supply chains.

Accordingly, the *purpose of the paper* is to identify and systematize transformations in MP under restrictions on pharmaceutical market in Russia. This goal reveals through the following *objectives*:
1. To theoretically determine the definition of MP and approaches to their study.
2. To identify trends of the pharmaceutical market in Russia and their impact on new aspects of MP under restrictions through the analysis of industry reports.

3. To determine the transformation of MP by conducting empirical research using qualitative and quantitative methods, interpret the results using advanced content-analysis and fuzzy-set QCA.
4. To systematize changes in MP based on the results of empirical research in accordance with the conceptual model.

The conclusion reflects the key findings and further research directions in the context of MP as one of the main directions to maintain companies' resilience in times of instability.

2. Relevance of the paper to the track topic

The paper corresponds to the chosen track «Marketing in the era of turbulence» for the following reasons:

– the article reveals the impact of restrictions on the MM complex in the post-covid and unstable period with a focus on the pharmaceutical industry, which has been subject to changes from different sides;
– the research reveals insights and new directions of marketing through a mixed study approach and a broad overview of trends;
– the conceptual model of research is based on the scientific papers [Wichmann et al., 2022; Kumar 2018].

Moreover, the scientific elaboration of the problem can be characterized as insufficient. On the one hand, there is a wide range of studies devoted to classifications of MP based on various industries and countries [Coviello et al., 2001, 2003; Carson et al., 2010; Maletsky, 2010; Gentsch, 2019; Wichmann et al., 2022], which are disclosed in detail in the theoretical review. On the other hand, the purpose of these works is to develop «universal» models for analyzing MP of firms excluding external context. Our study is based not only on theoretical aspects, but also relies on current trends and external market changes. *It should be noted that the paper proposes the author's model of systematization of changes in MP, based on a mixed study approach.*

3. The research question(s) and methods

It is important to emphasize that external «drivers» have influenced changes in the MP of pharmaceutical companies, which follows from the scientific literature and industry review sources. In this regard, *the main research question* is formulated as follows: *«How have MP transformed under restrictions and how will MP change on the pharmaceutical market in the future?».*

The key research question was divided into *four sub-questions*, which were realized at two stages of empirical research.

a. What key changes have occurred in the pharmaceutical market under restrictions? (expert interview)
b. How are the roles of key market actors changing? (expert interview)
c. How is the marketing mix complex being transformed and what changes of MP will be in the future? (expert interview)
d. Which basic profiles of companies were mostly changed during the sanctions period? (online survey with processing fuzzy-set QCA method)

The goal of *qualitative research* is to test and confirm the key transformations in MP identified at the stage of desk research of academic literature and industry reports, as well as the search for new knowledge («insights») from industry experts.

o The main research method are *in-depth interviews with representatives of pharmaceutical manufacturing companies* (directors/heads of marketing and related departments, leading marketers with >5 years of experience in the pharmaceutical industry). For the analysis, 9 expert interviews were conducted with representatives of various pharmaceutical companies, both domestic (6) and foreign (3) operating in the Russian market.

o As a method of data processing, *advanced content-analysis* was used in an extended interpretation using the specialized MAXQDA software. The data was encoded by two approaches, holistic [Dey, 2003] and descriptive [Miles, Huberman, 1994], based on the well-known manual [Saldaña, 2009].

At the same time, *the purpose of quantitative research (the online survey)* is to confirm the insights of expert interviews, as well as to identify sufficient and necessary conditions for the transformation of the MP under sanctions.

o The questionnaire was distributed among experts – representatives of the pharmaceutical market. The key selection criteria (filtering questions) were: 1) work experience in the pharmaceutical industry; 2) the position is not lower than the middle manager; 3) the respondent is a representative of a pharmaceutical manufacturing company. A total of 45 eligible respondents were included in the final sample.

o For the analysis and processing of data was used fuzzy-set QCA approach. This method is based on a mixed approach and is used to determine sufficient and necessary conditions for forecasting or achieving a result by combining a set of independent variables (Ragin, 2006). Moreover, this method is intended for the analysis of average samples (from 10 to 100 observations), according to Ragin (1987), Woodside (2013); Dul (2016).

4. The results to be reported

By implementing a combination of these methods, all research objectives were achieved. Further, the main results of each stage of the study will be briefly revealed.

4.1. Key scientific papers devoted to the evolution of MP

Conceptually, the development and changes of marketing can be divided into three key areas (or clusters):

− *Historical approach (marketing schools):* Shapiro, Doody (1968), Savitt (1981), Wilkie et al. (2003). In particular, the authors cite about 9 key schools of marketing thought development that actually correspond to the evolutionary approach (starting from understanding the added value of individual marketing functions, ending with behavioral and macro-marketing).

− *Evolution based on previous stages of development in management and market orientation:* Webster (2005), Tretyak (2006), Kumar (2015, 2018), Nwankwo, Kanyangale (2022). The authors adhere to the view of marketing development from the point of view of time prolongation, dividing the stages into approximately equal periods (decades).

− *Paradigm changes in the marketing understanding:* Gronroos (1994), Brodie et al. (1997), Vargo & Lusch (2004), Tretyak (2013), Bagiev et al. (2018), Line et al., 2019. In this case, the authors reveal the formation of marketing and MP from the point of view of the so-called external «driving forces» (milestones or events that have greatly changed the landscape of marketing functioning).

In this paper, the authors adhere to a similar logic and relies on external «driving forces» (or milestones) when studying the transformation of MP.

The focus method of MP classification is a MM approach, rethought by scientists in a recent article Wichmann et al. (2022).

4.2. Pharmaceutical market trends in Russia based on the content analysis of industry sources

To review changes in the pharmaceutical market, 27 industry and consulting reports were selected that meet the following criteria: 1) relevance (corresponds by keywords: «marketing», «pharmaceutical industry», «market development trends», etc.); 2) novelty (selected studies were

conducted after 2018); 3) reliability (companies and experts have been engaged in research for at least 10 years).

Based on the content analysis of industry sources, it was possible to identify the *key trends:*

1. *Reducing the importance of the sustainable development agenda:* The trend «Climate change and environmental degradation» was recognized as the least relevant for our country in the forecast until 2030 [HSE daily, 2022].
2. *Increasing digitalization and changing consumer behavior* [Yandex Market, 2022].
3. *Development of e-commerce sales channels (online pharmacies, marketplaces)* [DRT, 2022; DSM Group, 2022].
4. *The increasing role of the state and the focus on import substitution* [IQVIA Discussion, 2022; Yakov and Partners, 2022].
5. *Biotechnological development and increased funding in R&D [*Yakov and Partners, 2022].

4.3. New accents and major changes in MP

The revealed trends in the development of the pharmaceutical market were reflected in new accents in marketing mix:

− *Product:* the main change in the product policy was the revision of the portfolio / assortment, which affected foreign manufacturers to a greater extent.
− *Price:* the role of the pricing function becomes the most significant, since specialists have to «balance» between meeting the demand of end consumers and the goals of the company seeking to optimize costs.
− *Place:* switching to online channels and interaction with the public segment (to maintain resilience).
− *Promotion:* smooth transition to telemedicine, hidden (without brand) format of communication of foreign companies, increasing the role of the pharmacist.
− *People:* the reduction of marketing specialists and the number of branded visits to the doctor.

The results of the analysis of academic literature and trends in the pharmaceutical market formed the basis for the conceptual model, which was supplemented and disclosed with the help of empirical research (*see Fig. 1*).
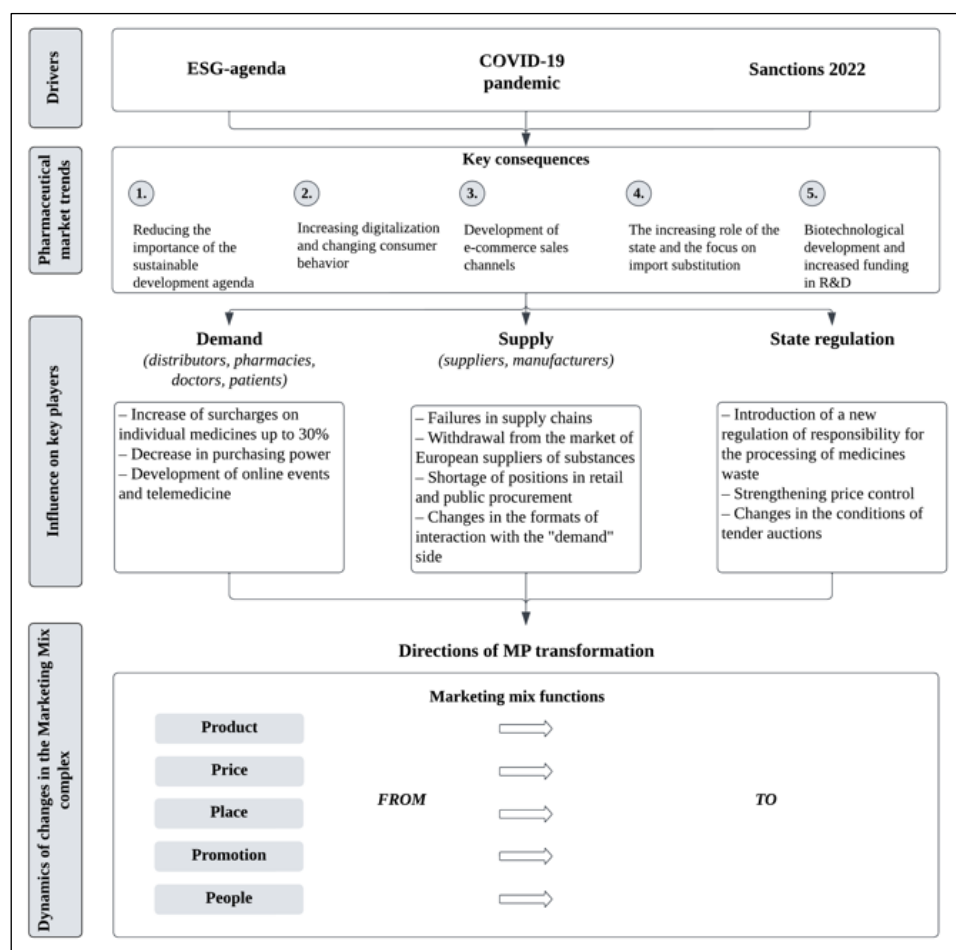
Fig. 1. Conceptual model of MP transformation
Source: compiled and adapted by the authors based on (Wichmann et al., 2022)

4.4. Insights from expert interviews
For clarity of the results, table 1 was compiled.

Table 1. Insights based on the results of expert interviews

RQs		Insights
RQ1 What key changes have occurred in the pharmaceutical market under restrictions?	ESG-agenda	– According to experts, the Sustainable Development agenda has had no impact on changes in the functioning of pharmaceutical companies. Experts admit the importance and effectiveness of the implementation of social projects, but only as reputational/image-based activities.
	COVID-19 pandemic	– The key consequence of the pandemic was accelerated digitalization: the state contributed to the implementation of the initiative to develop online sales of medicines (both over-the-counter and subsequently prescription); the proportion of patients ordering medicines online has increased since the beginning of 2020 and continues to grow; manufacturing companies during the pandemic actively restructured their processes in online interaction format.
	Sanctions 2022	– The most striking limitation due to the strengthening of international sanctions were failures in supply chains, «one-time» price increases and, as a result, a shortage of

		medicines. According to experts, the problem with the shortage of imported drugs and rising prices for them will persist, which will affect the purchasing power of patients.
RQ2 How are the roles of key market actors changing?		– In addition to increasing the power of the state, there is a serious problem of intermediaries (distributors and pharmacies) who "dictate" the rules of price for the end consumer, especially in conditions of instability. – The channel of communication with the patient becomes more difficult – because there is a bright tendency for «self-medication» that does not require a doctor's visit.
RQ3 How is the marketing mix complex being transformed and what changes of MP will be in the future?		– The functions of MP in pharmaceutical companies will be integrated in the near future, and external and internal management processes will be further combined to solve specific tasks. – At the same time, experts observe a change in the priorities of these functions: in their opinion, in addition to pricing and sales, an educational function with an emphasis on analysis and forecast will come to the fore. – As for the responsibilities of marketing specialists, there is an obvious trend to redistribute functionality to the entire value chain.

Source: compiled by the authors

4.5. Identified basic profiles of companies with shifts in MP during the sanctioned period

Using the fuzzy-set QCA method, 3 parsimonious («necessary») and 5 intermediate («sufficient») solutions were obtained (*see Table 2*).

Table 2. Necessary and sufficient combinations of solutions

Solutions	Combinations	Symbols
Necessary	Promotion Place*People Product*~Place*~People	unsigned – high degree of change; ~ – low degree of change; * – combination of conditions.
Sufficient	**Product*~Place**~Promotion**~People** Product*Price*Place***Promotion** Product*Price***Place*People** Product*Price***Promotion***People ~Product*Price*~Place***Promotion***~People	

Source: compiled by the authors

Based on the interpretation of the fuzzy-set QCA results, it was possible to identify *three basic profiles of pharmaceutical companies* in which the marketing mix complex was transformed (overall solution coverage is quite high – 64% of cases, as well as the overall solution consistency of the model – 86%):

1. *The first type* is companies that have faced changes in promotion (for example, changes in communication with a doctor or patient). Such changes may be a consequence of the transition to a «hidden» format of interaction and promotion of medicines.

2. *The second type* is manufacturers whose MP has been transformed under the influence of changes in place and in interaction with employees (marketers).
3. *The third type* is a pharmaceutical company that transformed its product policy (etc., expanded the portfolio of medicines), but did not make changes to the place system and did not narrow/expand the staff of marketers.

The acquired knowledge formed a conceptual model and helped to determine the directions of MP transformation on the pharmaceutical market in Russia (*see Fig. 2*).
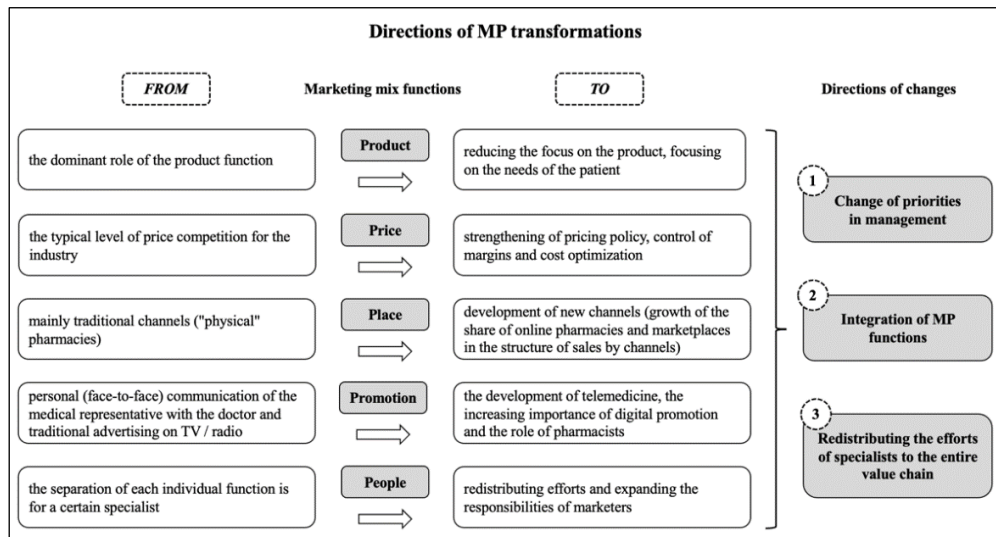
Fig. 2. Key shifts and directions of MP transformation on the pharmaceutical market
Source: compiled by the authors

5. Conclusion and Contribution

The purpose of the paper is the identification and systematization of the transformations of marketing practices under restrictions on the Russian pharmaceutical market. Indeed, the «Marketing mix» complex is changing and transforming towards the integration of functions, which was also noted in the works of V. Kumar (2018) and J. Wichmann et al. (2022).

Moreover, in conditions of restrictions, individual functions are gradually eroded, which leads to a redistribution of marketing efforts to the entire value chain. At the same time, in the near future, CEO and top managers will have to change their priorities, especially in foreign pharmaceutical companies.

The study comprehensively reveals changes in marketing management functions in the three contexts (or «drivers») in Russia: ESG agenda, COVID-19 pandemic, and sanctions 2022. From a theoretical point of view, the paper contributes to the theory of the evolutionary development of marketing in the context of «driving forces» (milestones or events that have greatly changed the landscape of marketing functioning). From the practical side, this study can serve as a support for top management in determining the applied skills needed to train marketers in order to increase the resilience of the company in the coming years.

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The Peculiarities of Promotion of Health Food Products under the Private Label by Russian Retailers

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Keywords: *healthy food products, private labels of healthy food products, offline and online marketing communications, merchandising, 3S model*

The market for healthy food products is growing in the world at a rate of 10–12% per year and may reach $230 billion by 2025. In Russia, it annually adds about 30% [Kazantseva, 2021]. In the European Union, the healthy food market is called health and wellness. There, this product segment has become the fastest growing in the main food and beverage market [express.liberty7]. The healthy food market in Russia makes a certain contribution to the development of the global market forhealthy products.

Responding to the high demand for healthy food products, Russian retailers have begun to include more healthy lifestyle products in their assortment. According to the World Health Organization, a **healthy food** is a balanced diet in terms of the intake of proteins, fats and carbohydrates, as well as sugar and salt, which depends on the individual characteristics of the person (such as age, gender, lifestyle and degree of physical activity), cultural context, specifics of local products and traditions in the field of nutrition [who.int]. Conventionally, healthy food can be divided into **three categories**: organic foods, functional foods, and dietary and diabetic foods [express.liberty7].

Due to the fact that proper nutrition products are difficult for potential consumers to perceive, and there is also high competition among market players due to the complexity of rapid scaling, the role of marketing is increasing [Bolshakov, 2022]. In the foreseeable future, more and more consumers will move from the concept of healthy lifestyle to conscious consumption [express.liberty7].

The paper is devoted to peculiarities of private label grocery products promotion by retailers that operate in healthy food products using the 3S model. The specifics of the market, the peculiarities of customer behavior and the portfolio of private label healthy lifestyle products of Russian retailers are analyzed.

There are two main **groups of trends** in the Russian healthy food market: functional, as well as socio-cultural and marketing ones. Functional trends refer to product composition.

Moreover, Healthy food products are becoming not only a way to satisfy hunger, but also an expression of a person's personal identity as an innovative, informed, conscious consumer [Eryshev, 2020].

Safety, sustainability and naturalness are three **reasons** why consumers choose healthy foods[8]. When making a purchase decision, consumers rely on a number of factors. Deloitte analysts identified traditional and emerging drivers. Traditional drivers of healthy food purchases include taste, price, and convenience. Evolving drivers are understood as health care and disease prevention, social contribution, consumer experience and new emotions from consumption, safety [Kazantseva, 2021].

According to a global study of healthy lifestyle consumers published in The Journal of Consumer Behavior, consumers who regularly and consciously buy healthy products (organic products) are characterized by a certain set of values and lifestyle. To describe this lifestyle, experts have introduced the abbreviation **LOHAS** - lifestyles of health and sustainability. The LOHAS profile is defined by demanding, well-educated consumers with an active lifestyle,

constantly looking for information, as a rule, wealthy and influencing others [Kosheleva, 2017].

The article offers recommendations to retailers for the successful promotion of healthy lifestyle products under private labels, considering the predisposition of consumers to follow a healthy lifestyle. In order to successfully promote private labels in the healthy food market in Russia, retailers need to use various branding tools, which include the modified **3S model** [Wansink, 2017].

Promotion of products for a healthy lifestyle has its own characteristics: the usual methods for such products are often ineffective. Retail chain managers should answer the question: how to promote healthy lifestyle products on the private label market in the best way? To answer this question, you can use the model of B. Wansink."3S", modified by the authors of this article. The model includes three components: marketing communications and promotional activities that create visibility for the retailer's healthy lifestyle products both inside and outside the store (signage); arrangement (planning) of the store and display of goods (structure); services providedby sellers to buyers at the point of sale or online (service) Proper use of this model can lead to a change in consumer behavior, which will be expressed directly in purchases, as well as an improvement in the perceived quality of healthy foods and the relative usefulness of the purchase. As a result, the efforts of retailers will be able to build loyalty both to healthy food products under private labels and to the retail chain itself [Wansink, 2017].

Finally, it should be noted that the provision of a wide range of healthy lifestyle products is part of the implementation of the CSR concept of retailers. At present, the role of retail chains has increased significantly, since it is they who have a direct impact on the final choice of consumers. Retailers, using various marketing tools, including branding, not only influence what consumers buy, but also shape the modern consumer culture of Russian buyers.

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Winning the Customer's Heart Here and Now:
Challenges of Brand Management and Customer Loyalty Management

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Abstract:
As market niches become vacant, customers are waiting for new brands that can satisfy their needs. This poses new challenges for marketing experts, such as creating and launching new brands quickly and efficiently. The report analyzes interrelationships between brand management and customer loyalty management concepts. The analysis and systematization of the data collected reveal a gap between the two subject areas: while brand management aims to achieve customer loyalty to the brand, customer loyalty management considers brand management as one of its tools to achieve customer loyalty. The paper introduces the concept of the "Customer Loyalty Chain", which includes the formation of a new attitude towards the brand, as well as trust and satisfaction which lead to the emergence of customer loyalty. A deeper understanding of customers' cognitive-affective processes, their motives, drivers, and barriers at every stage of shaping their loyalty to the brand, helps the company control this process with a greater precision, integrate this information into brand creation, and make the brand clear and attractive to the customer.

1. Introduction

Since February 2022, the Russian market has been facing the departure of foreign brands. The largest foreign businesses that have curtailed their operations or left Russia entirely, have lost up to $200–240 billion. According to a recent report of the Center for Strategic Research [Center for Strategic Research, 2022], 7% of the biggest foreign companies have announced their withdrawal from Russia without selling their local divisions, 15% have transferred their local units to new owners and 57% of subsidiaries of foreign companies are changing ownership and are going to be passed into the hands of Russian ultimate beneficiaries. Finally, 30% of foreign companies that have already sold or are preparing to sell their Russian business have announced a rebrand. Meanwhile, 85% of Russians are hoping that new and strong brands will emerge in Russia and 46% want the old and well-known international brands to come back [NAFI, 2023].

Nowadays, the Russian market offers unique opportunities for the creation of new brands: there are vacant market niches, and customers are eager for new brands to be established and are ready to engage with them.

In economics, brands are not just a communication tool between companies, products and customers; they create a special language which allows them to convey their product value to customers through associations and impressions. At the same time, companies regard brands not only as an asset they create by building a community of customers around it [Arvidsson, 2006], but also as a potential source of added value [Crimmins, 1992] for their businesses, made possible through brand creation and development.

Therefore, marketing experts who specialize in brand management and customer loyalty management are facing new challenges. How can brands be created, changed or adapted under the new economic conditions, up to now unknown to many professionals? And how can this be

done quickly, since the market with the niches, open to new brands, is now attractive not only to Russian companies, but also to players from other countries that used to find it difficult or impossible to access the Russian market due to the presence of well-known foreign businesses? How can a brand identity be built [Aaker, 1995] to ensure that the brand becomes a magnet for loyal customers in the short term? And what mechanisms have to operate in customers to form their loyalty to new brands fast? These challenges are especially relevant in current practical marketing activities.

This report aims to analyze interrelationships between brand management and customer loyalty management concepts, identify possible gaps between them, if any, and propose an integrated brand management model through building a Customer Loyalty Chain as a possible tool that can foster customer loyalty. This, in turn, would help marketing specialists create new strong brands in the short run.

2. On the paradoxical absence of connection between brand management and customer loyalty management

2.1. Analysis of brand management concepts in terms of their connection with customer loyalty management

Brand management is the design and implementation of marketing programs and activities that aim to create, measure, and manage brand equity [Keller, 2003]. Brand management begins with strategic market research and the creation of a brand identity as a response to market expectations and needs. Identity is a one-of-a-kind combination of brand-building strategies and brand belonging that communicates what the brand stands for and offers consumers a desired image of the brand [Aaker, 2014].

In the long term, the success of a brand depends on the brand concept chosen before its launch in the market [Park, Eisingerich, Park, 2013]. Brand-building concepts determine the significant role the brand plays in the company's leadership in the market [Kapferer, 1997; Urde, 1999; Aaker, Joachimsthaler, 2000; Keller, 2000; Davis, 2002; Davis, Dunn, 2002]. Building customer loyalty to the brand is an important step towards leadership, stronger internal brand management processes, and creation of a successful brand [Cunningham, 1967; Morgan, Hunt, 1994; Campbell, Keller, 2003; Hoeffler, Keller, 2003; Burmann, Zeplin, 2005; Ahn, Hyun, Kim, 2016]. However, the way in which customer loyalty to the brand is formed through the cognitive-affective processes that occur in customers remains poorly described [Kapferer, 1997; Urde, 1999; Aaker, Joachimsthaler, 2000; Davis, 2000; Keller, 2000; Davis, Dunn, 2002].

The analysis and taxonomy of brand management concepts regarding their interrelation with loyalty management have shown that [Keller, 1993; Kapferer, 1997; Urde, 1999; Aaker, Joachimsthaler, 2000; Davis, 2000; Logman, 2004; Ghodeswar, 2008; Nam J., Ekinci Y., Whyatt G, 2011; Cuong, 2020] they do not disregard the importance of managing customer loyalty. Moreover, they state that one of the main goals of brand management is to create brand value in the customer, which, in turn, will affect the development of customer loyalty to the brand. The customer loyalty rate becomes thus a measure of brand success.

It is noteworthy that the evolutionary nature of the development of brand management concepts from the perspective of managing customer loyalty has been revealed: from the thesis that customer loyalty is one of the key goals that determine the success of the brand [Keller, 1993; Kapferer, 1996; Urde, 1999; Aaker, Joachimsthaler, 2000; Davis, 2002; Logman, 2004] to several attempts to describe the relationship between brand attributes and cognitive-affective processes in the customer [Ghodeswar, 2008; Nam J., Ekinci Y., Whyatt G, 2011; Cuong, 2020]. Despite this, it remains unclear how customer loyalty can be managed and what metrics should be used to monitor this process.

2.2. Analysis of customer loyalty management concepts in terms of their connection with brand management

Rapid changes in markets, constantly increasing competition, launches of new brands that should replace those that have left the market, and the need to fight for every customer here and right now — all these factors entail the development of not only brand management concepts, but also customer loyalty management concepts.

Customer loyalty is a consistent consumer buying behavior towards a particular brand, which repeats over time and eventually transforms into a loyalty to this brand [Jacoby, 1971]. Customer loyalty ensures demand predictability and creates barriers for competitors [Keller, 2009] in which the company operates thus making entry to the market more difficult since customer loyalty to the competitor's brand cannot be replicated in a short period of time. Keller points out the relationship between brand management and customer loyalty management, saying that "to maximize brand resonance, the levels of both the intensity and activity of loyalty relationships must be increased" [Keller, 2009].

Loyalty comes in different types: attitudinal, behavioral, as well as their further subtypes [Muravskaja et al., 2019]. Loyalty in this report is seen in its entirety, while the research focuses on exploring the integration of customer loyalty management into brand management.

The report examines how customer loyalty can be managed through cognitive-affective processes that drive the customer. We based our research on the theory of cognitive-affective processing system [Mischel, Shoda, 1995] which emphasizes the importance of human cognitive and affective processes for personal development and explains how individual cognitive and affective qualities influence behavior and how an individual interacts with the environment. Therefore, it also explains how they form attitudes, trust and loyalty towards something. This allows us to integrate this complex process into brand management.

The analysis loyalty management concepts [Porter, 1985; Dick, Basu, 1994; Best, 2009; Chaudhuri, Holbrook, 2001; Bowden, 2009; Banytė, Dovalienė, 2014; Belli A. et al., 2022; Granados et al., 2021] and their connection with brand management has shown, as well as in the analysis of brand management concepts, the evolutionary nature of studies. Yet in this case, in contrast to the brand management concepts, we can see that the focus on the subject area is narrowing, rather than tending to integrate with brand management.

Thus, it can be said that studies of customer loyalty management are more selective and more focused on the impact of certain connectors on customer loyalty formation and are less focused on the impact of brand management on the formation of loyalty. Some of the analyzed concepts of customer loyalty management are partly focused on the improvement of processes within the company which eventually will lead to increased customer loyalty. Others describe mechanisms of how loyalty is formed, leaving aside the question of the company's requests and its objectives.

At the same time, the integration of loyalty formation mechanisms into brand management is not presented in all the studies and is not clearly described, for it is not the focus of the research of the authors of these concepts. Consequently, the emphasis is made on the fact that brand management has an impact on the formation of loyalty.

2.3. The paradoxical disconnect between brand management and customer loyalty management

On the one hand, researchers acknowledge the role of customer loyalty management in brand management, on the other hand, we can see that they tend to pursue different directions of research, resulting in a lack of synergy between the two fields, even though these two subject areas remain mutually dependent.

The analysis above allows us to conclude that brand management and customer loyalty management are weakly connected research areas. The concepts of brand management do not examine in depth how exactly the customer's loyalty to the brand is formed through cognitive and affective processes [Kurochkina, 2019]; therefore, when creating a brand, they do not adequately consider the factors that shape customer attitude, trust, satisfaction and loyalty.

Researchers of customer loyalty management view brand management as a tool to better understand the overall value of product positioning for target customers, as well as the rational and emotional benefits of the product, which will affect customer loyalty [Best, 2009].

As a result, we can observe the paradox of the interrelation between brand management and customer loyalty management: although this interrelation is postulated in both fields of studies, in fact the research area that is supposed to connect these two subject areas and provide a clear algorithm for building this interrelation and a system of metrics to assess its effectiveness, remains unexplored. This gap limits the potential of the brand to achieve leadership, because it does not fully take into account the factors that influence the formation of customer loyalty to the brand. Figure 1 illustrates this paradox with an interrelationship matrix of brand management and customer loyalty management.
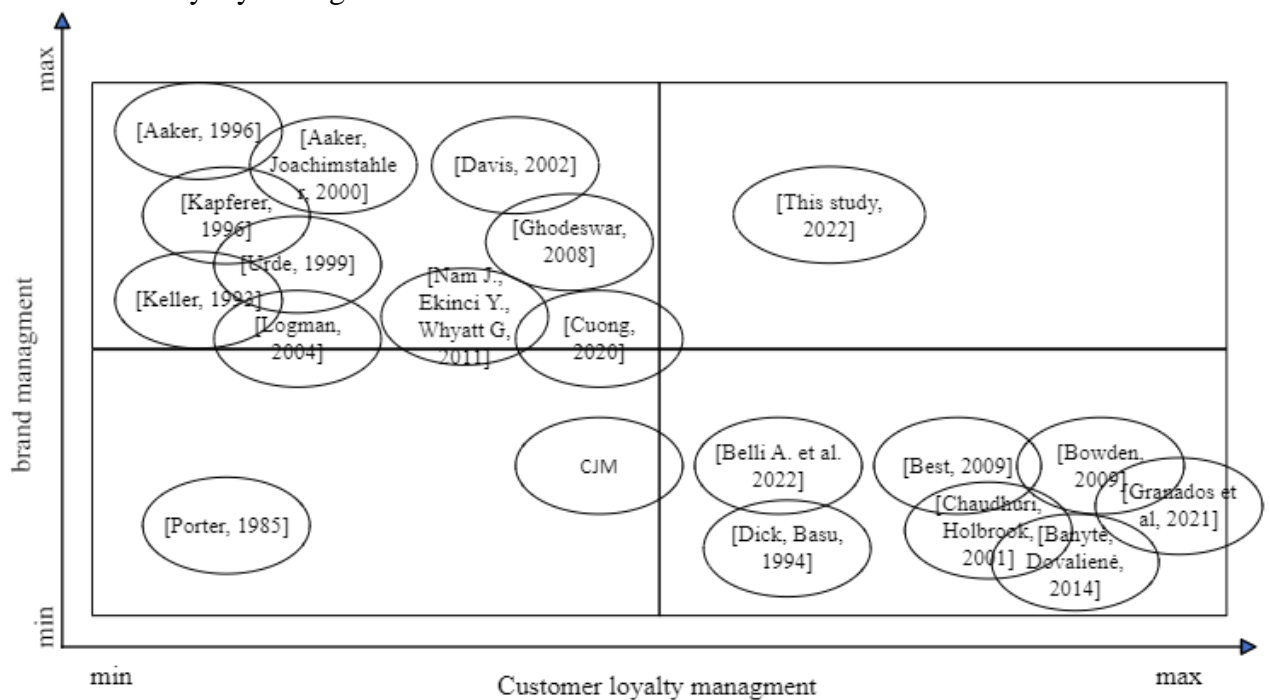
Figure 1. Interrelationship matrix of brand management concepts and customer loyalty management concepts. Created by the author of this report.

The interrelationship matrix of the concepts of brand management and customer loyalty management reveals the poor integration of these concepts. Brand management is gradually developing and moving towards a deeper understanding of loyalty management issues within the scope of brand management, while loyalty management is also advancing towards a deeper analysis of the customer loyalty formation process, but without any particular link to brand management. This gap, we assume, reduces the potential synergistic effect of these fields, as they are not well aligned and do not contribute enough to the common goal of building customer loyalty to the brand.

3. The customer loyalty chain and its place in brand management and customer loyalty management

A possible solution that would bridge brand management and customer loyalty management could become our own approach. It allows not only to focus on the formation of customer

attitude during the brand creation process, but also take control of the cognitive-affective processes that form customer loyalty thus influencing the formation of customer loyalty. We argue that this can be achieved by incorporating the concept of Customer Loyalty Chain into the brand settings.

Our approach builds on previous studies [Nam J., Ekinci Y., Whyatt G, 2011; Cuong, 2020] and completes the connectors they suggest between brand management and management of customer's loyalty, attitude [Keller, 2001], and trust [Olsen, Johnson, 2003; Dabholkar, Sheng, 2012]. This approach allows to connect the studies of the cognitive-affective processes of the customer [Bowden, 2009; Banyte, Dovaliene, 2014; Granados et al., 2021] that affect the formation of customer loyalty and brand management.

Graphically, this can be represented as follows:
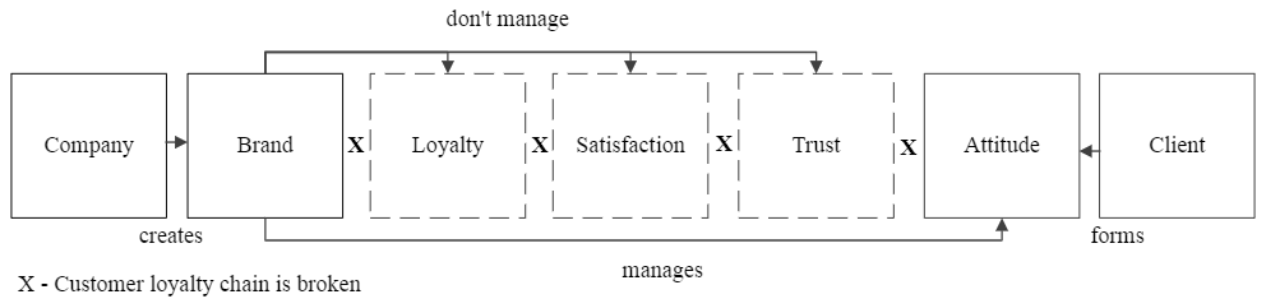
Figure 2a. The gap between brand management and customer loyalty management. Created by the author of this report.
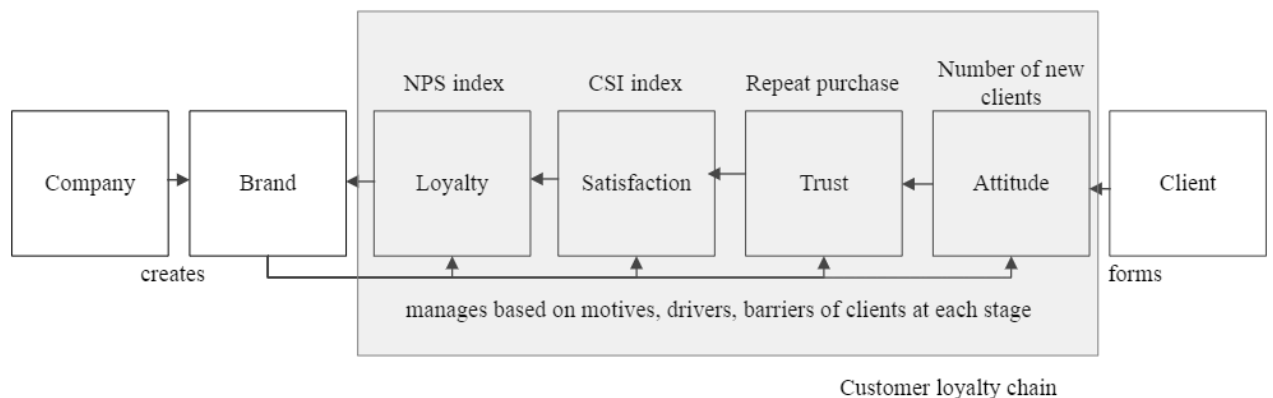
Figure 2b. Our approach to the integration of brand management and customer loyalty management through the Customer Loyalty Chain and implementation of this chain in brand management. Created by the author of this report.

Our approach depicted in Figure 2b helps to solve the problem posed by [Kapferer, 1996], who states that customer loyalty is vital for business success, and one needs to understand how it can be integrated into the identity of the brand. This approach allows us to view the process of building customer loyalty to the brand holistically and embed the key factors that foster customer loyalty into the brand identity. Understanding the nature of customer loyalty formation in brand management gives the opportunity to the company to manage the process of formation of customer loyalty effectively.

Moreover, our approach provides a set of metrics to assess the effectiveness of this process, because it allows us to measure the effectiveness of management of each single connector in the chain of customer loyalty formation to the brand.

Our approach to the integration of brand management and customer loyalty management is based on the construction of the Customer Loyalty Chain and its implementation in brand management.

The concept of the Customer Loyalty Chain can be defined as follows: Customer Loyalty Chain is a set of consecutively described expectations of the customer that, if met by the company, can generate a positive attitude, trust and satisfaction of clients and manage their loyalty.

The customer with his or her expectations are the core of this concept. Building a chain of customer loyalty formation or a chain of a specific category (if the brand has not entered the market) creates the necessary foundation to develop brands that will elicit a positive response from customers.

Customer Loyalty Chain helps to identify the internal motives, barriers and drivers of the customer that influence the formation of attitude and trust towards the brand, satisfaction with interaction with the brand and loyalty to it. Therefore, it can enable businesses to control and manage customer loyalty formation to their brand if they have methods to assess the effectiveness of the brand towards success among the loyal clientele.

To form a positive attitude [Keller, 2001], it is essential to analyze the motives that influence the choice of a brand among alternatives and the factors that make the customer prefer one brand over another. A possible way to measure this can be the new customer traffic metric or the positive feedback obtained from customer surveys.

To shape trust [Olsen, Johnson, 2003; Dabholkar, Sheng, 2012], the company's strategy should be aligned with the motives, drivers and barriers that affect the customer's trust in the brand. The metrics for this can be either the repeat purchase rate (a behavioral metric) or the level of trust assessed by customer surveys (an attitudinal metric).

To achieve customer satisfaction [Cheng et al., 2011], it is important to identify customer expectations from using a product or service, understand customer barriers and drivers, and anticipate customer expectations by creating a relevant response from the company. In this case, the Customer Satisfaction Index (CSI) can be used as a metric.

Only when the positive attitude, trust and satisfaction towards the brand have been established, we can talk about the formation of customer loyalty [Jacoby, 1971; Khan, 2013] to the brand, by understanding the motives, barriers and drivers that hinder or facilitate customer loyalty to the brand and creating a quality response from the company to meet customer expectations. At this stage, the Net Promoter Score (NPS) can be used as a metric for success.

Studying the cognitive and affective processes that lead customers to develop their loyalty to brands will help determine what elements should be included in the brand identity in order to speak the same language with customers and respond clearly to their expectations. The Customer Loyalty Chain as a tool for analyzing the process of customer loyalty formation can be effective when the company aims for market leadership through customer-centric work, when it is open to changes and has or is willing to create a system of data on customer behavior.

The approach of integrating brand management and customer loyalty management through the construction of the Customer Loyalty Chain can become a new powerful tool for both brand and customer loyalty management and can realize the aspiration for market leadership, as the Chain helps to provide an understandable and appealing response from the brand to customer expectations and trigger their cognitive-affective processes to build loyalty to the brand.

4. Conclusion

The analysis of literature on brand management and customer loyalty management reveals an evolutionary nature of the research process which goes, though, in different and sometimes opposite directions. The analysis and systematization of brand management concepts [Keller, 1993, Kapferer, 1997; Urde, 1999; Aaker, Joachimsthaler, 2000; Davis, 2002; Logman, 2004; Ghodeswar, 2008; Nam et al., 2011; Cuong, 2020] and loyalty management concepts [Dick, Basu, 1994; Chaudhuri, Holbrook, 2001; Best, 2009; Bowden, 2009; Banyte, Dovaliene,

2014; Granados et al., 2021; Belli et al., 2022]show that there is no consensus in the academic community on how customer loyalty is formed and managed, and what mechanisms should be used to make the brand closer to the customer.

The paradox of the disconnect between brand management and customer loyalty management stems from the fact that brand management concepts do not examine the mechanisms of building customer loyalty, while using the loyalty metric as one of the main indicators of brand success in the market. Customer loyalty management concepts regard brand management as one of their tools to achieve loyalty, but do not provide a systematic description of this approach.

The field of studies that aims to integrate brand management and customer loyalty management, as well as the mechanisms that can serve as tools for the interrelation between brand management and customer loyalty management, remains underdeveloped and may offer promising opportunities for future research.

The paper proposes the author's approach to the integration of brand management and customer loyalty management: the concept of Customer Loyalty Chain, which can become a new tool and help businesses, by studying cognitive-affective processes of their customers, identify which ones influence the positive attitude, trust, satisfaction and, ultimately, customer loyalty towards the brand and integrate these findings into brand management, thus making the brand more appealing to customers.

Customer Loyalty Chain is a tool that will help make the preparatory research phase of brand identity creation more efficient and incorporate the principles underlying customer loyalty building into the basis of the brand that is being created in order to ensure a deeper elaboration and customization of the brand identity. It should be noted that this tool does not change the brand management model itself. However, during the first stage, it helps to better focus on customers and their expectations in terms of cognitive-affective processes of customer loyalty formation and to embed a response to the triggers of customer loyalty formation into the core of the brand.

The use of the customer loyalty chain in brand management will provide a set of metrics that can be used to assess how close the brand is to leadership through building a loyal customer base: new customer inflow, repeat purchase rate, trust index, Customer Satisfaction Index (CSI), Net Promoter Score (NPS).

This approach will help marketing experts not just create brands, but manage the formation of customer loyalty to them at the stage of brand creation, which means that they will be able to create brands that customers can understand and relate to, which in the short term will gather a loyal audience and, as a result, will ensure leadership in the market.

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Pathways for the Implementation of Digital Servitization: Effect on Firm Performance

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Abstract:
This article proposes two possible pathways for digital servitization. On the one hand, standardization pathway posits that digital transformation enables servitized firms to make their service-based business model more standardized, and as a result, scalable. On the other hand, adaptation pathway advocates that servitization enables highly digitalized firms to make their digital offer more adaptable to heterogeneous customer needs, and as a result, customizable. We use a survey to 127 Spanish companies to test these relationships using PLS-SEM to test single- and multi-mediation models. Results corroborate the existence of both pathways, but also suggests that standardization pathway is more efficient than the adaptation pathway. This is consistent with historical transitions in adoption (services existed before digital transformation) and services being dependent on digital technologies to be delivered remotely. These findings are important as show that the weight of customization in digital servitization is lower than previous studies seem to suggest. Findings also point to important managerial implications.

Introduction

Digital servitization is an expanding concept [Paschou, Rapaccini, Adrodegari, & Saccani, 2020]. It brings together two apparently unconnected business trends such as digital transformation, and the combination of product and service in the same offer [i.e., servitization] to propose a superior business model [Vendrell-Herrero, Bustinza, Parry, & Georgantzis, 2017]. Previous research have shown numerous examples of a successful conjunction of these trends [Kamalaldin, Linde, Sjödin, & Parida, 2020; Paiola & Gebauer, 2020], though these studies do not theoretically and empirically distinguish between the two concepts. Hence, the literature still lacks an empirical model that separates servitization and digital transformation into two independent phenomena that can converge towards operational performance through different pathways. This study fills this gap.

The few empirical studies that separate digital transformation and servitization to see how these variables are related to business performance are unidirectional. For example, Kohtamäki, Parida, Patel, and Gebauer [2020] discuss the relationship between digital transformation and performance and the moderating effect of servitization. This vision assumes that companies embark on a digital transformation and, in doing so, realize that their digitalized offer can be better adapted to customer needs through services. So implicitly these authors consider that digital servitization is a story of customization. However, we consider that there is an alternative view. Companies could also start by servitizing and add digital capabilities to make their services more standardized and scalable.

These two seemingly opposing views of digital servitization would be in line with a central tenet in the international marketing literature: standardization versus adaptation to foreign markets. One the one hand, Subscription-based business models [Spotify] would be an example of the adaptation pathway – where the company transforms a product (e.g., CD) into a digital token [e.g., downloads], but later offers it as a service (e.g., stream) to better adapt to consumer

needs [Parry, Bustinza, & Vendrell-Herrero, 2012]. Similarly, autonomous vehicle solutions would fit with the adaptation pathway as process starts with digitalization of the resources [e.g., vehicles] and continues with the addition of customized solutions [e.g., services]. On the other hand, business models based on the shared economy [e.g., Uber] would be an example of the standardization pathway. A service (e.g., ride) becomes more efficient with more digital technologies [Reuschl, Tiberius, Filser, & Qiu, 2021]. Another example of standardization is advanced service models [e.g., Rolls Royce's Power-by-the-hour] in which manufacturing companies monitor and escalate their services through digital technologies, i.e. data obtained from sensors enable a more efficient service delivery.

In this study, we propose two mediation models. In both cases the dependent variable is operational performance (P), but in each of these models the role of Servitization (S) and digital transformation (D) is reversed, i.e., they exchange the independent variable and mediating variable roles. This allows us to associate the models to the pathways specified above. When Servitization is the mediating variable (DSP) we would speak of the adaptation pathway and, on the contrary, when digital transformation is the mediating variable (SDP) we would speak of the standardization pathway. With this approximation we can determine the relative weight of each one of the routes and therefore we can solve the question that we pose in the title – i.e., what comes first the chicken or the egg? Or in our context determine which pathway seems to be the one that offer highest complementarity between Servitization and digital transformation – the one that starts with Servitization (SDP – standardization pathway) or the one that starts with digital transformation (DSP – adaptation pathway). By testing these models on a purpose-built survey to 127 Spanish companies through Partial Least Squares Structural Equations Modelling (PLS-SEM) we find that standardization pathway seems to be more effective in deploying integrated digital servitization business models.

The article contributes to the literature in several aspects. First, it responds to several calls for quantitative studies examining how servitization and digital transformation are intertwined [Gebauer et al., 2021; Kohtamäki, Parida, Oghazi, Gebauer, & Baines, 2019]. Second, it is the first article to use frameworks widely employed in international marketing (i.e., standardization vs adaptation) to theoretically dissect the pathways towards a digital Servitization. Finally, the article offers a simple methodology that can be applied to other industrial and geographical contexts.

Hypotheses development
The standardization pathway
Digitalization has revolutionized the way businesses operate, and one of its most significant benefits is its ability to boost product standardization and scalability [Teece, 2018]. By leveraging digital tools and technologies, companies can automate and streamline their production processes, making it easier to maintain consistent quality standards across all products [Sharma & Joshi, 2023]. This not only ensures that customers receive a consistent experience but also allows companies to scale their operations more efficiently [Huang, Henfridsson, & Liu, 2022]. Furthermore, digitalization allows for real-time monitoring and analysis of production data, making it easier to identify areas where improvements can be made and to make adjustments quickly [Halawa et al., 2020].

Similarly, digital technologies have transformed how services are produced and delivered, allowing for greater standardization and scalability of services [Sjödin et al., 2020]. Through the use of digital tools such as automation, analytics, and AI, companies can streamline their service processes and ensure consistent delivery of high-quality services to their customers [Vendrell-Herrero, Bustinza, & Vaillant, 2021]. One way that digital technologies can be used to standardize services is by automating routine tasks [Leminen et al., 2022]. Automating tasks such as appointment scheduling, data entry, and customer inquiries, can enable companies to reduce the risk of human error and ensure that the same process is followed every time. This

improves the quality and consistency of the service, which is essential for building customer trust and loyalty. Digital technologies also allow for the use of standardized service platforms, which can be easily replicated and scaled up as needed [Choi, Feng, & Li, 2020]. For example, companies can use cloud-based platforms to deliver services, allowing for seamless integration with other software systems and enabling the service to be accessed from anywhere in the world. This makes it easier to deliver services to a larger customer base, increasing the scalability of the service offering.

In sum, we argue that digital technologies offer a range of tools and capabilities that can be leveraged to standardize services and increase scalability [Linde, Frishammar, & Parida, 2023], thus enabling companies to follow a standardization pathway. This would consist on adding services to the product offer (servitization) followed by the inclusion of digital technologies that enable higher efficiency in service provision leveraged by standardization. In that way, as shown in Figure 1, we posit that digitalization mediates the relationship between servitization and firm operational performance (Servitization– Digitalization - Performance, SDP route).

Hypothesis 1: Digital transformation mediates the relationship between servitization and operational performance.

- Insert Figure 1 –

The adaptation pathway

Servitization enables companies to adapt and customize their products according to the specific needs of their customers [Rabetino, Harmsen, Kohtamäki, & Sihvonen, 2018]. By providing services that are tailored to the individual needs of customers, companies are able to increase the value of their products and build stronger relationships with their customers, leading to increased customer satisfaction and loyalty [Sousa & da Silveira, 2019]. By providing customized services, companies are able to differentiate themselves from their competitors and offer unique value to their customers.

We argue that firms that have gone through a digital transformation can leverage on servitization to enhance and personalize their offer to match consumer needs. For example, a highly digitalized firm that produces transport equipment can use IoT sensors to monitor the performance of their equipment in real-time [Vendrell-Herrero et al., 2021]. This data can then be commercialized as a service. Consumers will benefit by knowing precise predictions on when maintenance is needed or when upgrades are necessary. This service not only ensures that the equipment is always performing at its best, but it also provides customers with a more personalized experience that is tailored to their specific needs. This argument is consistent with Kohtamäki et al [2020]. They found that digitalization without servitization capabilities lead to negative returns, and therefore, servitization is a necessary condition for highly digitalized firms to remain competitive.

In sum, we argue that servitization offers a range of customization capabilities that can be leveraged to better adapt firm's offers to specific consumer needs, thus enabling companies to follow an adaptation pathway. In this sense, we consider that a possible pathway of digital servitization can start by investing in digital transformation, and then be followed by a service implementation that enables a more customized offer, and therefore, more engaged and satisfied consumers. In that way, as shown in Figure 2, we posit that servitization mediates the relationship between digitalization and firm operational performance [Digitalization – Servitization – Performance , DSP route].

Hypothesis 2: Servitization mediates the relationship between digital transformation and operational performance.

- Insert Figure 2 -

The prevalence of standardization

So far, we have argued that there are two possible routes to take advantage of digital servitization: the standardization pathway (or SDP route), and the adaptation pathway (or DSP route). In this section, we discuss which of these routes is likely to prevail in the longer run.

We argue that the standardization route will prevail for two reasons. First, there is a historical reason. The servitization literature emerged in the last two decades of the twentieth century with two seminal articles [Vandermerwe & Rada, 1988; Wise & Baumgartner, 1999]. That literature presented servitization as a downstream move that was difficult to scale. This trend continued with a series of conceptual [Oliva & Kallenberg, 2003; Tukker, 2004] and empirical [Kastalli & Van Looy, 2013; Neely, 2008] studies. But it was only after 2017 when digital servitization emerged. Digital technologies make it possible to scale services, and from that moment digitalization and servitization seem to be inseparable terms in the servitization literature. But this is not the case in the digitalization literature, which seems to have its independent line of research [Gong & Ribiere, 2021]. This argument seems to indicate that servitization cannot be separated from digitization, but digital transformation can be seen as independent of servitization.

Second, we argue that the success of servitization is dependent on the digital capabilities. A limitation of services, despite its capacity to generate added value for the customer, is that they are hardly scalable, which limits firm growth [Gebauer et al., 2021]. We consider that this is the fundamental value that digitalization has brought. Through digitalization, services can be offered remotely and more efficiently [Opazo-Basáez, Vendrell-Herrero, & Bustinza, 2022]. This dependency does not happen the other way around. Digitalization can benefit from the value of customization on sporadic occasions, but it is not necessary condition to implement scalable digital business models [Mithani, 2023].

In sum, we argue that the standardization pathway [SDP route] will be superior to the adaptation pathway because historical and dependency reasons. Based on these arguments, we posit the following hypothesis:

Hypothesis 3: The mediation role of digital transformation in the SDP route is stronger than the mediation role of Servitization in the DSP route.

- Insert Figure 3 –

Data and method

The sample, drawn from the SABI database, includes Spanish companies from the industrial sector, specifically from manufacturing and technological services. We used the industrial codes from the Spanish *Clasificación Nacional de Actividades Económicas* [INE, 2009] to classify firm's industries. Digital transformation is driving the systematic restructuring of organizations, leading to the establishment of a dedicated department or functional area within the organizational structure specifically focused on digital transformation [Kretschmer & Khashabi, 2020]. The sample consisted of companies with more than twenty employees and a department of digital transformation. Many of these companies are engaged in international activities, while others belong to international companies or groups of companies. A total of 349 Spanish companies constituted the population. To ensure that respondents were acquainted with survey questions, we limited the participation to managers holding one of the following roles: operations or production manager, digital transformational manager, human resources manager, and innovation or marketing manager. These managerial positions are characterized by having a comprehensive understanding of the company and its products, enabling them to accurately evaluate the concepts of servitization, digital transformation, and operational performance.

We designed a questionnaire that was reviewed by four seasoned scholars from reputed universities. Moreover, a pre-test was conducted in four companies, using interviews to improve the clarity of the questionnaire and ensure effective, accurate and unambiguous communication with the respondents. Data collection started by sending a private message on LinkedIn to

targeted managers encouraging them to participate in the study. This message explained the purpose of the research, data collection procedures, and confidentiality policies. Once they accepted to participate, we sent them a link to the electronic questionnaire. Data collection took place between May and July 2022.

Finally, we received 127 complete answers, which represents a response rate of 36.4% of the study population, similar to the ones obtained by other survey-based studies in management field. Roughly two thirds were in manufacturing and the rest in technological services. Respondent and non-respondent companies were compared in terms of general characteristics and model variables. These comparisons did not reveal any significant differences, suggesting no response bias. The study design aimed to ensure representation in terms of size, sector, age and annual volume of sales.

Analysis and results

We employed Partial Least Squares Structural Equations Modelling [PLS-SEM] methodology to test the hypotheses. We used conventional maximum likelihood estimation techniques to test the model [Jöreskog & Sörbom, 1996], thereby suggesting that the nomological network of relationships fits the data [Figure 4].

- Insert Figure 4 -

Beginning with the SDP pathway, which corresponds to Hypothesis 1, we have identified the direct links between servitization and operational performance [referred to as DL_1 in this study] and between servitization and digital transformation (referred to as DL_3) (see Figure 4). In relation to the SDP path, we have calculated a parameter $\beta_{SDP} = 0.195$, with a p-value < 0.001.

The pathway referred to as DSP, which serves as the basis for Hypothesis 2, establishes the direct relationship between digital transformation and operational performance (DL_2), as well as the link between digital transformation and servitization (DL_4) (see Figure 4). The PLS-SEM methodology utilized in this study reveals values of $\beta_2 = 0.430$ with a p-value < 0.001 for the direct relationship of digital transformation with operational performance, and a parameter $\beta_4 = 0.422$ with a p-value < 0.001 for the relationship between digital transformation and servitization. These findings are consistent with the current state of the art and provide substantial evidence for our research.

Once the direct relationships have been examined, we can now move on to studying the indirect relationships and, consequently, our second hypothesis. For the DSP path, we have calculated a parameter $\beta_{DSP} = 0.083$ with a p-value < 0.001. The confidence intervals for the mediating effect of H_2 (DSP) range from 0.027 (lower limit at 2.5%) to 0.158 (upper limit at 97.5%).

In order to verify the third hypothesis of the research, the direct effects and the mediating effects of hypotheses 1 and 2 were measured as a percentage, by means of the parameters β. For the SDP path, we compared the percentage represented by β_{SDP} versus the sum of β_{SDP} and β_1, while for the DSP path, we considered β_{DSP} and β_2, and compared the percentage representing β_{DSP} versus the sum of β_{DSP} and β_2.

The data show that the mediating effect of digital transformation between servitization and operational performance (SDP), is greater than the effect of servitization between digital transformation and operational performance (DSP). Specifically, in the SDP pathway, it is evident that 49.4% of the total effect is attributed to the mediation of digital transformation between servitization and operational performance, while the remaining 50.6% represents the direct effect of servitization on operational performance. This finding emphasizes that companies pursuing a servitization strategy must recognize the significant role of digital transformation in enhancing their operational performance. Conversely, in the DSP pathway, the direct effect of these two constructs accounts for 83.7%, while the mediating effect of servitization between digital transformation and operational performance amounts to 16.3%. This validates our third

hypothesis, highlighting that the mediation role of digital transformation in the SDP pathway is stronger than the mediation role of servitization in the DSP pathway.

Discussion and conclusion

Previous studies coincide in identifying digital servitization as an element that enhances firms' competitive advantage [e.g., Kamalaldin, Linde, Sjödin, & Parida, 2020; Paiola & Gebauer, 2020]. However, most studies see digital servitization as an indissoluble construct, meaning that not enough attention has been paid to the role of each one of its two components: servitization and digitalization. Given the growing relevance and topicality of this firm activity, it is of great relevance to dissect its characteristics and understand how to implement it in order to maximize its impact on firms' performance. The aim of this study has been to fill this gap, or in other words, describe how digital servitization unfolds and impacts performance, according to the chosen implementation path.

To address this research gap we propose and test two symmetric simple mediation models, by using a purposely built survey addressed to Spanish manufacturing and technological service firms. Our findings indicate that although both variables can mediate the relationship between the other variable and operational performance (SDP in Hypothesis 1 and DSP in Hypothesis 2), the role of digital transformation as a mediating variable is substantially stronger (49% vs 16%), suggesting that servitized companies that add digital technology to their services benefit more from digital servitization than highly digitalized companies that add services to their offer (Hypothesis 3). Additionally, for robustness purposes two models of multiple mediation show qualitatively similar results. This is an important empirical contribution based on the recommendations offered by Thoemmes [2015]. We consider that moving forward this empirical approach may help in disentangling other 'what is first, the chicken or the egg?' type of questions as can be work-family conflict [Nohe et al., 2015], export-productivity [Vendrell-Herrero, Darko, Gomes, & Lehman, 2022] or entrepreneurial orientation- firm performance.

These findings point to a set of related conceptual implications for two important streams of literature. First, this study contributes to the digital servitization literature by responding to several calls for research that shows how digitalization and servitization are intertwined [Gebauer et al., 2021; Kohtamäki et al., 2019]. The prevalence of digitalization as a mediating variable suggests that, contrary to the conclusions from previous studies [e.g., Kohtamaki et al., 2020], most successful digital servitization seems to be a story of service scalability and not of product customization. This is an important contribution as it suggests that servitization is a starting point towards digital servitization. This is in fact consistent with the historical process of adoption of service and digital business models [Kohtamäki et al., 2022; Favoretto et al., 2022] and the fact that services depend on digital capabilities to be delivered remotely, and thus be standardize and scalable [Gong and Ribiere, 2021; Linde et al., 2021].

Second, this article builds on the product standardization vs adaptation debate by moving it from international marketing domain to the technology [and knowledge] management domain. By doing this, this study responds to calls in technology management for more research connecting flexibility and standardization [Shalley & Gilson, 2017]. This study shows that most features that normally characterize product standardization are shared by digitalization [e.g., scalability] and that most features that normally characterize product adaptation are shared by servitization (e.g., customization). In this way, the study can differentiate between two digital servitization implementation pathways: standardization and adaptation.

This study also points to important managerial implications. First, according to our findings, managers should perceive servitization as the starting point of digital servitization. This means that digital technologies should be implemented at a later stage to ensure scalability of services. Second, consistently with our robustness test, human capital is an antecedent of both servitization and digital transformation. This means that managers interested in implementing digital servitization in their organizations will need to ensure that they have an appropriate level of human capital before doing further investments.

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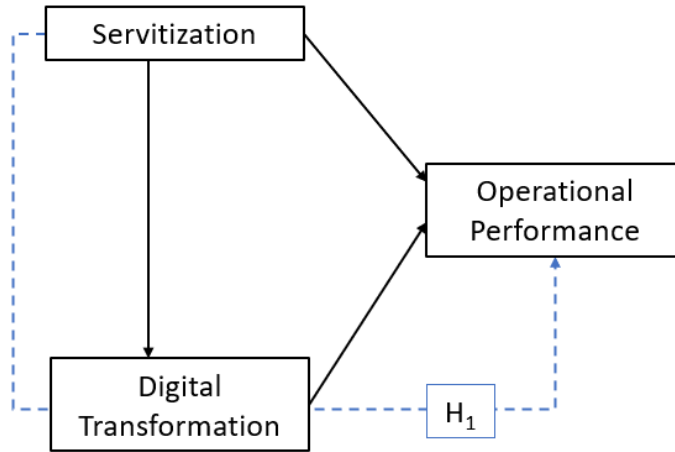
Figures

Figure 1. Standardization Pathway
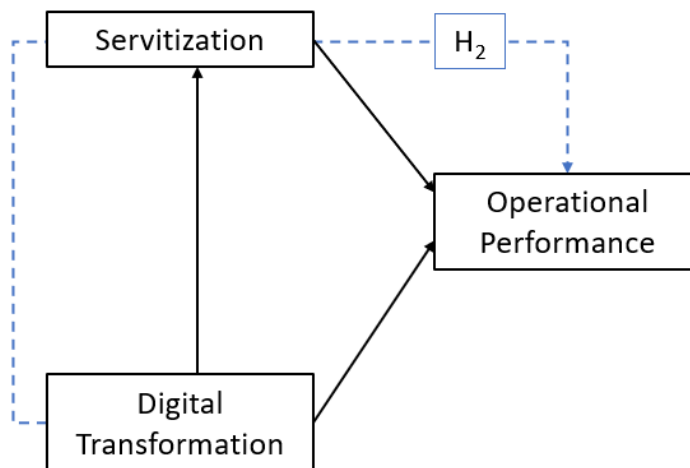
Figure 2. Adaptation pathway
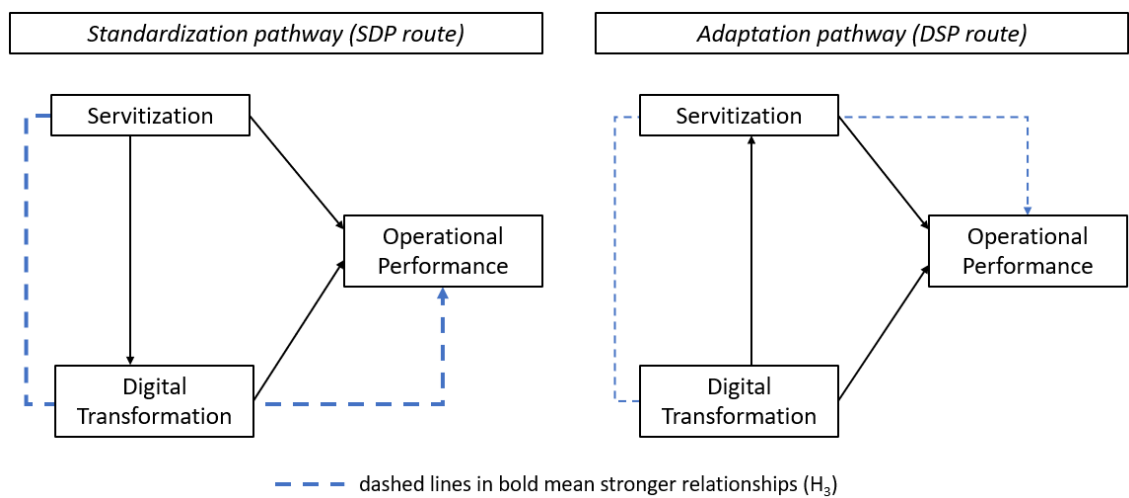
Figure 3. Weighting digital servitization pathways
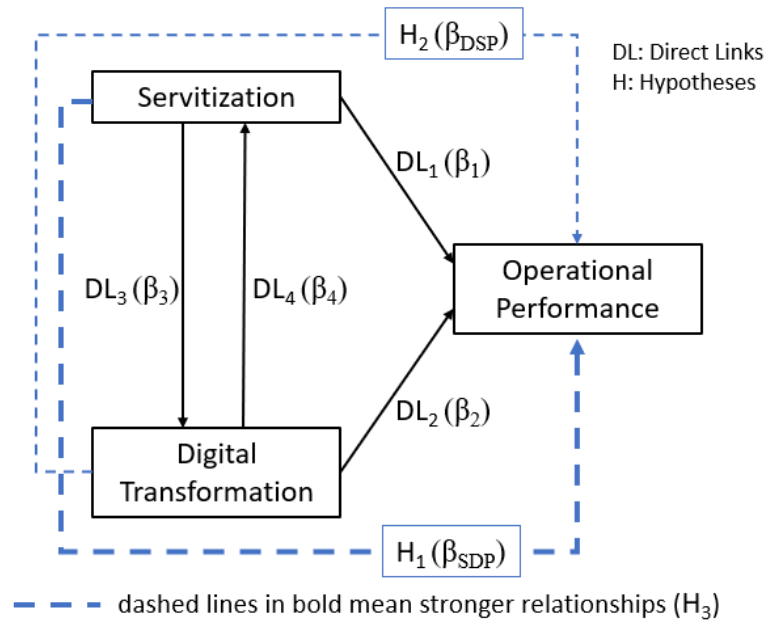
Figure 4. Conceptual model with direct links [black solid lines] and mediation hypotheses [blue dashed lines].

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On Improving Effectiveness and Increasing Efficiency in the Public Sector

Technical Change and Wage Premiums amongst Skilled labor: Evidence from the Economic Transition

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Abstract:
Skill-biased technical change (technology shifts favouring certain workers; SBTC) is the mainstream theory on wages. I present an SBTC model that explains two research puzzles of economic transition: a drop and an increase in college returns and a transformation recession. This shows that economic transition fits into the SBTC framework settling three academic debates: (1) 'Big Bang' versus gradualism in economic reform; (2) the place of the economics of transition in literature; (3) whether Russia is a 'normal country.'

1. Introduction

The Russian economy is marked by two primary research puzzles that occurred following the dismissal of central planning. The first puzzle (referred to as Puzzle A for clarity) is the increase in returns on a college degree; the second puzzle (Puzzle B) is the simultaneous decline in output. These puzzles are shown in Figure 1. Both of these puzzles have attracted significant research attention.

A common theme in the theories regarding the output decline is reorganization (Ickes 2016). Meanwhile, the increase in college returns is typically attributed to initial wage adjustments, while the subsequent reduction is explained by the rising number of college graduates (e.g., Kyui 2016; Belskaya, Sabirianova Peter, and Posso 2020). These research directions do not interact with each other, and a unified theory that links them is absent.

This paper lays out an alternative theory that can reconcile these two research directions and offer a uniform explanation for both puzzles. The theory is centred around a significant demand shock for law and business (LB) skills triggered by the sudden removal of the central planner. The lack of supply caused a decline in economic performance and the subsequent adjustment on the labour market supply side to accommodate the demand for LB skills. What's crucial is that this argument is grounded in SBTC, a mainstream concept in wage theory.

Before the model is introduced, I briefly summarise the SBTC literature.
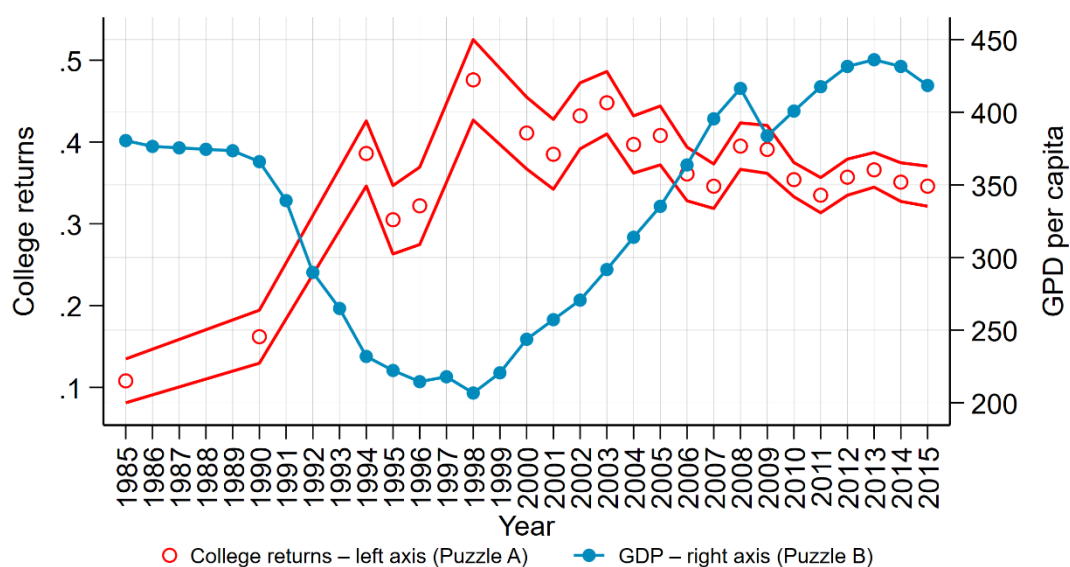
Figure 1. Two research puzzles of the Russian economy: increase in college returns and drop in economic output in the 1999s. College returns are shown with standard errors. GDP is in per

capita terms calculated in constant prices and local currency.
Source: Alexeev (2023, Figure 1)

1.1 Skill-biased technical change

The traditional view of economic growth, as introduced by Solow (1957), has been characterized by factor-neutral technical change. For illustrative purposes, let's consider an aggregate production function given by $Y = ZK^\alpha L^{1-\alpha}$

Here, Y represents aggregate output, K stands for aggregate capital, L denotes aggregate labour, α indicates the elasticity of output to capital, and Z represents total factor productivity (TFP). In competitive output and input markets, the share of income attributed to capital equals α. Then armed with an estimate of α and measures of (Y, K, L) from national accounts, neutral technical change can be quantified 'residually.' This approach to growth has dominated the literature for decades, creating an overwhelming consensus that neutral technological improvements are the primary source of growth in income per capita.

This approach fails to explain the significant increase in inequality, particularly the sharp rise in the wages of skilled labour relative to unskilled labour, despite a substantial increase in the supply of skilled labour. Katz and Murphy (1992) generalized the above function by introducing a differential between skilled L_s and unskilled labor L_u: $L = [(A_s L_s)^\sigma + (A_u L_u)^\sigma]^{1/\sigma}$

Here, A_s and A_u represent the factor-specific productivities. The authors showed that the ratio A_s/A_u is increasing; thus, economic growth favours skilled labour. The ultimate reason for this bias has been found to be the introduction of computers, which led to an increase in the relative productivity of skilled labour. This, in turn, raised its relative demand and, all else being equal, the skill premium (Autor, Katz, and Krueger 1998).

This discovery that rapid technological changes require the retraining of labour for optimal technology-skill complementarity gave birth to a rich literature (Violante 2016). To generalize SBTC beyond computers, economists came to use the term general-purpose technology (GPT) to describe technological advances that (1) pervade many sectors, (2) improve rapidly and (3) spawn further innovations. Some examples of GPT include electricity or steam engines (Rousseau 2016).

The latest strain of SBTC literature is on organizational change, showing that in some cases, organization technologies satisfy the definition of GPT (Caroli and Van Reenen 2001; Bresnahan, Brynjolfsson, and Hitt 2002; Milgrom and Roberts 1990; Garicano and Rossi-Hansberg 2006; Dessein and Santos 2006). The market-based organization of production naturally fits this definition.

2. Economic transition as SBTC

The most parsimonious formulation of economic transition as SBTC does not request an explicit parameterization of the aggregate output:
$$Y = f(Z, L_u, L_s, K) \qquad (1)$$
The only standard assumption is that Y is increasing in all arguments

Equation (1) put no structure on theory, leading to a the question is how to capture economic transition within this framework. What is the unique feature so definitive that it can be expressed unequivocally through mathematical analysis?

A market economy is characterized by chronic frictions driven by contractual and informational imperfections between firms and between firms and clients. In a command economy, these frictions are minimized, and what remains is easily managed by the central planner. In a market economy, these frictions are addressed by individuals with LB skills.

This simple augmentation of skilled labour, L_s allows for shifts in work needed to be done by LB workers.
$$L_s = \left(\gamma L_\ell^\theta + L_\ell^\theta\right)^{1/\theta}. \qquad (2)$$

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Here, γ allows for a change in the relative productivity of LB graduates, denoted by subscript ℓ, relative to other specializations, denoted by $\bar{\ell}$. The parameter γ can be considered as a change in the demand for LB skills, a change in the productivity of LB skills, or a share of work that needs to be performed by LB workers. Any of these interpretations support that during the onset of economic reforms, this parameter has experienced an instantaneous increase. The increase is also shown directly in Alexeev (2023)

For the back-of-the-envelope context, according to The Panel Study of Income Dynamics in the 2013 wave, law and business occupations accounted for about 15% of employed labour in the United States. In Australia, in the 2020 wave of Household, Income and Labour Dynamics, approximately 13% of the workforce was engaged in these fields. In contrast, from 1985 to 1996, the Russian economy, during the onset and early years of reforms, only 2% of the employed labour possessed these skills, according to The Russia Longitudinal Monitoring Survey (see Figure 2).

The minimalist modification of a standard SBTC model shown in (2) is sufficiently powerful to capture the main aspects of economic transition and solve the two main puzzles of the Russian economy, as I now demonstrate.

Figure 2. The LB workers return and their share in the labour force. Returns include standard errors.
Source: Alexeev (2023, Figure 5)

2.1 Puzzle A: increase and drop in college returns

Numerous researchers have independently demonstrated that Russian college graduates suffer from essential heterogeneity, complication the economic interpretation of return on education. The average college returns mask a very high return for LB workers, while other skilled labourers show fairly stable returns (Kyui and Radchenko 2021; Alexeev 2023; Gimpelson and Zinchenko 2021). Figure 2 summarizes this aspect of the Russian labour market by illustrating the estimates of college returns for LB workers and other skilled labour, as well as the share of LB workers in the employed labour force.

This further supports the SBTC interpretation of transition. Assuming that wages, W, paid in the equilibrium reflect the relative productivity of workers, Equation (1) and (2) can be solved, and the LB differential shown in Figure 2 can be captured with the following comparative statics:

$$\frac{\partial \ln(W_\ell / W_{\bar{\ell}})}{\partial \gamma} = \frac{1}{(1-\gamma)\gamma} > 0.$$

The derivative is positive: an instantaneous increase in LB worker productivity increases LB returns relative to other skilled labour.

A subsequent drop in LB returns can then be shown as the following derivative:

$$\frac{\partial \ln\left(W_\ell / W_{\bar{\bar{\ell}}}\right)}{\partial \left(N_\ell / N_{\bar{\ell}}\right)} = -\frac{1}{\theta} < 0.$$

This derivative is negative for a positive θ. Alexeev (2023) shows that the θ parameter is indeed positive. The overall wage premium in Figure 1 (a weighted average across all specialisations) mimics this massive transitory betweenmajors differential, explaining the puzzling initial increase and subsequent de cline in college returns.

This is in complete concordance with SBTC. An increase in the wage premium is transient. Only during the early adoption phase of new technology can those workers who adapt quickly reap some benefits. As time progresses, a sufficient number of workers will acquire the skills to work with the new technology, thus offsetting the wage differential (Violante 2016). What's so special about transition is that the differential takes place within the skilled labour.
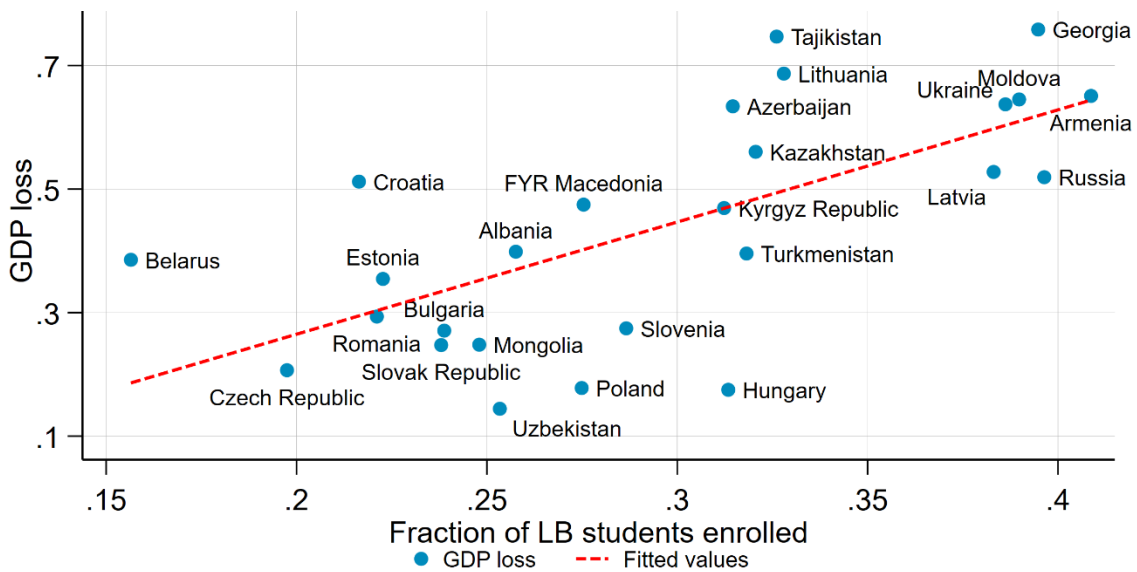
Figure 3. GDP loss and recomposition of skills during the transition. The GDP loss is a percentage decrease of real GDP during the transitional recession. The share of LB graduates in tertiary institutions after the transitional recession.
Source: Alexeev (2023, Figure 10)

2.2 Puzzle B: Transient drop in economic output

The SBTC perspective emphasizes the role of learning during episodes of radical technical change, which is in line with the initial productivity decline that occurred in most developed economies in the 1980s during the implementation of computers. At the beginning of the deployment of new technology, the output may temporarily decrease as workers and firms learn how to use the new techniques. This can easily be shown using the suggested model. Namely:

$$\frac{\partial Y}{\partial \gamma} = \frac{\partial Y}{\partial L_s} \left(L_\ell^\theta - L_{\bar{\ell}}^\theta\right)\left(\gamma L_\ell^\theta + (1-\gamma) N_{\bar{\ell}}^\theta\right)^{\frac{\theta-1}{\theta}} \frac{1}{\theta}$$

$$< 0, \text{ if } \gamma > \frac{L_{\bar{\ell}}^\theta}{L_{\bar{\ell}}^\theta - L_\ell^\theta}.$$

The output may drop in response to an increase in demand for LB graduates if the supply is sufficiently low.

To test this implication, it can be shown that the size of the differential between LB and other skilled labour (showing a spike in the relative demand) positively correlates with the

transformation recession in a cross-sectional sample of transitional economies (Figure 3). To proxy for the differential, the share of LB students enrolled in colleges is used. The logic for this proxy is that, as labour markets are competitive, an unusually high proportion of enrollments in LB implies a wage differential similar to the one shown in Figure 2. The stronger the firm signal with prices that they need for LB skills, the larger the recession.

3. Discussions

This paper presents a theory that seamlessly connects disjointed theories on transformational recession, college expansion, college returns, and the labour market. The theory is expressed through a mathematical model, which is adapted from Alexeev (2023), and meticulously refined to demonstrate with utmost clarity that an explanation for two puzzles in the Russian economy is readily accessible and intuitive.

The theory is based on a recent observation in SBTC literature that an economy-wide organizational change is effectively a technology shock. This extends to the case of transitioning from a centralized to a market-based production, as observed in the early 1990s in Russia and other traditional economies As with any technological shock, it needed complementary skills for optimal adaptation.

This perspective on transition did not pick up because SBTC literature was in a very early stage when the economic transition began. Therefore, the SBTC perspective never participated in a competition to understand the transition; instead, alternative theories took place.

Since the economic transition represents an instance within the broader framework, the usual SBTC policy recommendations immediately apply. This viewpoint simplifies (nearly trivializes) the extensive and seemingly complex debate concerning 'Big Bang' versus gradualism in economic reform (e.g., Iwasaki and Suzuki 2016; Shen, Liu, and Zhang 2019).

The SBTC perspective unambiguously supports gradualism. The optimal policy response should focus on the gradual integration of new technology, aiming at smoothing and accommodating the shock. Achieving a smoother integration in the context of economic transition entails a sequential decentralization of industries. Accommodation is realized through preemptive investments in education and training, including a strong emphasis on continuous lifelong learning and upskilling.

The SBTC view on transition also reaffirms a recent conclusion that there is no need to consider the economics of transition as a separate subfield (Olofsgård, Wachtel, and Becker 2018). It has been argued that lessons learned observing transitional economies extend to political economy and contract theory. Here I show that they also extend to SBTC, by showing that technology shift could be unusually extreme and take place within skilled labour, which has never been documented before.

Furthermore, the SBTC view contributes to Russia and a 'normal country' debate (Shleifer and Treisman 2014; Batinti and Kopstein 2022) by demonstrating that economic or political theory does not need to be altered to accommodate socialist or post-socialist economies. In particular, the inequality and poverty that often accompany technological shocks have been universally observed in the past. To minimise the potential political turmoil, the government should have pre-emptively prepared for the shock and considered income redistribution measures, such as progressive taxation and social safety nets, to mitigate the adverse effects on mis-skilled workers.

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Development of Domestic Tourism in Russia as one of the Priorities of state Policy

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Abstract:
This study focuses on the analysis of the sphere of domestic tourism in Russia. Due to the restrictions on foreign tourism caused by the current political situation in the world, there is a need to reorient to domestic tourism. The development of domestic tourism can be called one of the priorities of state policy, since the tourism sector has a large share in the country's GDP. Moreover, since 2020, after the introduction of restrictions on external tourism due to the spread of coronavirus infection, and still the state is actively developing and applying measures to develop domestic tourism. This work will be based on studying the preferences of tourists in the field of three types of tourism: cultural, recreational and sports. These types of tourism were not chosen by chance: recreational and cultural tourism are the most popular types of tourism, and sports tourism was chosen because a healthy lifestyle is actively promoted in Russia. Studying the interests of tourists will help to understand what to focus on when developing domestic tourism. Moreover, we hypothesize that there is a close relationship between tourists' preferred leisure and their preferences in tourism. This study is aimed at developing an understanding of which factors and conditions determine a particular interest of tourists in certain types of tourism and ways of organizing travel and providing relevant policy recommendations. Such an understanding should help tourist organizations better develop their growth strategies, as well as provide the government with a heads-up on how to support development of domestic tourism.

Keywords: *development of domestic tourism; tourist leisure; tourists' preferences; leisure and tourism connection; factors determining tourist interest*

Introduction

The economic crisis that followed the COVID-19 pandemic affected many different industries. Due to major changes in the business environment, the current situation in the works of many researchers has been called the "new reality"(e.g. Jacobides & Reeves, 2020; Kissinger, 2020). The tourism sector has become one of the most affected (e.g., Khalid et al., 2021; Pardo and Ladeiras, 2020). In 2020, international tourist flows were stopped due to the closure of national borders, which led to the need to reorient tourism activities to domestic tourism (e.g. Li et al., 2016; Guo et al., 2015; Haddad et al., 2013).

In this context, the experience of Russia is important. Russia is a large country with great tourist potential but whith extremely disproportionate development of the tourism industry. On the one hand, over the past two decades, Russia has become one of the world leaders in the number of outbound tourists. In 2019 Russians made 45 million outbound trips, and Russia ranked 8th in the world in this indicator (World Bank, 2019). On the other hand, the domestic tourism potential of the country is not sufficiently unlocked due to the historical predominance of outbound over inbound and domestic tourism. Such situation has caused by the lack of a comprehensive state policy for the development of the tourism industry.

The Government of the Russian Federation has recently paid special attention to supporting domestic consumer demand. This is due to the need for economic recovery from the COVID-19 pandemic, as well as the introduction in 2022 of unprecedented economic sanctions

in the European Union and the United States. The state is faced with the task of organizing tourist flows and tourist leisure. However, with an increase in demand for domestic tourism services, the unpreparedness of the destinations to receive tourists was revealed due to many factors, which include the insufficiency of the number of hotel rooms, the lack of specialists in the tourism sector in many regions, as well as problems with the organization of various types of tourist leisure (sports, cultural, entertainment, etc.).

Thus, this study aims at developing an understanding the factors influencing the interest of tourists in a particular type of tourism and the method of organizing their travel, as well as providing relevant policy recommendations for the development of domestic tourism.

International experience

Different countries develop and support the domestic tourism industry in different ways, however, there is something that unites them. Thus, the World Tourism Organization draws attention to the fact that measures to support domestic tourism in various countries primarily include a financial component. Such measures include the following:
 – issuance of vouchers to citizens for the purposes of domestic tourism;
 – tax incentives (VAT reduction on domestic flights and other tourism services);
 – providing financial support to tourism organizations, etc.

Thus, there are many examples of measures to support and develop domestic tourism from foreign experience. They can serve as a good basis for the creation of similar programs in Russia, which will help the development of domestic tourism.

Theoretical framework

Literature review

The key concept in present research is `the relationship between leisure and tourism`. Despite the differences between home (casual leisure) and outbound (tourism), Mannell and Iso-Ahola (1987) suggested that leisure and tourism have similar behavioral and psychological characteristics, such as freedom of choice, pleasure, intrinsic motivation, self-determination, and self-expression.

Leiper (1990) suggested that tourism may be the preferred form of leisure because it has characteristics that distinguish it from other leisure activities, primarily casual leisure, by seeking enjoyable leisure experiences in new destinations.

Ryan (1994) suggested that the behavioral factors that promote, inhibit and motivate leisure and tourism are likely to be similar.

Rapoport's (1975) work-family-leisure triple helix and Pierce's (1988) concept of the traveler can be used to understand how tourism can interact with leisure and other areas of life.

What is more Moore et al. called for an integrated approach to leisure and tourism as for many travel is an important part of life as more people take short trips rather than annual long summer vacations more frequently.

Currie (1997) postulated that daily leisure behavior influences tourist behavior. He suggested that while traveling, people are more likely to engage in activities similar to their daily leisure activities.

Various researchers have used leisure-based concepts such as Beard and Ragheb's (1983) Leisure Motivation Scale, Leisure Restrictions (Gilbert and Hudson, 2000) and Serious Leisure (Green and Jones, 2005) to understand tourism. However, the study of the relationship between leisure activity and tourism behavior as such is just beginning.

The theoretical framework

Based on the above-given literature review, we presume that preferred type of tourism should be considered within a model (see Fig. 1) that connects it both with the preferred type of leisure and preferred components of leisure.

Fig. 1. Leisure-Tourism Relationship Model
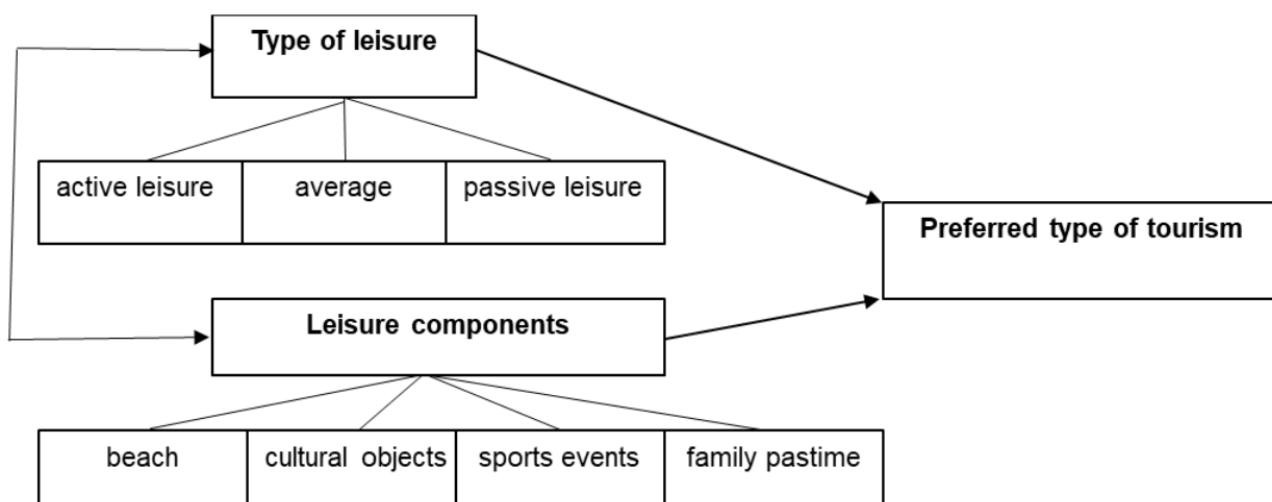
Source: authors' design

The presented model has the following principal elements:

- *Type of leisure* - type of leisure activity preferred by tourists in everyday life.
- *Leisure components* - travel leisure components preferred by tourists.
- *Preferred type of tourism* - type of tourism that the tourist prefers (beach, cultural, sports).

So, our principal research hypotheses are as follows.

H1: The choice of the type of tourism depends on the preferred type of leisure.

H2: The choice of the type of tourism depends on the preferred leisure components of the trip.

H3: There is a correlation between the preferred type of leisure and the preferred leisure components of the trip.

The formulated research hypotheses are to be tested with help of planned in-depth interviews with specialists in the field of tourism and a survey of the Russian population. The principal relationships in the theoretical framework are to be quantified using the PCA (Principal Component Analysis) and Cluster Analysis. It should be noted that all the hypotheses put forward have been confirmed.

Conclusion

In this study we pose the problem of analyzing the preferences of tourists in traveling through the relationship between tourism and leisure. Based on the literature reviewed, we develop a Leisure-Tourism Relationship Model, which reflects the relationship of such factors as the preferred type of leisure and the preferred components of leisure while traveling with the preferred type of tourism.

Empirical support of the identified relationships will help sports tourism organizations better develop their growth strategies. Efficiency and effectiveness of government actions to support the development of domestic tourism is also expected to be better analyzed based on the results of this research.

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Making a Decision on Additional Online Training by Undergraduate Students

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Abstract:
This research aims to identify factors that influence and motivate undergraduate students to taking additional online-courses apart from their study program at the university. The speed of global development and the state of the labor market leads to the fact that modern students receive additional training during their studies. It was hypothesized that career self-determination, namely awareness of the necessary skills and confidence in a future career, has the greatest impact on students' decision-making about additional training. Using principal component analysis, two pivotal segments of additional online-course students were revealed. After that, the most significant factors for decision-making were found based on both logistic regression and decision trees built for those segments. The study draws the attention of universities, the state and private educational companies to the needs of students and provides consistent policy recommendations.

Introduction

The knowledge acquired by students at universities, by the time of graduation, with a high degree of probability, may lose its relevance. 75% of schoolchildren who started their studies in 2016 will work in specialties that do not yet exist, and by 2030, 2.5 million new specialties will appear in the world [Rambler, 2021]. By the end of 2022, the share of Russians who do not work in a university specialty has become equal to 30% [Izvestiya, 2022]. All of these trends lead to the fact that modern students begin to receive additional education during their studies.

The research is aimed at identifying significant factors when students decide to take additional online training to obtain professional skills. The results of this study can be useful for commercial educational platforms to better understand the needs of the youth target audience, and for universities to adjust educational policy and develop the direction of additional education.

Research objectives:
- Identify the factors that most significantly affect the decision of students to take additional training;
- Provide recommendations to meet the needs of students in obtaining the necessary professional skills.

Literature review

The research is based on the concept of additional training, which has a specific meaning and is fixed by law. Additional training (same as continuing education or *professional development*) is a type of education that is aimed at comprehensively satisfying the educational needs of a person in intellectual, spiritual, moral, physical and (or) professional improvement and is not accompanied by an increase in the level of education [Federal Law No. 273-FZ dated 29.12.2012 "On Education in the Russian Federation", article 76]. This concept is not the same as additional professional training (or *supplementary vocational education), which includes* advanced training programs and professional retraining programs and obeys the clear rules of Russian legislation regarding the development of programs and obtaining a license.

The basic scheme of the study and the survey were compiled based on the article Greene (2015) Predictors of Retention and Achievement in a Massive Open Online Course. The authors investigated the influence of various factors on Retention&Achievement indicators in massive

open online courses using the Coursera platform as an example. The authors used data on respondents who have already enrolled in some courses on the platform, and since the idea of this study is different and aims to identify other dependencies, only some variables from the article were selected for inclusion in the theoretical framework, namely:

1. Relevance of the course to work and academics
   a. Current job related to the course topic
   b. Current academic program related to the course topic
   c. Work experience in the course topic
2. Prior experience with MOOCs
   a. Prior experience of taking massive open online courses

The block "MOOCs experience" with two variables was taken taking into account the Russian educational context: in many Russian higher educational institutions (for example, St. Petersburg State University, ITMO and others), a part of the educational programs is implemented in the form of mandatory and online courses on online platforms (Open Education, Stepik, universities' own platforms). Thus, some students somehow already have experience interacting with online courses and educational platforms, which can influence their independent decision to take additional training.

Blocks "Online Education Experience" and "Advertising" with multiple variables inside were taken from the Edmarket agency's study [2019] "How do People Choose Online Courses?"

Theoretical framework

Based on the above-given literature review, theoretical model for further quantitative research was created (see Fig. 1).

Fig. 1. Theoretical model of factors influencing students' decision to take a course
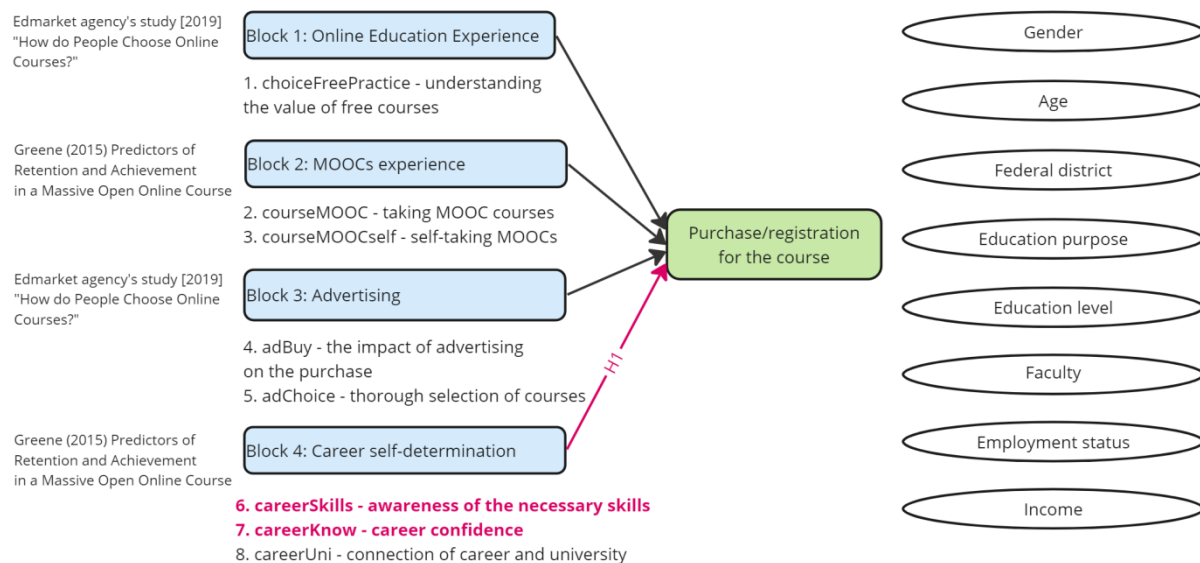
RH1: *Awareness of the necessary skills increases the likelihood that a student will buy or enroll in a course.*

RH2: *Career confidence increases the likelihood that a student will buy or enroll in a course.*

Calculation results

Initially, the student audience was divided into 2 segments using principal components analysis (PCA):

1. Those who want and love to study and take many additional courses;

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2. Those who are confident in their university and future profession and take free courses in order to dive deeper into the field of study.

The formulated research hypotheses were tested using two logistic regression models and two decision trees. Samples with different dependent variables were used for quantitative evaluation:

- Sample 1: Y = 1 = respondents who have taken at least one paid online course in the last 12 months;
- Sample 2: Y = 1 = respondents who have taken only free online courses over in the last 12 months, and they took at least one of them on their own (it was not a part of the university study program)

Analysis of **decision trees** for each sample showed that:

- *In the 1st sample, students' income is of the greatest importance when deciding whether to take paid additional training;*
- *In the 2nd sample, when deciding on free tuition, the most important factor is the high awareness of what skills students need to develop.*

For logistic model 1, answering the question "What is the probability that a student will take at least one paid online course?" (Sample 1) statistically significant coefficients are:

- *CourseMOOCself (positive sign) – taking MOOCs independently during the last year (at a significance level of 0.05);*
- *Income (positive sign) – income level (at a significance level of 0.1).*

For logistic model 2, answering the question "What is the probability that a student will enroll in at least one free online course on his own, and at the same time will not take paid courses?" (Sample 2) statistically significant coefficients are:

- *AdBuy (negative sign) – an assessment of agreement with the statement on a 5-point scale "If I accidentally see an advertisement for an online course that is useful to me, then I am quite likely to buy it if it meets my needs" (at a significance level of 0.05);*
- *CareerSkills (positive sign) – the student's confidence about what skills need to be developed for successful employment and/or career advancement (at a significance level of 0.1).*

Research hypothesis 1 was confirmed at a significance level of 0.1, but it is true only for listeners of free courses.

Conclusion

There are genuine differences between those who take paid and free courses. With the help of graph based on PCA, decision trees and logistic models, different factors of greatest importance for these two categories were found.

Students are interested in additional education, and, understanding the peculiarities of the student audience, universities, the state and private companies can create the best conditions for additional education of students that will help to achieve their personal and career goals.

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State Regional Mobile Applications in the Public Transport Sector (on the Example of St. Petersburg and Moscow)

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Abstract:
One of the key directions for the development of e-government in Russia has become the growth of regional mobile applications to facilitate interaction between the state and citizens or businesses and improve the standard of living in the cities. This research is devoted to transport mobile applications created at the initiative of regional authorities. The study focuses on Russian applications, namely the services of Moscow and St. Petersburg. Local governments often create and invest in new mobile apps, but their actual active user base is not large. The population actively downloads mobile transport applications, however, stops or even does not start using them. Our study aims to identify the level of actual intent of the population to use transport applications, as well as the factors that significantly affect this, and provide appropriate policy recommendations. This understanding should help regional authorities rethink their app development priorities and improve their strategies for working with active audiences in transport apps.

Keywords: *e-government; electronic district; mobile public transportation application usage; behavioral intention*

Introduction

The system of public administration in the Russian Federation has changed significantly since the beginning of the 21st century. These changes have been in the global emergence of a fundamentally new approach to interaction with citizens - e-government (Kiselev A., 2017). E-government is a computer system for interacting with the population of the country and structures that are not part of the system of public authorities, via the Internet and other digital means (West D., 2004.).

The transition from traditional public services to e-government services was driven by the following benefits of the system: increased cost-effectiveness of service provision, reduced administrative costs, faster adaptation to the needs of citizens (Akman I. et al., 2005). These advantages were appreciated not only by federal, but also by regional authorities, in connection with which the creation of regional services began.

An important direction in the development of regional public services has become the development of mobile applications to facilitate the procedure for interaction between the state and citizens or businesses and improve the standard of living in the regions (ABC of the Internet, 2023). Over the past 10 years, more than a dozen mobile applications have been created in Moscow alone, most of which have been downloaded more than 1 million times (Official website of the Mayor of Moscow, 2023).

Regional applications are not only actively released, but also actively downloaded by the population. For example, the Moscow Transport app has been downloaded over 5 million times (United Transport Portal of Moscow, 2023), which is more than a third of the inhabitants of Moscow. So, mobile applications for public transport have become popular among users to plan their trips to their destination in a timely manner and manage them cost-effectively (Altay & Okumuş, 2022).

However, despite the significant number of app downloads, the number of active app audience is much smaller. On the example of the application "My Moscow": download 5 million

times, the active audience is 900 thousand people (Official website of the Mayor of Moscow, 2023), which is only 18% of downloads and only about 7% of the number of topics, although the application is a regional analogue of the application "Gosulugi" and assumes the largest audience among all applications of the local government of the subject.

Thus, the population downloads government mobile applications, but stops or does not even start using them in more than half of the cases, which reflects the problem of slow implementation of e-government applications in developed and developing countries (Rana N. et al., 2015).

To sum up, this study aims to identify the level of actual intent of the population to use transport applications, as well as the factors that significantly affect this, and provide appropriate policy recommendations.

Theoretical framework

Literature review

Why and how people choose to use new technologies is one of the central questions of information systems research. Some of the most common and comprehensive models that explore the use of technology are UTAUT and UTAUT2 (Marikyan D. & Papagiannidis S., 2023).

Venkatesh et al. formed the Unified Theory of Acceptance and Use of Technology (UTAUT) using previous models and theories, namely Theory of Reasoned Action (TRA), Technology Adoption Model (TAM), Motivation Model, Theory of Planned Behavior (TPB) combining TAM and TPB model, Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT) and Social Cognition Theory (SCT). The model was intended to explain the behavioral intentions to use information technology and the subsequent behavior of the user. The UTAUT model included 4 variables that influence the intention to use new technologies: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh V. et al., 2003).

Later, the UTAUT model was supplemented by the researchers and transformed into the UTAUT2 model. The goal of creating the updated UTAUT2 model was to achieve greater universality of the model, orienting it to the segment of private users. As a result, the following impact variables were added to the updated model: hedonic motivation (pleasure to use), price value, and habit. Control variables were also added: gender, experience, age (Venkatesh V. et al., 2012).

I would also like to consider the Technology Adoption Model (TAM) mentioned above, since it has a "attitude" variable that is significant for our study, which was not included in the constructed UTAUT model (Davis F.D. et al., 1989). The variable "attitude" is significant as an influence factor in several studies that consider the specifics of the e-government industry.

One of this seminal research in "attitude" in the field of e-government and information technology was the work of Yogesh K. Dwivedi et al., who created the UMEGA (Unified Model of Electronic Government Adoption). UMEGA identifies usage "attitude" and "facilitating conditions" as the only factors influencing the behavioral intention to use e-government services. Other factors influence behavioral intention indirectly through attitude, these factors are expected performance, effort expectancy, social influence, and perceived risks. (Dwivedi Y. K. et al., 2017). Similar influencing factors were identified in the work of Nripendra P. Rana et al.: the behavioral intention the is influenced only by the user's attitude and facilitating conditions, and the attitude is influenced by the expected performance, effort expectancy, social influence, and fear of use (anxiety) (Rana N. P. et al., 2015).

The theoretical framework

Based on the above review of the literature, we proceed from the fact that transport regional mobile applications should be considered within the framework of a model (see Fig. 1) that links the actual behavioral intention of use and the factors influencing this intention.

Fig. 1. A model of citizens' intention to use government mobile transport applications
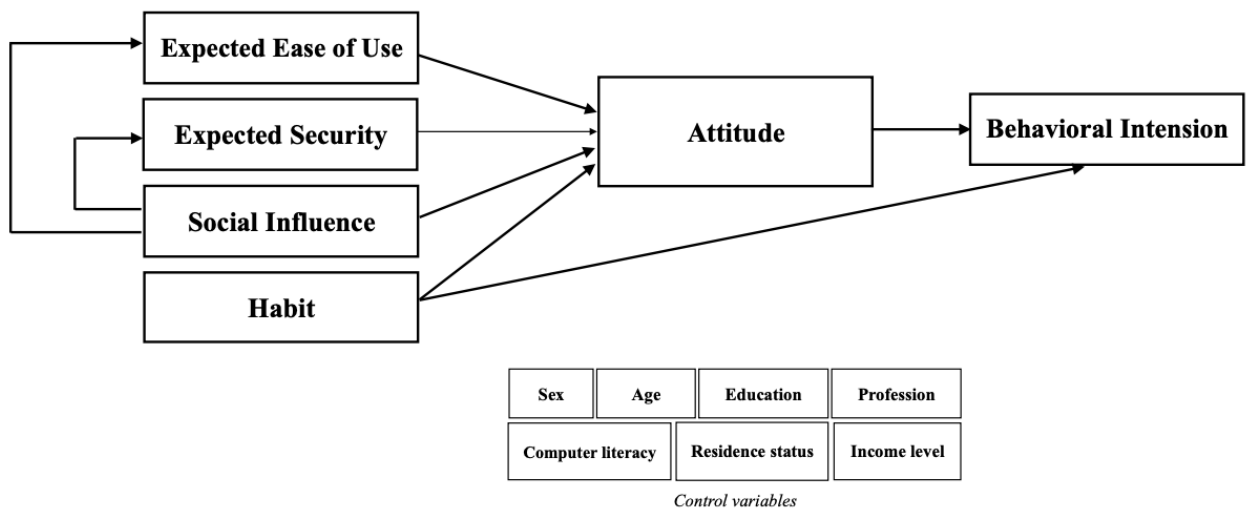
Source: authors' design

The presented model has the following principal elements:

- Behavioral Intention – a variable that reflects the willingness of users to continue using transport applications
- Attitude – a variable that reflects the attitude of users to transport regional applications, considering their experience of use
- Expected Ease of Use – a variable that reflects the usability of transport mobile applications, considering user experience
- Expected Security – a variable that reflects the level of user confidence in regional mobile applications and the expected security of their personal data, considering user experience
- Social influence – a variable that reflects the level of user exposure to social influences (friends, relatives, news, ratings in app stores, etc.)
- Habit – variable that reflects the habitual daily use of these applications

So, our principal **research hypotheses** are as follows.

RH1*: The Expected Ease of Use has a positive and significant impact on Attitude.*
RH2*: The Social influence has a positive and significant impact on Attitude.*
RH3*: The Social influence has a positive and significant impact on Expected Ease of Use.*
RH4*: The Social influence has a positive and significant impact on Expected Security.*
RH5*: The Habit has a positive and significant impact on Attitude.*
RH6*: The Habit has a positive and significant impact on Behavioral Intention.*
RH7*: The Attitude has a positive and significant impact on Behavioral Intention.*

The formulated research hypotheses are subject to verification with the help of an in-depth interview with an expert in the field of public transport applications and a survey of users of these applications. The principal relationships in the theoretical framework are to be quantified using the PLS-SEM routine.

Conclusion

In this study, we pose the problem of analyzing the intention of the population to use mobile regional transport applications in Russia (on the example of the cities of Moscow and St. Petersburg). Based on the reviewed literature, we develop our own model that captures the actual behavioral intention of the population and the factors influencing this intention and includes user attitudes towards these applications.

Empirical support should help regional authorities rethink their app development priorities and improve their strategies for working with active audiences in transport apps. Effectiveness and efficiency of government's actions in supporting such mobile application activities is also expected to be better analyzed based on the results of this research.

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Modeling the Grading Effects on Student Effort:
the Roles of Targets, Beliefs, and Explanatory Styles

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Abstract:
Academic standards in higher education can vary a lot from instructor to instructor. Yet, it remains largely unclear how the different academic standards influence student effort. I build a simple two-period model to analyze how the grades that are desired, already earned, and expected in the future influence the student's willingness to exert effort. In my model, each period, the student's utility function represents a sum of two components: the continuous disutility of effort and a dummy part for the joy of anticipating the target grade (if the amount of effort is perceived to be high enough to warrant it). I derive that in the first period, the utility-maximizing choice of effort depends on the grade target, its importance to the student, and the student's initial beliefs about their productivity. The actual grade, though, will not have to coincide with the student's anticipation; thus, having got their first-period result, the student has to attribute it to some stable or unstable factors. Under the unstable attribution, the student adjusts only their grade target; under the stable attribution, the student additionally updates their productivity beliefs. The model implies that higher initial grades, ceteris paribus, lead to lower (or at least not higher) future effort, with only one important exception: the effort dramatically jumps from zero to maximum when a low initial grade increases to the level where the student switches from giving up to being motivated. The model also predicts several kinds of grading effects depending on the student's grade target, self-beliefs, and explanatory style, and provides practical recommendations on how to motivate the different types of students.

1. Introduction

Different college instructors may hold different views on how to grade student learning; some teachers can be particularly tough graders, while others are more lenient. Little understanding is yet achieved on how the diverse academic standards affect student effort.

In this paper, I attempt to look inside the black box of student motivation and explain the study behavior as a response to the student's grading expectations and the instructor's grading practices. The aim of this paper is to build a theory of student response to the grading treatment in order to understand student motivation better, and in the future to be able to optimize the grading practices accordingly.

I build on the existing psychological theories of motivation[1] and apply the behavioral economics framework to predict the student's behavioral response to different pieces of information that they can infer from their grades. I argue that the grades convey the information in a tacit and ambiguous way: they are normally given to college students without an explanation of how they are earned; hence, the students are free to entertain all sorts of explanations of how their effort translates into grades. I suggest that the (latent) process of grade guessing and effort adjustment can play a crucial part in determining the students' study behavior.

Notably, the very first grades that a student gets can serve as an important, even if ambiguous, source of information on the student's ability, return to effort, and/or grading strictness. Depending on how the students utilize the informational potential of their initial

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[1] See an overview in Reeve (2018).

grades, their study behavior can change dramatically: e.g. a failing grade can result in a dropout decision for a student who attributes failure to a lack of ability vs. in increased motivation to study more effectively for a student who admits their wrong choice of learning strategy.

From my model, I derive recommendations on how to boost student effort, both at the beginning and within an ongoing study program. While the concept of constructive alignment (Biggs & Tang, 2007) suggests that in order to elicit maximum student effort, the instructors need to align teaching and assessment (by teaching what they test), my model implies that an additional alignment is needed: finding the optimal balance between the student's expectations (grade targets, self-beliefs, and attributional styles), and the instructor's grading practices.

2. Model

I model behavior of a student enrolled in a two-period study program. Each period i ($i = 1$, 2), the student earns an (average) grade g_i; for simplicity, the final GPA is calculated as a simple average of the two grades: GPA $= (g_1 + g_2)/2$. The student is grade-minded: they have a final GPA target G that is exogenously set and stays constant in the model.

Each period i, the student chooses their study effort based on anticipation of how their effort will be translated into the grade. I assume that the student expects their grade g_i to be represented, as a handy approximation, by a linear function of their effort: having invested effort e_i, they believe they will get *at least* $\tilde{g}_i = \alpha + \beta e_i$. Here, $\alpha > 0$ and $\beta > 0$ are the student's beliefs about the grade they can secure with no effort, and the return to effort, respectively. Varying effort on a continuum from 0 (no effort) to 1 (full effort), the student can control their anticipated grade.

I use the reference-dependent preferences framework (Kőszegi & Rabin, 2006) to model student behavior in the two periods. The grade target G serves as the reference point. The student is assumed shortsighted in the sense that each period, they choose the effort level that maximizes their anticipated utility in that period. The most important "goods" for the student are leisure and grades; and their time is constrained. So, the utility function each period i has the following simplest form:

$$U_i(e_i, \tilde{g}_i) = -e_i + \varphi \cdot 1(\tilde{g}_i \geq G_i),$$

where $e_i \in [0, 1]$ represents effort, $\tilde{g}_i$ the anticipated grade, G_i the period-i grade target, and $\varphi \geq 0$ is a measure of satisfaction of anticipating the target to be achieved.

In period 1, the student applies the utility-maximizing effort e_1^*. Then they earn the actual grade g_1, which can, in principle, deviate from their initial prediction: $g_1 \neq \tilde{g}_1 = \alpha + \beta e_1^*$. In that case, the actual result—the unexpected success ($g_1 > \tilde{g}_1$) or failure ($g_1 < \tilde{g}_1$)—needs to be somehow attributed, either in a stable internal (e.g. ability), or in a stable external way (e.g., the grading system), or to some unstable random factor (e.g. luck, sickness, or a particularly harsh grader). Then the respective initial beliefs about α and/or β can be updated, and the period grade target adjusted to derive the optimal effort in the second period.

The stable internal attribution implies that the student updates only their "ability" belief: $\alpha_{upd} = g_1 - \beta e_1^*$. The stable external attribution implies that the graders artificially discount or magnify the student's results altogether, and, thus, the student needs to (proportionately) adjust both beliefs: $\alpha_{upd} = \frac{g_1}{\alpha + \beta e_1^*} \cdot \alpha$, and $\beta_{upd} = \frac{g_1}{\alpha + \beta e_1^*} \cdot \beta$. The unstable attribution does not require belief updates, as it assumes the dissonance temporary.

Below, I derive the student effort depending on the given parameters, analyze the arising grading effects, and suggest possible policy interventions in the two study periods.

In period 1, I assume for simplicity that the target G_1 the student sets for the first period is the same as their final target: $G_1 = G$. In order to maximize the period-1 utility function $U_1(e_1, \tilde{g}_1)$, the student has to apply their initial belief about how the grade is earned: $\tilde{g}_1 = \alpha + \beta e_1$. Thus, plugging it into the utility function results in the following optimization problem:

$$\max_{e_1 \in [0,1]} U_1(e_1, \tilde{g}_1) = \max_{e_1 \in [0,1]} -e_1 + \varphi \cdot 1(\tilde{g}_1 \geq G) = \max_{e_1 \in [0,1]} -e_1 + \varphi \cdot 1(e_1 \geq e_G),$$

where e_G is the effort level that the student perceives to be enough to reach the period-1 grade target: $e_G = (G - \alpha)/\beta$.

The solution to this problem depends on the relations between the student's grade target, valuation of leisure (relative to academic achievement), and self-beliefs:

• if $\varphi = 0$ (the "no stakes" case), then $e_1^* = 0$ (the "indifferent" mode), as the student does not care about the grades, while effort is costly;

• if $0 < \varphi < 1$ (the "low stakes" case), then the student does to some extent care about grades, although their effort will also depend on the relation between the target G and the return to effort β, relative to the "free lunch" component α, and full effort is impossible to be elicited:

if $0 \leq G \leq \alpha$, then $e_1^* = 0$ (the "overoptimistic" mode), as the student believes that this low target can be achieved without any effort;

if $\alpha < G \leq \alpha + \beta\varphi$, then $e_1^* = e_G$ (the "motivated" mode), i.e., the student strategically chooses the positive amount of effort just enough to secure the target grade;

if $\alpha + \beta\varphi < G \leq \alpha + \beta$, then $e_1^* = 0$ (the "unmotivated" mode), i.e., the student believes they can achieve the target, but this will require a lot of effort which is too costly;

if $G > \alpha + \beta$, then $e_1^* = 0$ (the "hopeless" mode), i.e., the student gives up entirely because they do not believe they can achieve the target.

Note that the maximum amount of effort that the student in the "low stakes" case would exert is $e_1^* = \varphi < 1$, and it corresponds to the belief that the goal G can just be secured with this amount of effort. However, it is an unstable solution, as any marginal increase in G or decrease in β would make the goal too costly to go for, and the student would fall into the "unmotivated" mode with zero effort. A policy implication here would be to avoid setting high grade targets for students who are concerned about their grades only to a modest extent (e.g. for professional athletes): if the opportunity cost of studies is high, the student should not be expected to go for a high grade target, and a reasonable goal (e.g. passing all the exams) in this case could induce more effort than a hard, though potentially achievable one (e.g. earning a degree with honors). Also, even if the target seems realistic to the teacher, it is crucial to make it look achievable for the student: if their β-belief is too low, they can find themselves in the "unmotivated" mode or even in the "hopeless" one. Along with correcting the grade target and the β-belief, in the "low stakes" case, it can also be useful to increase the student's φ, or the value of grades relative to leisure, e.g., by using fun study materials to decrease the cost of effort;

• if $\varphi \geq 1$ (the "high stakes" case), the solutions for the "overoptimistic", "motivated", and "hopeless" modes will be the same as in the "low stakes" case. However, because now the student is highly concerned about their grade target, the "unmotivated" mode is being replaced with an extension of the "motivated" one.

Note that in the "high stakes" case, the student can, in principle, be motivated to exert full effort if they believe that it is necessary and sufficient to secure the target grade. However, the goal also needs to be set no higher than the student's full potential, and the student needs to be supported in their belief that it is achievable with full effort.

Grading effects in period 1 are the motivational effects that stem from interrelations between the student's grade target and their belief about how the grade is earned.

Note that the optimal effort in the first period depends on the grade target discontinuously (except for the degenerate "no stakes" case): it equals zero when $G \leq \alpha$, then linearly increases ($e_1^* = (G - \alpha)/\beta$) until $G = \alpha + \beta\varphi$ (the "low stakes" case) or $G = \alpha + \beta$ (the "high stakes" case), and then abruptly drops to zero. Thus, if the educator wants to maximize student effort by helping them set an appropriate grade target, in the "high stakes" case, they should not set it beyond the student's (perceived) reach ($G_{max} = \alpha + \beta$); and in the "low stakes" case, it needs to be set even lower ($G_{max} = \alpha + \varphi\beta$), taking into account the student's opportunity cost of effort.

Now consider an exogenously set grade target G, and the student's malleable beliefs α and β. The dependence of effort on the background ability belief α mirrors the dependence on the grade target: if the student is very overconfident in reaching their grade target ($\alpha \geq G$), they exert no effort; once the confidence reduces to some reasonable level ($\alpha < G$), the effort begins to continuously increase until α falls into the opposite extreme— the point of underconfidence where the effort plummets to zero.

More important here is the β-belief, though: having an extremely low belief about their return to effort ($\beta < G - \alpha$), the student cannot hope to achieve their grade target and, thus, has no motivation to go for it. However, if they get persuaded that their return to effort is sufficient ($\beta \geq G - \alpha$), then they might either go for their target grade (the "high stakes, motivated" mode) or still perceive the opportunity cost of effort as too high (the "low stakes, unmotivated" mode), preventing them from studies until the point $\beta = (G - \alpha)/\varphi$, where they start believing that the maximum amount of effort they are willing to exert ($e_1 = \varphi$) will secure them their target grade.

Theoretical recommendations for improving the students' motivation in the first study period can be summarized as follows: First of all, it is important to identify if the student has any motivation at all. If both intrinsic and extrinsic motivation is absent (the "no stakes" case), then the teacher could explain to the student the usefulness of good grades on the labor market, for postgraduate admissions, scholarships, etc. A boost in extrinsic motivation could transform the "no stakes" case into the "low stakes" or even the "high stakes" one.

Now, in order to understand how far the student can be nudged, the "high stakes" case needs to be distinguished from the "low stakes" one. If the student is very grade-oriented (the "high stakes" case), then under a proper combination of the grade target and the return to effort they will exert full effort. If the "high stakes" student shows no effort, it is important to identify whether they are (over)optimistic or, on the contrary, hopeless, as the recommended interventions in these two cases are quite different: an (over)optimistic student needs a challenging (though still feasible) goal, and a hopeless one either needs to adjust their grade target downwards, or, if their β-belief is inadequate, they need an encouragement.

The motivation of an underperforming "low stakes" student can similarly be increased both by correcting the student's β−belief and by setting a more adequate grade target. The "low stakes" student will exert no effort under three modes: "overoptimistic", "hopeless" and "unmotivated"; recommendations for overcoming the first two modes are similar to those in the "high stakes" case, and for the "unmotivated" mode the same as for the "hopeless" one. And similarly to the "no stakes" case, it can also be beneficial to increase the student's subjective value of grades.

In period 2, an additional grading effect kicks in: the effect of the period-1 grades. How the initial grades affect the period-2 effort depends on what kind of information the student derives from them. Students with the so-called unstable explanatory style attribute unexpected results to random factors (e.g. luck) which they do not expect to have further effect in period 2; thus, for them, no update of the self-beliefs is needed. Students with the so-called stable internal explanatory style derive from their grades the information about their ability (or "talent") α. And students with the so-called stable external explanatory style have to adapt to an allegedly strict or lenient grading system by (proportionately) discounting or inflating both their α and β.

Hence, at the beginning of period 2, the student gets the grade g_1, revises their beliefs about either α, or α and β, or neither of the two, and updates their period-2 goal: $G_{upd} = 2G - g_1$. Then the student solves the optimization problem again, deciding how much effort to exert in the second period.

Based on the classification of the period-1 behavioral regimes outlined above, the students' further results can be traced. Below, I consider the most informative period-1 situation where the student in the "low stakes" case ($0 < \varphi < 1$) operates in the "motivated" mode by exerting positive, grade-seeking effort: $e_1 = e_G = (G - \alpha)/\beta$. (The "high stakes, motivated" case solution can be got from the "low stakes, motivated" one immediately by replacing φ with 1.)

The "low stakes" case, initially "motivated" mode represents the behavior of the student who in the first period went after their goal G because they perceived it to be within reason- able reach: $\alpha < G \leq \alpha + \beta\varphi$. In the second period, their effort will additionally depend on their initial grade g_1, and on the attributional style they use to explain the deviation (if any) of their actual grade from the one they anticipated (see Fig. 1):

Figure 1: Causal effect of initial grade on further effort
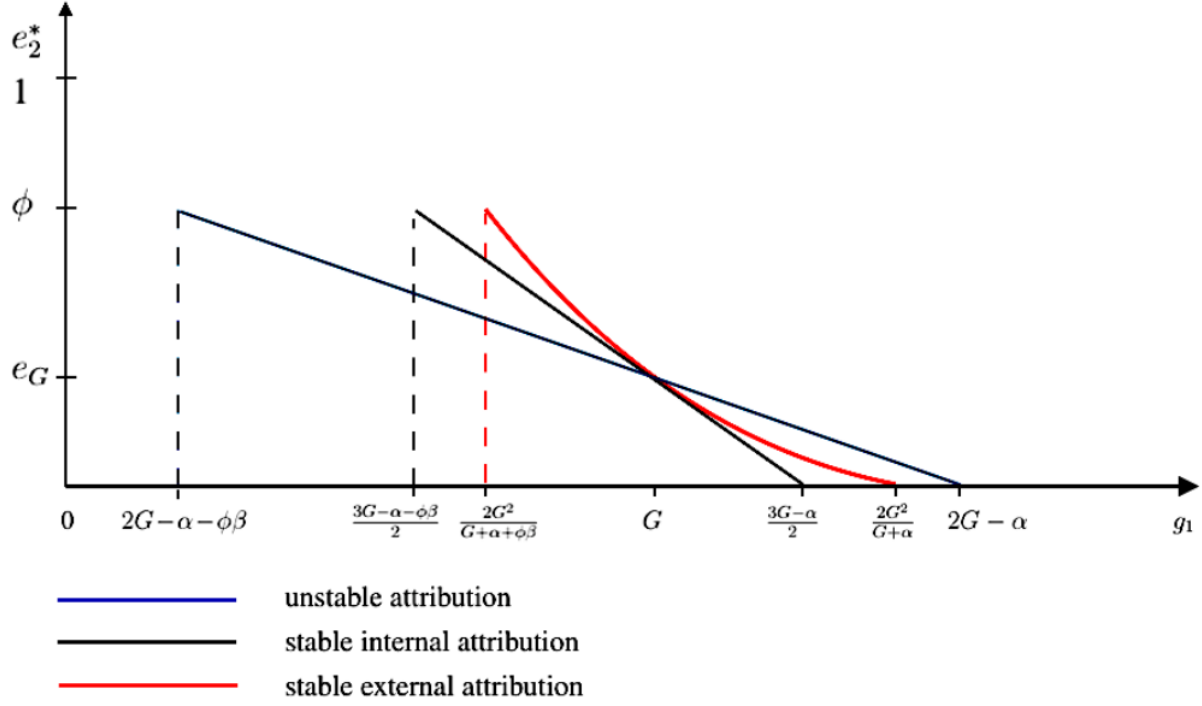
• Under the unstable attribution (see Fig. 1, blue graph), the student changes their beliefs about neither α, nor β, they only need to adjust their period-2 target $G_{upd} = 2G - g_1$, derive their new target-ensuring effort level $e_{Gupd} = (G_{upd} - \alpha)/\beta = (2G - g_1 - \alpha)/\beta$, and, depending on its value, decide whether to go for the target or not:

if $g_1 < 2G - \alpha - \varphi\beta$, then $e_{Gupd} > \varphi$, thus, the target is not worth pursuing, and $e_2^* = 0$ (the "unmotivated" or "hopeless" mode);

if $2G - \alpha - \varphi\beta \leq g_1 < 2G - \alpha$, then $0 < e_{Gupd} \leq \varphi$, thus, the target is reasonable, and $e_2^* = e_{Gupd}$ (the "motivated" mode); note that this interval of the initial grade values—from somewhat lower to somewhat higher than the target—covers the situations where the student strategically uses their initial grade value to adjust their effort in order to finally score the desired grade. Thus, scoring in period 1 slightly higher (lower) than the target leads to a respective decrease (increase) of effort in period 2: $\partial e_2^*/\partial g_1 = -1/\beta < 0$; the negative grading effect is stronger for students holding weaker beliefs about return to effort;

if $g_1 \geq 2G - \alpha$, then $e_{Gupd} \leq 0$, thus, the target is perceived to be achievable even without effort, and $e_2^* = 0$ (the "overoptimistic" mode).

Note that the unstable attribution literally brings the student back to the period-1 problem, just with a potentially new grade target G_{upd}. And as in period 1, to promote positive effort, the target grade G had to range from α to $\alpha + \varphi\beta$, so in period 2, must the initial grade g_1 range from $2G - \alpha$ to $2G - \alpha - \varphi\beta$, to place the new target $G_{upd} = 2G - g_1$ in the original range: between α and $\alpha + \varphi\beta$. Thus, the unstable attribution does not needlessly narrow the student's opportunities.

• Under the stable internal attribution (see Fig. 1, black graph), the student has $\alpha_{upd} = \alpha + (g_1 - G)$ and $e_{Gupd} = (3G - 2g_1 - \alpha)/\beta$. This grade-ensuring effort level e_{Gupd} also can be either

unreasonable ($e_{Gupd} > \varphi$), or reasonable ($0 < e_{Gupd} \leq \varphi$), or unnecessary ($e_{Gupd} \leq 0$), giving rise to the following subcases:

if $g_1 < (3G - \alpha - \beta\varphi)/2$, then the target is not within easy reach, and $e_2^* = 0$ (the "unmotivated" or "hopeless" mode); mentors, having discovered students' unrealistic goals or pessimistic self-beliefs, may want to suggest more reasonable goals and/or productivity beliefs, and introduce the growth mindset (see, e.g., Dweck (2006)); teachers are also advised not to give such harsh grades to effort-exerting students, as in this case, being a bit more lenient could make a difference between the student dropping out, and exerting maximum effort;

if $(3G - \alpha - \beta\varphi)/2 \leq g_1 < (3G - \alpha)/2$, then the target is adequate, and $e_2^* = e_{Gupd} = (3G - 2g_1 - \alpha)/\beta$ (the "motivated" mode); within this interval the grading effect $\partial e_2^*/\partial g_1 = -2/\beta$ is twice as strong as under the unstable attribution (here, the initial grades matter more because they affect not only the future grade target, but also the ability belief);

if $g_1 \geq (3G - \alpha)/2$, then the student expects the target to be achieved even without effort, hence $e_2^* = 0$ (the "overoptimistic" mode).

Note that the stable internal attribution significantly limits the student's opportunities: while in period 1, the motivating grade target G could vary with a range of $\varphi\beta$ (from α to $\alpha + \varphi\beta$), in period 2 the range is only half as wide, because the motivating G_{upd} lies between $(G + \alpha)/2$ and $(G + \alpha + \beta\varphi)/2$; also, in this case, the range of g_1 values motivating positive e_2^* is only half the width of the interval for the unstable attribution.

• Under the stable external attribution (see Fig. 1, red graph), the student has $\alpha_{upd} = \alpha g_1/G = \alpha g_1/(\alpha + \beta e_1)$, $\beta_{upd} = \beta g_1/G = \beta g_1/(\alpha + \beta e_1)$, and $e_{Gupd} = 2G^2/(\beta g_1) - 2\alpha/\beta - e_G$. Again, depending on whether e_{Gupd} lies between 0 and 1, there are three cases:

if $g_1 < 2G^2/(G + \alpha + \beta\varphi)$, then the target is perceived to be out of easy reach, and $e_2^* = 0$ (the "unmotivated" or "hopeless" mode); note that the externally attributing students switch to giving up even under higher levels of unsuccessful grades than the internally attributing ones ($2G^2/(G + \alpha + \beta\varphi) > (3G - \alpha - \beta\varphi)/2$): while, facing failure, the internally attributing lose confidence only in their background ability, and thus can begin studying harder, the externally attributing also depreciate their return to effort which leads them to the quicker giving-up;

if $2G^2/(G + \alpha + \beta\varphi) \leq g_1 < 2G^2/(G + \alpha)$, then the target is adequate, and $e_2^* = e_{Gupd} = 2G^2/(\beta g_1) - 2\alpha/\beta - e_G$ (the "motivated" mode); note that here the externally attributing students exert somewhat more effort than the internally attributing ones. The grading effect here is $\partial e_2^*/\partial g_1 = -2G^2/(\beta g_1^2) < 0$, which is again stronger for students holding less confident β-beliefs. In addition, the strength of the grading effect decreases with the initial grade; for $2G^2/(G + \alpha + \beta\varphi) \leq g_1 < G$, the grading effect is stronger than the constant grading effect $\partial e_2^*/\partial g_1 = -2/\beta$ for the internally attributing students, and for $G < g_1 < (3G - \alpha)/2$ it is weaker;

if $g_1 \geq 2G^2/(G + \alpha)$, then the student expects the target to be achieved even without effort, hence $e_2^* = 0$ (the "overoptimistic" mode).

Note that somewhat similar to the stable internal attribution, the stable external attribution also limits the students' opportunities causing them to give up where the students with the unstable attribution keep on studying.

Fig. 1 also shows that the grading effects in period 2 arise if there is a gap between the grade target and the actual initial grade. Depending on whether the student achieved their period-1 target or not, their period-2 behavior adjusts accordingly.

A rational student, having got their target grade in the first period, exerts a similar amount of effort in period 2. After an initial excessive success ($g_1 > G$) though, a rational student adjusts their effort downwards (if any). Notably, after the excessive success, an externally attributing student applies more effort than an internally attributing one (the explanation "They give high grades to high-performers!" is less relaxing than the overoptimistic "I'm so smart!"), and a student with unstable attribution slacks the least (also being less grade-sensitive in general).

The effect of failure is trickier. Extremely low initial grades completely demotivate all types of students. Then, for each attributional style, there is some critical value of g_1^{min}, above which the student abruptly shifts from "hopeless" or "unmotivated" mode with zero effort to the grade-seeking one with maximum effort. Under the stable internal and unstable attributions, the shift occurs at lower g_1^{min} values, meaning that the students, who explain failure as a lack of prior background or especially as a random shock, are less likely to become hopeless than those, who explain failure as a signal of tough grading. Although poor background cannot quickly be corrected, still by at least not discounting their return to effort, the students can sometimes maintain hope that more effort will help them achieve their grade target in the future.

Practical interventions in case of failure immediately stem from Fig. 1: in order not to give up, the student needs to decrease their grade target G, or increase their β-belief, or adopt the growth mindset represented in this model by the unstable attributional style. The latter suggestion seems the most powerful: when the student realizes that it is neither their ability, nor the grading system to blame, but their unsuccessful choice of learning strategy, then they can choose a better one (e.g. studying in a team or watching video lectures), that will help them finally reach their study goal, even if a revised one.

3. Conclusion

In this paper, I investigate the learning motivation of a grade-minded student. I build a two-period model of student behavior where the study effort is costly, and the student's only incentive is academic grading; in particular, the student has a target GPA that they need to achieve. Beyond the target GPA and the cost of effort, the student in my model is also "endowed" with productivity self-beliefs, and an attributional style—stable or unstable, internal or external—that they use to interpret their results to adjust to the grading system.

The model implies that in the first period, the student exerts the amount of effort just enough (according to their self-beliefs) to secure their target grade in that period, or does not exert any effort at all if the target is set too high or too low. Then, in the second period, depending on their attributional style, the student uses (or disregards) their initial grade to update their productivity self-beliefs, and to figure out how much effort will be needed to reliably hit the GPA target in the end.

The model provides a series of predictions for grade-motivated student behavior, in particular suggesting that: (i) extreme academic standards (and initial grades) demotivate every grade-minded student, (ii) for each student, there exists a single low turning value of their initial grade at which they switch from zero to maximum effort in the next period, and (iii) beyond the turning value, the second-period effort continuously decreases with the initial grade until at some (high) turning value it finally reaches zero again.

The model also suggests practical recommendations on how to adjust to different circumstances of an underperforming student in order to nudge them (in the spirit of libertarian paternalism) to exert maximum effort in the grade-minded environment. The interventions depend on their timing in the following way:

• At the start of the study program, if the underperforming student does not care about the grades, the teacher can explain to the student to what extent the grades will matter. If the student already somewhat cares about the grades, then the value of the grades (relative to leisure) can further be increased, e.g., by making the cost of effort as low as possible; this might make the student willing to exert maximum effort. However, the grade target may also need to be adjusted to meet the student's potential, and the student may need to be encouraged to go for their desired grade. In this optimal situation, when the goal is properly set at the (reasonable) maximum of the student's potential, the confident student puts in maximum effort and delivers what was expected of them, so that the teacher can give them their target grade in the first period, and simply repeat the strategy in the second period, leading the student to their target GPA.

• And within an ongoing program, the underperforming student can also be consulted to understand the cause(s) of their low effort: most likely they got very high (or very low) grades in the previous period(s) implying that they are too smart (or plain unable). This fixed mindset needs to be disclosed to the student, and they can largely benefit from learning about the growth mindset, i.e., the idea that just because they excelled (or failed) in one study period, does not mean that they are smart (or unable), and that the main determinant of their future success is their effort. In addition, it needs to be ensured that the student perceives their grade target as achievable with the maximum amount of effort they are willing to exert; thus, their goal needs to be set reasonable, and, if necessary, their productivity self-beliefs also have to be corrected.

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Social Protection of Victims of Domestic Violence: Factors of Readiness to Apply for Assistance to Social Protection Organizations in the Russian Federation

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Abstract:

This research is focused on factors of readiness to apply for assistance to social protection organizations (SPOs) in Russian Federation in case of domestic violence. The statistics on domestic violence in Russia remains one of the highest in the world for many years. Social protection of domestic violence victims requires close attention due to complexity, contradictory and latent nature of the problem. Considering the results of the interview with the expert, we hypothesize 6 links between victims' behavioral intention to seek help from SPOs and intrafamilial, extrafamilial, and other factors. Our study is aimed at developing an understanding of the barriers faced by victims of domestic violence when approaching SPOs, as well as providing relevant policy recommendations. This understanding should help SPOs identify areas of improvement in the domestic violence system of care and increase the availability of assistance to victims.

Keywords: *domestic violence, social protection organizations, intrafamilial factors, extrafamilial factors, behavioral intention*

Introduction

Domestic violence is one of the most common forms of violence in the world. More than 30% of women worldwide experience violence from their intimate partners during their lifetime. The prevalence of physical violence against women ranges from 30 to 60% in different areas. For women and girls aged 14-44, violence is the leading cause of death and disability [WHO, 2023].

In order to prevent recurrence of violence and to provide assistance and support to victims of domestic violence, the Russian Federation provides them with social protection. Crisis centers are the recommended form of social protection for victims of domestic violence.

A crisis center is an organization that provides emergency help for crisis situations such as domestic violence, suicidal thoughts or behavior, substance abuse, violence, and other similar problems. The main goal of a crisis center is to provide effective help to people in crisis and help them return to a healthy and safe lifestyle.

Along with the provision of assistance in crisis centers and other institutions, the legal framework for the prevention of domestic violence is present. However, it is recognized at the state level that the effectiveness of this type of domestic violence prevention is extremely low, as the police do not accept complaints from abused women [TASS, 2021]. In addition, Russia has the lowest index of protection of women from violence among the G20 countries [OECD]. Russia does not have specific laws against domestic violence, and victims often face obstacles in obtaining restraining orders or seeking assistance from law enforcement agencies [Human Rights Watch, 2021].

The Russian Supreme Court has submitted a bill to the State Duma to transfer criminal cases of intentional infliction of minor harm to health, battery and slander from the private to the private-public category of charges. The existing procedure makes it possible to close cases related to domestic violence — this is facilitated by the absence of a preliminary investigation stage, the possibility of terminating a criminal case for lack of corpus delicti when the

complainant fails to appear in court without a valid reason, and the obligation of the victim to support the prosecution.

Only 40 per cent of women who have experienced domestic violence seek help from appropriate organizations [UN]. This is due to many factors, including fear, strong ties to the abuser (often husbands, cohabitants and close relatives are the aggressors), economic dependence and lack of information about available resources and services.

There are only about 15% of domestic violence cases registered by law enforcement agencies result in criminal cases in Russia. In addition, only about 7% of cases reach the end, i.e. end with a court decision. The low rate of prosecution and conviction of perpetrators is often attributed to the lack of sufficient legal mechanisms to protect victims and the insufficient work of law enforcement agencies [RBC, 2020].

Thus, this study allows to identify areas of improvement of the system of social protection of domestic violence victims and to use the proposed recommendations in the work of the state executive authorities that perform the functions of development and implementation of state policy and regulation in the field of social protection of domestic violence victims.

Theoretical framework

Literature review

In scientific literature, the problem of domestic violence is often viewed from two perspectives: as an individual, family problem and as a societal problem. A cross-national study [C. Arthur & R. Clark, 2009] examined the determinants of variability in domestic violence at the national level.

The researchers described six theories designed to explain intersocial differences in domestic violence:

- a Resource Theory;
- an Exchange Theory;
- a Culture of Violence Theory;
- a Patriarchal Theory;
- a Modernization Theory;
- an Economic Dependency Theory.

Gender inequality and norms on the permissibility of violence against women are the root cause of violence against women suffering from domestic violence [WHO, 2021]. The prevalence of domestic violence is influenced by factors such as age difference in partners, women's attitudes towards domestic violence, alcohol abuse, partners having children from another marriage and others [Abramsky et al., 2011]. The highest values for domestic violence were previously recorded in post-conflict periods [Bradley, S., 2018].

Also, the determinant factors of domestic violence are related to the physical and mental health of the victim, the presence of dependencies in the family, the experience of violence, as well as the presence of social support from loved ones and belonging to low socioeconomic communities [Sadowski et al., 2004]. Another important factor affecting the level of domestic violence is a woman's pregnancy. After the birth of a child, cases of domestic violence are more frequent [Mezey & Bewley, 1997].

It is worth noting that violence by women is often perpetrated against children and rarely against partners. Nevertheless, when violence by a woman against her partner is fatal, studies often associate it with domestic violence experienced by the woman in the relationship prior to the murder [Dutton & Kropp, 2000].

Research on domestic violence has been conducted in many countries, each identifying the determinants of domestic violence. In doing so, researchers have often identified both individual factors, such as educational attainment, and societal factors, such as culture and gender norms in society. The following countries were considered: France, UK, Australia, India, Serbia, Nigeria, Pakistan, Japan, China, Colombia, Brazil, Mexico, Bulgaria.

The theoretical framework

Based on the above-given literature review, we presume that determinants of help-seeking should be considered within a model (see Fig. 1) that connects it with the intention to ask for help which leads to a direct contact a SPO.

Fig. 1. An extended model of willingness to seek help from SPOs
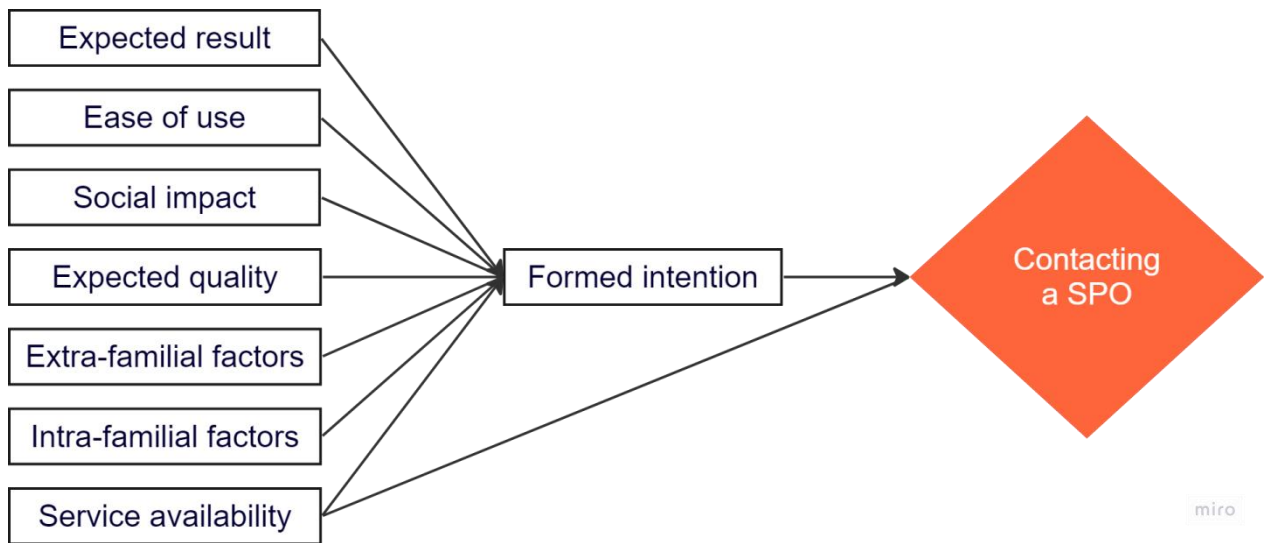
Source: authors' design

The presented model has the following principal elements:
- *Expected result* – the extent to which victims of domestic violence assess they would be able to resolve the conflict in the family if they contacted a SPO.
- *Ease of use* – the extent to which victims of domestic violence assess how easy it would be for them to go to a SPO and get help.
- *Social impact* – the influence of the opinion of people around, such as friends, family or colleagues, on the decision to seek help from a SPO.
- *Expected quality* – the extent to which victims of domestic violence rate the quality of resources, linkages, staff competence and other aspects of the SPO's work.
- *Extra-familial factors* – these factors affect all families and couples regardless of their employment status, physical and mental condition, experience of violence, etc. and include:
  1. Availability of special legislation against domestic violence
  2. The presence of a conflict in society, such as a civil war or a war between states in which the country is involved
  3. Patriarchal traditions and gender stereotypes
  4. Degree of women's political participation in the life of society
  5. Support of social movements by the state, especially women's movements that speak about actual problems faced by women

6. Attitude of mass media to the problem of domestic violence
7. Poverty level

- *Intra-familial factors* – these factors represent the different individual characteristics of people who perpetrate and/or are subjected to violence and include:
    1. Having a secondary education;
    2. Presence of mental disorders;
    3. Dependence on alcohol or, less frequently, drugs;
    4. Experience of violence in childhood;
    5. Experience of sexual abuse, including in childhood, forming a learned helplessness;
    6. Demographic factors;
    7. Religious affiliation;
    8. Labor status, namely the availability of a job and the amount of salary.

- *Service availability* – the extent to which victims of domestic violence rate the extent to which the infrastructure in place and the resources provided by SPO are available for use.
- *Formed intention* – psychological readiness of a victim of domestic violence to recognize the problem and ask for help.
- *Contacting an SPO* – the actual application of a victim of domestic violence to a SPO.

So, our principal **research hypotheses** are as follows.

RH1: Behavioral intention to apply to a SPO increases as the expected result increases.

RH2: Behavioral intention to apply to a SPO increases as the ease of use increases.

RH3: Behavioral intention to apply to a SPO increases as dependence on social influence decreases.

RH4: Behavioral intention to apply to a SPO increases as the expected quality increases.

RH5: Behavioral intention to apply to a SPO increases as the availability of the service increases.

RH6: Behavioral intention to apply to a SPO increases as the barriers among external factors decrease.

The formulated research hypotheses are to be testes with help of planned in-depth interviews with SPOs experts and a survey among citizens of the Russian Federation. The principal relationships in the theoretical framework are to be quantified using the tandem analysis and decision tree.

Conclusion

In this study we pose the problem of analyzing of readiness factors to apply for assistance to SPO. Based on the literature reviewed, we develop an extended model of willingness to seek help from SPOs, which encompasses the impact of domestic violence determinant factors and determinants of help-seeking on actual contact with SPOs.

Empirical support of the identified relationships will help SPOs identify areas of improvement in the domestic violence system of care and increase the availability of assistance to victims. Effectiveness and efficiency of government's actions in supporting such SPOs' activity is also expected to be better analyzed based on the results of this research.

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Opportunities and Investment Practice of the Regional Budgets

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Abstract:
The challenge of accelerating economic growth makes it even more necessary to increase the rate of investment growth. An important role in this process belongs to the state, including funds from the budget system at various levels. Analysis of trends in investing in fixed capital allows us to determine the features of the current stage and the main aspects and instruments of investment from budgets.
The paper presents the consideration of the role, problems of the budget investments in the economy in 2017-2021. Institutional opportunities for investment from regional budgets have been studied. The obstacles for the regional development on their own basis are considered.

Introduction

The formation and development of the Russian system of fiscal federalism goes back two decades. It went through different stages of centralization and decentralization of certain aspects of the budget process. At the same time, the main goal of the changes remains to improve the quality of public financial management, that is, to improve the institutional environment in which decisions regarding planning and execution of budgets are made. We are talking about the norms of budget legislation and the practices of their application. In this context, the issue of regulating capital expenditures of regional budgets is important, acquiring particular importance in connection with changes in the conditions for attracting private investment.

In conditions of uncertainty and during periods of crisis, investment from budgets acquires special importance, and thereby the question of the effectiveness of such investment in infrastructure and the provision of public goods becomes more acute. This article reflects the results of an extensive 2022 study[1]. In the mentioned study with the participation of the author, based on the study of statistics, literature, and the main regulatory framework for the period 2017-2021 relating to budgetary policy and inter-budgetary relations in general, a broad context is given for the process and results of investment in fixed capital and regional economic development. Analysis of trends in investment in fixed capital made it possible to determine the features of the current stage and the main aspects and instruments of investment from budgets.

Period 2017-2021 characterized by a sharp transformation of previous trends. On the one hand, the entry into force of new factors, including the pandemic, changes in the debt status of regional budgets, the use of new instruments in interbudgetary relations, and on the other hand, the increasing role of the state in the economy and investment in fixed capital. New factors that first emerged in the history of the country influenced the institutional context and changed the economy and fiscal policy of the state.

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[1] Regional budget policy and investment in fixed assets. Research commissioned by RANEPA, 2022.

1. Institutional changes and budget policy priorities

The strategy for the development of public finance is reflected in a number of regulatory documents, among which the state program "Development of federal relations and creation of conditions for effective and responsible management of regional and municipal finances", adopted in 2013, is important. The first stage of this program covered a three-year period (2013-2015), and then in 2016 a new program was developed and adopted, providing for the implementation of the second stage for a period of 5 years until 2020 (hereinafter referred to as the State Program). The importance of developing regions on their own basis is evidenced by the adjustment of the priorities of the state program in 2021. Initially, the following main groups of priorities were used: inter-budgetary relations, balancing budgets, delimitation of powers between public authorities, improving the quality of financial management in regions and municipalities. In the 2021 edition, they were added: reducing the debt burden and stimulating budget investments.

The latter provides for the following steps: provision of budget loans to finance infrastructure projects; the use of mechanisms for financing budget investments in transport, engineering, energy and utility infrastructure through the restructuring of budget loans; stimulating the provision of investment tax deductions at the regional level through partial compensation from the federal budget for shortfalls in regional budget revenues.

The relatively short period of time from 2017 to 2021 contained previously unknown factors that caused both the continuation of existing centralization trends and the use of emergency support measures during the crisis. So, in the pre-crisis period 2017-2019 the centralization of tax revenues at the federal level continued. The situation with the balance of regional budgets was successfully regulated by equalizing subsidies, subsidies for balance and other support measures. The problem of the total public debt of the regional budgets and reducing the debt burden on budget loans was resolved through restructuring in 2017. There was an increase in real budget revenues, and starting from 2018 they were executed with a surplus. The launch of national projects was an innovation of this period. The balance of consolidated regional budgets has improved.

However, already in the pre-crisis period, a number of negative trends emerged, in particular, an imbalance in the decentralization of income and expenditure of sub-federal budgets. In addition, the volumes and number of targeted interbudgetary transfers, especially "other interbudgetary transfers', the volume of which should have been reduced by transferring them into subsidies or other forms of support, have increased significantly. Against this background, there was a decrease in the share of subsidies to equalize budgetary security in the total volume of transfers and in real terms. Since 2020, measures to counter the spread of coronavirus infection have come into force, resulting in an anti-crisis increase in interbudgetary transfers and public debt.

In the period 2020-2021, anti-crisis measures introduced by the Ministry of Finance of the Russian Federation were aimed at solving pressing budget problems. In 2020, the regions recived the opportunity to exceed the maximum values of deficit and public debt indicators; the repayment terms of debt restructured in 2012 and 2013 were extended by 2 years. (until 2025-2034) and in 2017 - until 2029 with changes in repayment volumes.

At the same time, certain measures were stimulating in nature and were aimed at accelerating the post-pandemic economic development of the affected regions. The government developed a mechanism for using funds released becouse of the restructuring of budget loans to finance new infrastructure projects in the transport, engineering, energy and utilities sectors. In 2020, the possibility of providing "horizontal" regional budget loans for a period of up to three years was established, loans from the budget of the region to local budgets - up to five years, and the term of treasury loans to replenish the balance of funds in the budget account was increased from 90 to 180 days.

In 2021, measures were again taken to reduce the debt burden of the regions by restructuring semi-annual budget loans provided in December 2020 during the pandemic. This restructuring program is designed until 2029 with the possibility of early debt repayment; it provides for the following obligations of the regions: not to increase the volume of market borrowings; use the released funds to finance new infrastructure projects.

At the same time, two new types of budget loans from the federal budget appeared:

- to replace market borrowings of regions and municipalities with a maturity until 2029;

- to finance regional infrastructure projects (infrastructure loans) for 15 years at a rate of 3% (initially for the period until 2023 in the amount of up to 500 billion rubles). These loans have a specific purpose and can be used on the basis of competitive selection for housing construction, renovation of housing and communal services systems, construction of highways, integrated development of territories, creation of tourism industry facilities, etc.

The increased role of budget investment loans is justified both in general by the needs of regional development in line with national goals and strategic objectives of socio-economic development, and by the situational request to overcome the economic consequences of the pandemic based on the redistribution of the federal budget surplus to the regional level.(Gorodetzky, 2021).

In 2021, the situation with the overall volume of budget revenues improved.In a number of cases made it possible to compensate for the negative results of the previous year and the reduction in the volume of subsidies from the federal budget. The pandemic and the economic stagnation that preceded it made significant adjustments to the implementation of the program to stimulate economic development and achieve more than 3% growth in the near future by 2024. The delay in the economic growth acceleration program makes it even more necessary to increase the rate of investment growth. An important role in this process belongs to the state, including funds from the budget system at various levels. In this regard, it remains to be determined whether and how institutional changes have affected the state of public finances and the investment situation in the regions.

2.Investments in fixed assets in Russian regions and the role of budget investments

The amount of investment in fixed capital from all sources in the period 2017-2021. in the Russian Federation increased in nominal terms at current prices from 12.2 trillion rubles in 2017 to 17.3 trillion rubles in 2021 according to Rosstat.[2]

As is well known, the main source of investment is the own funds of enterprises, accounting for about 60% of the total investment. Resources of the budgets at all levels are traditionally the second most important source of financing investments in fixed capital in Russia. In the 21st century, on average, about 19% of capital investments were financed from budgets of all levels, with the maximum value being reached in 2009 (21.9%). During the period 2017-2021, the average annual share of budget financing in the total volume of financing investments in fixed assets amounted to 16.7% in the Russian Federation as a whole.

The share of federal budget funds decreased during this period. If in 2015 federal funds accounted for more than 60% of all budget funds allocated for investments in fixed assets, then, starting in 2018, the share of the federal budget was already less than half in budget financing of capital investments. At the same time, the share of regional financing has constantly increased, reaching almost half of all budget investments in 2021. The share of local budgets in budget financing of investments in fixed assets remained relatively stable and generally insignificant (within 1-1.24%).

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[2] Here and below: Rosstat. Regions of Russia. Socio-economic indicators 2021(In Russian) - *URL: https://gks.ru/folder/210/document/13204)*

Significant interregional differences are reflected in the fact that the value of the indicator differed between extreme examples by more than 30 times. In a number of regions with low indicators of socio-economic development and low levels of budgetary security (in particular in the republics of the North Caucasus (Ingushetia, Dagestan, Karachay-Cherkessia, Kabardino-Balkaria, North Ossetia, Adygea, Chechnya), Southern Siberia (Tyva, Altai , Buryatia), Crimea and Sevastopol) from budget funds financed from a third to three quarters of all investments in fixed assets. At the same time, the share of budget financing in capital investments was extremely low (at the level of several percent) in some regions with the highest values of budgetary security (Yamalo-Nenets Autonomous Okrug, Khanty-Mansiysk Autonomous Okrug, Nenets Autonomous Okrug). At the same time, in Moscow this figure was significantly higher than the Russian average, while in St. Petersburg, the Moscow region, Tatarstan and the Leningrad region it was more or less close to the average.

3. Problems of regional development on their own basis

Currently, capital expenditures of Russian regional budgets are in most cases insufficient to ensure sustainable economic growth. The traditional explanation for this is to state the limited budgetary resources, primarily the regional budgets' own revenues.

Despite the importance of this circumstance, one should not forget about the possibilities of borrowed resources, especially since this is provided for by budget legislation. It is interesting that relatively low-income regions with high budget deficits, caused by the need to finance significant social obligations (current expenses) with low levels of their own income, predictably do not have the ability to allocate a significant share of the budget to capital expenditures, although they attract borrowing. As Milchakov (2016) notes, regions are forced to borrow and are often aimed at financing social expenditures rather than capital investments. There are also many regions that are not focused on capital investment, even if they have a surplus; Among actively investing regions, regions with a balanced or surplus budget predominate.

D. Kadochnikov[3] provides a convincing explanation of this situation by in the already mentioned study.

Insufficient attention to the possibilities of borrowed sources is due to several factors, but two prevail among them:

firstly, for most regions it turns out to be easier to fight for additional federal transfers and non-market types of borrowing (budget loans, which are actually a form of transfers);

secondly, the norms of Russian budget legislation regulating the deficit and the sources of its financing do not encourage regions (even quite creditworthy ones) to borrow financing of capital investments, but rather work to neutralize the low quality of budget planning.

Most regions in the budget planning process provide for a budget deficit, and on a scale close to the maximum permissible from the point of view of budget legislation. At least for the most creditworthy regions, regularly planned deficits (and therefore planned borrowing) do not exceed or are comparable to planned capital expenditures.

However, in the process of implementation, regional budget laws are revised several times, usually in the direction of increasing revenues and expenses. At the same time, the degree of upward revision of income, again, as a rule, turns out to be noticeably greater than the degree of increase in expenses. The almost inevitable increase in revenues in the process of budget execution is a consequence of their initial underestimation (or forecasting according to the most conservative forecast).

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[3] Leading expert of the project Regional budget policy and investment in fixed assets. Research commissioned by RANEPA, 2022.

The impossibility of a comparable increase in expenditures, especially capital ones, is due to the fact that for this it is not enough to amend the budget law, but it is necessary to revise the terms of the state order, project documentation, etc.; thus, it is much more difficult to quickly revise the amount of budget expenditures, and in the case of budgetary capital investments it is almost impossible.

The practice of a conservative approach to income forecasting (in other words, the practice of underestimating them), designed to insure regions from fluctuations in financial revenues, leads to an inevitable underestimation of the potentially acceptable volume of expenses. Moreover, since a number of current (especially social) expenses are to a certain extent predetermined, including at the federal level, planned capital expenditures are initially planned at a minimum level and are ultimately financed not through borrowing, but from own income and transfers. Thus, the legal opportunities provided to the constituent entities of the federation to attract debt financing are chronically underutilized, and budget expenses (including capital investments) turn out to be less than they could be.

In the coming period, it is necessary to expand budget financing of the investment process, primarily because there has been an intensification of state participation in the economy; the role of budget investments is becoming critically important for unprofitable enterprises and sectors of the economy.

In the long term, the structure of budget investments in fixed capital should contain a high share of capital investments in the education and health care systems, and cannot be reduced to the development of infrastructure serving production and transport flows.

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Motivation of Students of Public Administration when Entering the Civil Service in Russia

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Abstract:

This research is focused on examining the motivation of students of Public Administration programs at the universities of Saint Petersburg regarding their employment in the state bodies in Russia. The lack of qualified personnel, the low attractiveness of work in state authorities and the importance of public service for the development of the country indicate the need to study the motivation of young professionals. Our study is aimed at developing an understanding of motivation of specialists at the stage of obtaining higher education in the field of Public Administration. Such an understanding can help government agencies create attractive vacancies for young professionals, develop effective programs and strategies to improve the quality of personnel, which will lead to an improvement in the quality of government work in general.

Introduction

Nowadays, many young professionals do not consider long-term employment in the public sector. According to Antal Russia, only 40% of civil servants remain in public service for more than three years, and the staff turnover rate in the Federal Tax Service among employees under 30 years old averages 19% per year [Vedomosti, 2019].

In recent years, the share of young job seekers employed or willing to work in government has halved, declining from 38% in 2016 to 19% in 2019 [HeadHunter, 2019].

The unattractiveness of a career in state bodies for young professionals leads to a shortage of personnel. The Draft Methodology for Organizing Comprehensive Work on Personnel Management in the Civil Service associates the problem of a shortage of qualified personnel with difficulties in attracting, adapting, and evaluating specialists, as well as insufficient motivation among civil servants [Bukharina, 2019].

Scientific articles devoted to the study of the shortage of qualified personnel in the state and municipal service reveal that not all employees have special training in the system of state and municipal government, and many civil servants do not work in their field of education [Gusarskaya & Panov, 2013]. The discrepancy between the profile of training specialists and the positions they hold is also noted by specialists holding leadership positions in state bodies. This is explained by the fact that many university graduates, whose profile of study was related to public administration, do not pursue a career in public service.

Given the high competition for the personnel in the labor market and the decrease in the interest of young, qualified specialists in the civil service, it becomes especially important to study the motivation of specialists during their higher education in public administration.

The results of this study will help identify the reasons why many students do not consider working in state authorities as a career option and will aid in developing recommendations for their involvement.

Theoretical framework

Literature review

In a study of differences in the motivation of employees in the private and public sectors, S. A. Frank and G. B. Lewis proposed the following factors that can influence motivation: income level, career opportunities, job security, interesting work, helping others, and usefulness to others. society. Civil servants have a stronger desire to help others and be useful to society, monetary rewards motivate them less [Frank & Lewis, 2004].

In a study of public sector employee satisfaction in Saudi Arabia, the following aspects of work have been proposed that may influence employee job satisfaction and motivation: nature of work, pay, management, opportunities for advancement, relationships with colleagues [Syed, 2014].

Public service motivation is often singled out as a separate factor influencing the decision on employment in state authorities. To determine its components, the factors proposed by J. L. Perry (1996) were used: participation in policy development, commitment to the public interest, social justice, civic duty, compassion, selflessness, as well as motives proposed earlier by J. L. Perry and L R. Wise (1990): rational (participation in policy development, commitment to a public program, promotion of special interests), normative (desire to serve the public interest, loyalty to duty and government, social justice), affective (commitment to a program out of conviction in its social significance , patriotism benevolence).

Within the framework of the study by Papadopoulou & Dimitriadis (2019), 7 factors were included in the model: supervisor support, job autonomy, task interdependence, attraction to public participation, commitment to public values, compassion, self-sacrifice. The researchers put forward hypotheses about the influence of the above factors on the intrinsic motivation of civil servants, and influence of public service motivation on work performance and job satisfaction (8 hypotheses in total).

2.2. Theoretical framework

Based on the above literature review, hypotheses were put forward about the influence of several factors on the decision to employ in government agencies (see Fig. 1).

Fig. 1. Theoretical framework of the study
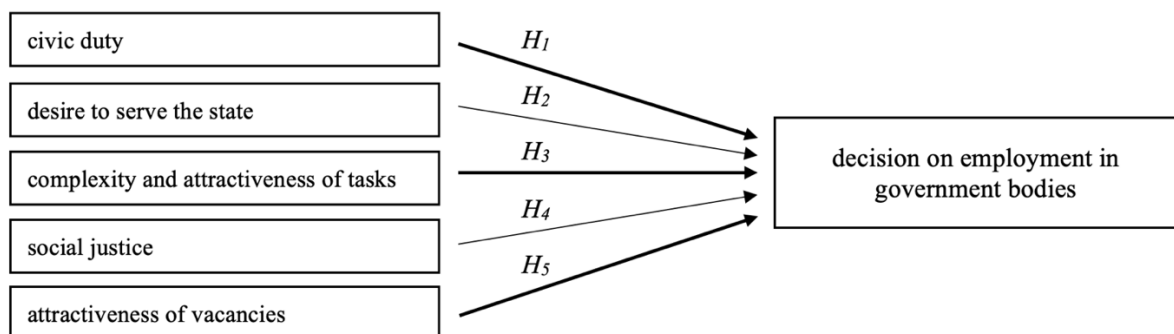
Source: authors' design

The main **research hypotheses** are as follows.

H1: The presence of a sense of civic duty positively influences the student's decision to apply for employment in state authorities.

It is assumed that students who feel a sense of civic duty tend to choose work in public agencies, as they see it as an opportunity to embody their ideals and values, to make real improvements in the life of the state.

H2: The desire to serve the state has a positive effect on the student's decision about employment in state authorities.

The desire to serve the state can positively influence a student's decision to apply for a civil service, as it reflects an intrinsic desire to be involved in important decisions that affect the lives of others.

H3: The desire to perform complex and interesting tasks positively influences the student's decision about employment in state authorities.

Students who aspire to challenging tasks may consider government agencies as a place where they can show their potential. Work in state authorities often provides an opportunity to participate in a variety of projects and solve complex problems related to public issues.

H4: The desire to achieve social justice positively influences the student's decision to apply for employment in state authorities.

It is assumed that students who strive for social justice tend to choose a career in public bodies to realize their values and participate in social changes at the level of public programs.

H5: The attractiveness of vacancies placed by the government has a positive effect on the student's decision to apply for employment in state authorities.

Students who find government vacancies attractive tend to choose them as their future job. When jobs offer interesting job opportunities, more people may be interested in competing for those positions.

The formulated research hypotheses were tested by interviewing students of the faculties of Public Administration of St. Petersburg universities. The size of the sample – 101 observations.

To determine the significance of factors and the nature of their influence, a logit model was constructed. At the 5% significance level, hypotheses 2 and 4 were rejected, hypotheses 1, 3 and 5 were not rejected, as expected, the nature of their influence is positive.

Conclusion

In this study, the problem of the shortage of young, qualified personnel in the civil service in Russia was addressed. Based on the literature reviewed, a theoretical research model was developed to explain the relationship between various aspects of employment and the decision to work in state authorities. Several research hypotheses were formulated to examine the influence of these factors on the employment decision.

The conducted empirical research helped to identify the factors influencing students' decisions about employment in state authorities. Based on this, the following conclusions were formulated.

Firstly, students who have a sense of civic duty are more willing to consider employment in state bodies, so this aspect should be included in the employer value proposition (EVP) to make it more attractive.

Secondly, compound government projects have a positive impression on students. Therefore, government agencies need to actively position the current tasks as complex and important for society to engage young professionals in working on projects even during their education.

Thirdly, the attractiveness of vacancies and the quality of communication with universities are essential factors in attracting talented students to public service. State authorities should use job search sites that are popular among students, improve the quality of candidate selection and expand cooperation with universities through joint projects, internships, and other forms of partnership.

Fourth, government agencies need to actively develop their employer image. Improving the reputation in the labor market contributes not only attracts qualified employees, but also enhances trust and loyalty from citizens.

Finally, a correct understanding of the motivation factors and the application of appropriate strategies will allow the attraction and retention of talented and motivated specialists, contributing to the effective functioning of state bodies and ensuring the state's development.

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Tax Structure at Subnational Level in Advanced and Emerging Economies: Lessons for the Efficiency of Russian Public Sector

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Abstract:
A comparative analysis of the tax burden by types of taxes and the distribution of tax revenues by tiers of the budgetary system in Russia and the world federal states based on statistics of the International Monetary Fund is carried out. It is revealed that Russia has relatively low taxes on income and goods, and high taxes on labor. The relatively high amount of regional budget revenues is due to the peculiarities of IMF methodology, while the share of local budget tax revenues in Russia in the consolidated budget is one of the lowest in the world. The areas of increasing the efficiency of the budgetary system of the Russian Federation with regard to the tax burden and regulation of fiscal decentralization are proposed.

Introduction

It is widely known that taxation negatively affects business activity. The introduction and collection of taxes affects the private sector of the economy in different ways, making changes in the allocation of resources and shifting incentives for economic agents (Furman J., 2006). Theoretically, it is considered proven that the losses incurred by taxpayers exceed the benefits received by the state from tax collection (Mankiw N.G., 2011).

The tax burden by definition reduces the profitability of entrepreneurial activity, as it brings additional costs. In addition, it very often entails a decrease in labor productivity. At the same time, it is assumed that the tax structure has a different impact on the economic incentives of taxpayers. In particular, in the structure of tax revenues, taxes on goods are considered preferable compared to taxes on labor ("Labor tax", "Payroll tax", "Taxes on payroll & workforce") – both from the point of view of budget consolidation and support for economic growth (Anderson D., Hunt B., Snudden S., 2014).

An important issue in a federal state and within a decentralized model of intergovernmental relations is the distribution of tax revenues among tiers of the budgetary system. The objective conditionality of the distribution, as well as the purposeful regulation policy, are closely related to the three goals of state, dating back to the works of R. Musgrave (Musgrave R., 1959; Musgrave R., Musgrave P., 1989), such as economic efficiency, social justice and macroeconomic stability (Oates W.E., 1999). The beneficial influence of significant fiscal powers at the local and regional levels of the budgetary system on economic development is reflected in a huge number of scientific publications (Baskaran T., Feld L. P., Schnellenbach J., 2016; Hatfield J. W., Kosec K., 2013). Moreover, the thesis about the positive inpact of fiscal decentralization is substantiated both in the theoretical papers (Congleton R.D., Kyriacou A., Bacaria J., 2003) within the framework of the concept of endogenous economic growth, and in the papers with an empirical bias (Ligthart J. E., van Oudheusden P., 2017).

The aim of this paper is to identify the main shortcomings in the tax system of the Russian Federation in such aspects as the structure of the tax burden and the distribution of tax revenues among tiers of the budgetary system.

Methodology

When analyzing international statistics, one should proceed from the approach of the International Monetary Fund (IMF) to the classification of budgetary revenue items. In general, most revenue items in the budgetary classification and reporting of the budgetary system of the Russian Federation are similar to the international approach. Small differences are that insurance premiums are not considered a type of taxes, and customs duties, on the contrary, belong to such. In addition, the tax system of the Russian Federation does not provide for a separate tax on real estate, as well as inheritance tax and sales tax. Additionally, for intergovernmental transfers, classification is provided by the source of the provision instead of the classification by its target orientation.

In this study the following research methods were used: general scientific methods, balance method, grouping, comparison, classification.

Results

In Russia, the total tax burden is rather high (more than 40% of GDP in 2019) (Table 1). For example, it is higher than the average of all the federal states of the world, as well as in comparison with non-federal states in the same way. A sample of non-federal states comprise almost forty countries belonging to the group of developed and developing ones, those possessing a unitary state structure.

Table 1. Revenue structure of consolidated budgets in 2019, % of GDP

State	Total revenues		Taxes on income, profits, and capital gains		Taxes on payroll and workforce*		Taxes on goods and services		Other revenue	
	2005	2019	2005	2019	2005	2019	2005	2019	2005	2019
Non-federal states, on average	37,0	37,2	10,5	10,4	9,9	9,9	12,6	12,0	2,6	3,7
Federations, on average	38,6	36,5	12,7	11,6	8,8	8,1	9,1	8,7	5,5	6,0
Russia	**39,2**	**40,9**	**9,3**	**8,0**	**5,1**	**7,4**	**7,5**	**8,2**	**9,2**	**13,4**
Australia	34,9	34,8	16,9	16,9	1,2	1,3	8,9	7,3	6,0	6,8
Austria	48,4	49,0	12,1	12,9	17,2	17,8	12,4	12,0	6,4	6,0
Belgium	48,6	49,3	15,8	15,2	15,3	15,4	12,1	12,4	3,3	4,0
Brazil	…	41,7	…	7,2	…	11,3	…	13,9	…	7,1
Canada	40,1	41,5	15,6	17,0	5,2	5,4	8,0	7,6	7,4	7,5
Germany	42,9	45,8	10,3	12,7	17,5	17,2	10,0	10,0	3,9	4,5
Indonesia	…	14,3	…	4,9	…	…	…	5,6	…	3,2
Mexico	…	21,0	…	6,9	…	2,8	…	5,9	…	4,5
South Africa	30,8	34,9	12,6	13,8	0,8	0,9	9,3	10,1	5,8	7,6
Spain	38,4	38,2	10,4	10,0	12,6	12,9	11,6	10,6	2,5	2,9
Switzerland	31,6	32,8	11,5	13,1	6,2	6,5	6,3	5,5	5,7	5,5
USA	30,8	30,1	12,1	11,6	6,7	6,7	4,4	4,1	4,4	4,4
Note:										
Developed	39,5	40,2	13,1	13,7	10,3	10,4	9,2	8,7	4,9	5,2
Developed, without Austria and Belgium	36,5	37,2	12,8	13,6	8,3	8,3	8,2	7,5	5,0	5,3
Developing	30,8	27,9	12,6	8,2	0,8	3,7	9,3	8,9	5,8	5,6

Source: own calculations based on IMF data (Government Finance Statistics database. Revenue).

Note: * - including insurance premiums.

At the same time, the amount of tax revenues in the budgetary system of the Russian Federation in the context of three main types of taxes – on income (profit), labor (or wages) and goods and services - is relatively small. There is a kind of parity between those three types of taxes, which was facilitated by a reduction in taxes on income, profit and capital gains and an increase in taxes on labor (including insurance premiums) for 2005-2019. The disadvantage of such dynamics is that taxes on labor (officially, "Taxes on payroll and workforce") in Russia are most close to the global average, unlike taxes on income and goods, which are lesser compared to the average values. For example, income taxes in Russia are relatively small and comparable only to those of Brazil, Indonesia and Mexico. Thus, taxation in Russia is distinguished by relatively low taxes on income and goods, and high taxes on labor. Given that labor taxation is considered the most disincentive for economic development, this situation can be assessed as a disadvantage of the tax system of the Russian Federation.

The tax burden on the main types of taxes at a relatively low level in Russia is possible due to the high level of other income (13.4% of GDP). The same phenomenon is observed, for example, for Saudi Arabia (26.3% of GDP). This is due to the fact that the IMF methodology (Government Finance Statistics, 2014) classifies taxes related to the exploitation of mineral deposits as "Other revenue". What is meant here is the revenue item "Rent on subsoil assets" in the IMF methodology book. Thus, the developed extractive sector is largely an advantage of the tax system of the Russian Federation, since it makes it possible to reduce the tax burden on the main factors of production, primarily labor, while maintaining the overall tax burden at a level above the global average.

Due to the attribution of mineral extraction taxes to non–tax revenues in international statistics, the amount of tax revenues in the budgetary system of the Russian Federation, including insurance premiums, is quite small - 27.5% of GDP in 2019 (Table 2). It is much less than the size of the tax burden in the developed federations of the world (30-35% of GDP), although it is higher than the average for developing federal states (22.3% of GDP). Developed federations include Australia, Austria, Belgium, Canada, Germany, Spain, Switzerland and the USA. Developing federations include Brazil, Indonesia, Mexico and South Africa.

The amount of tax revenues primarily distributed to regional budgets is quite high in Russia and is comparable to that of developed countries (7-8% of GDP), which is much higher than in developing federations (2.8% of GDP). This is also reflected in the proportion of distribution of tax revenues in "federation-region" relations. Specifically, in Russia approximately two–thirds of tax revenues are distributed to the federal budget, and one-third to the consolidated regional budgets. This proportion indicates a very high share of regions in the consolidated budget in Russia. At the same time, this indicator is still lower than in Canada, Switzerland and the USA. But it should be borne in mind that such a proportion was calculated without taking into account revenues from the oil and gas producing sector. With the inclusion of those in the composition of tax revenues, the calculations would lead to a conclusion of a much greater fiscal centralization in Russia, including in comparison with other federal states.

Table 2. Distribution of tax revenues (including insurance premiums) by tiers of the budgetary system in 2019, % of GDP

State	Consolidated budget	Federal budget,	Regional budgets	Local budgets	*Note:* share in consolidated budget revenues, %

		including extra-budgetary funds			Federal budget, including extra-budgetary funds	Subnational level (regional and local budgets)
Non-federal states, on average	33,7	29,8	-	3,9	89,1%	10,9%
Federations, on average	30,5	22,8	5,8	2,1	75,7%	24,3%
Russia	**27,5**	**18,4**	**7,9**	**1,2**	**66,9%**	**33,1%**
Australia	28,0	22,8	4,3	0,9	81,4%	18,6%
Austria	43,0	40,5	1,0	1,5	94,4%	5,6%
Belgium	45,2	36,5	6,3	2,5	80,7%	19,3%
Brazil	34,6	23,0	9,1	2,5	66,5%	33,5%
Canada	34,0	17,3	13,4	3,3	50,9%	49,1%
Germany	41,2	27,8	10,1	3,3	67,3%	32,7%
Indonesia	11,1	9,8	0,9	0,4	88,1%	11,9%
Mexico	16,4	15,4	0,8	0,3	93,7%	6,3%
South Africa	27,1	25,5	0,3	1,3	94,2%	5,8%
Spain	35,2	26,6	5,4	3,2	75,6%	24,4%
Switzerland	27,3	16,2	6,9	4,2	59,5%	40,5%
USA	25,7	16,6	9,0		…	64,5%	35,5%
Note:						
Developed	35,0	25,5	7,0	2,4	71,8%	28,2%
Developed, without Austria and Belgium	31,9	21,2	8,2	2,5	66,5%	33,5%
Developing	22,3	18,4	2,8	1,1	85,6%	14,4%

Source: own calculations based on IMF data (Government Finance Statistics database. Revenue)

At the same time, the low level of fiscal decentralization in Russia is manifested in the extremely low amount of tax revenues at the local level of the budgetary system – only 1.2% of GDP. This is comparable to the indicators of developing federations, but is much lower than those figures in Brazil, Canada, Germany, Spain and Switzerland (there are no data for the USA).

The average share of the federal budget in total tax revenues in federal states is noticeably lower than in non–federal states, which reflects one of the main features of the federative structure - decentralization (Table 3).

In Russia, the share of the federal budget in tax revenues is relatively small (67-70% of total revenues). But this is largely due to the exclusion from the analysis the taxes on mining, as noted above. The share of local budgets for 2005-2019 has significantly decreased, and is now around the figure comparable to the average level of developing countries, although in Brazil, for example, this indicator is quite high. In comparison with Russia, in Canada, Germany, Spain and Switzerland, the local level of the government plays a much more significant role if estimated through the share of tax revenues of the consolidated budget.

Table 3. Dynamics of distribution of tax revenues (including insurance premiums) by tiers of the budgetary system, % of total revenues

State	Federal budget, including extra-budgetary funds			Regional budgets			Local budgets		
	1995	2005	2019	1995	2005	2019	1995	2005	2019
Non-federal states,	88,1	87,0	89,1	-	-	-	10,1	11,6	10,9

on average								
Federations, on average	78,3	75,1	75,7	14,3	18,5	18,5	7,4	6,4	5,9
Russia	...	**68,9**	**66,9**	...	**24,9**	**28,7**	...	**6,2**	**4,4**
Australia	76,4	82,3	81,4	19,6	15,0	15,4	4,0	2,9	3,4
Austria	93,0	94,3	94,4	2,4	2,3	2,3	4,6	3,5	3,4
Belgium	90,5	86,9	80,7	3,9	7,6	13,9	5,5	5,5	5,5
Brazil	...	...	66,5	...	...	26,4	...	...	7,2
Canada	50,2	52,9	50,9	39,4	38,2	39,4	10,3	8,9	9,7
Germany	71,0	70,0	67,3	22,6	22,8	24,6	6,3	7,2	8,1
Indonesia	94,9	...	88,1	2,5	...	8,2	2,6	...	3,7
Mexico	79,9	...	93,7	15,6	...	4,6	4,5	...	1,7
South Africa	94,5	94,0	94,2	0,6	0,9	1,0	4,9	5,1	4,8
Spain	86,6	77,9	75,6	4,9	14,1	15,3	8,5	8,1	9,1
Switzerland	58,2	58,9	59,5	24,2	25,3	25,1	17,6	15,8	15,4
USA	65,8	65,1	64,5	21,1	34,2	35,1	13,1	0,7	...
Note:								
Developed	74,0	73,5	71,8	17,3	19,9	21,4	8,7	6,6	7,8
Developed, without Austria and Belgium	68,0	67,8	66,5	22,0	24,9	25,8	10,0	7,3	9,1
Developing	89,8	94,0	85,6	6,2	0,9	10,0	4,0	5,1	4,3

Source: own calculations based on IMF data (Government Finance Statistics database. Revenue).

Conclusion

The results of the study might be summed up as follows.

Low labor taxes are considered the strongest stimulating factor for economic development, and Russia has a fairly high tax burden on labor. It is advisable to consider the possibility of reducing it, in particular, by increasing taxes on goods, the burden on which in Russia is quite low in comparison with the rest of the world federations.

At the federal level it is advisable to form a mechanism that affects the incentives of regional authorities and encourages them to increase the amount of tax revenues of municipal budgets – primarily through the tax sharing rates. The current amount of local budget revenues in Russia is extremely low and tends to decrease.

Formally high level of fiscal decentralization at the regional level in Russia is due to the exclusion of the mineral extraction tax from calculations, as prescribed by IMF. Whereas the current analysis based solely on the data of the Federal Treasury reports for the period up to 2022 in fact confirms the continuation of the period of centralization in the budgetary system of Russia (Yushkov A., Savulkin L., Oding N., 2017). However, more accurate quantitative results require additional calculations within the framework of international comparative analysis.

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Operations Management and Business Informatics

Reverse Logistics Systems Classification

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Abstract:
Due to the lack of classification of reverse logistics systems in scientific literature, research is not carried out based on a unified theoretical foundation. As a result, either individual reverse logistics systems (RLS) of companies are studied or research is based on a "model" theoretical system that does not correspond to other existing logistics systems. This gap in scientific understanding of reverse logistics prompted the aim of this study: to develop a classification of types of RLS. The study used comparative, content analysis and the Best-Worst methods based on data from scientific articles in specialized publications devoted to the issues and problems of RLS. A five-level classification of types of RLS is created, taking into account different forms of companies, areas of operation, market situations, and economic factors.

Keywords: *Reverse logistics, sustainable management, supply chain management, classification.*

1. Introduction

For many firms, the effectiveness of their reverse logistics system (RLS) is becoming more of a factor in their strategic planning and management, due to rising evidence of the correlation of an effective RLS with profit increases (Larsen et al., 2022; Song et al., 2021; Braga Junior et al., 2018).

As a field with multiple aspects and directions of research, several classifications of reverse logistics elements exist. Rogers and Tibben-Lembke classify reverse logistics activities by the possible interaction with packaging or products, with the activities for the former different from the latter in having no option for further resale (Rogers and Tibben-Lembke, 2001).

Another paper looks at supply chain models in reverse logistics (Savaskan et al., 2004), namely:

- Centrally coordinated systems – single manufacturer single retailer bilateral monopoly models;
- Manufacturer collecting models – the manufacturer collects used product and decides on the wholesale price and the product return rate;
- Retailer collecting models –the retailer engages in the promotion and collection of used products in addition to distributing new products;
- Third-Party collecting models – used-product collection activity is contracted by the manufacturer to a third party, engaged only in the collection of used products from the market.

De Brito and Dekker (2004) classified product return reasons as: manufacturing returns (components or products have to be recovered in the production phase), distribution returns (initiated during the distribution phase) and customer returns (initiated once the product has reached the final customer).

Nuss, Sahamie and Stindt (2014) created the Reverse Supply Chain Planning Matrix to classify planning problems in reverse logistics as strategic, tactical planning and operational planning problems.

Finally, inventory models for returns (Fleischmann et al., 1997) were divided into deterministic models and stochastic models, which are further subdivided into periodic and continuous models.

As can be seen, even though there are many classifications pertaining to different individual aspects of reverse logistics or RLS, there is no comprehensive study of overall RLS types. As a result, any scientific discussion and analysis of RLS is based either on the study of example models, that are too specialized around a specific industry or on an idealized generic model that is more applicable in theory rather than in practice.

2. Method

The literature review in this work was conducted using the content analysis method since it is appropriate for observational research and has the capacity to systematically assess the symbolic content of all types of recorded documents (Bengtsson, 2016). The content analysis method aids researchers in locating and classifying literature into different groups that can assist in the provision of a variety of study opportunities.

Articles written in English in 1998-2023, published in scholarly journals and conferences were included in this study. Databases like Google Scholar (scholar.google.com), Science Direct (www.sciencedirect.com), Emerald (www.emeraldinsight.com), Taylor & Francis (taylorandfrancis.com), and Springer (www.springer.com) were searched for related publications. The search was conducted using these keywords: "reverse logistics", "reverse logistics supply chain", "reverse supply chain", "product recovery management", "remanufacturing'. Works by different researchers were examined, however, only those that have a RLS and its aspects as the main research object (31) were selected for the purposes of this study.

Analysis was done using Taguette – an open-source tool for qualitative data research through tagging common characteristics of the RLS in the studies which were then assigned a frequency (number of articles containing the tag) (Fig. 1).

[Insert Figure 1 about here]

As a result of the content and frequency analysis, the characteristics of "Generic system" and "Industry-specific" were excluded due to not having any practical use in a RLS typification scheme. The tags are exclusively more for describing RLS in studies, while the overall classification should have both practical and scientific purpose. "Closed-loop system" and "Open-loop system" tags were also excluded due to being outliers and not common at all in articles that study RLS, appearing in only 0,83% of selected studies.

The separation of RLS types should have a hierarchical form, since within different levels there can be large-scale or general classification features that narrow into more specified variations. According to these aspects, it is possible to classify RLS systems in levels,

All remaining tags were then collected into clusters with common characteristics, such as Scope of operations, RLS functional organization, Structure of the RLS, RLS aim, and Territorial scope.

For further analysis the resulting frequencies have to be sorted down to a common denominator. A single arithmetic mean of the frequencies inside each cluster was calculated, and then a ranked sorting of weights for each cluster was done according to the following equation (Eq. 1), where the nth weight for any given datapoint d in the dataset under a certain parameter is a comparison of its value x against the maximum numeric value of d under the parameter, which is a constant for all calculated d weights.

[Insert Equation 1 about here]

In this way, the maximum weight W for any given d can be no more than 1, with other d under the parameter having weights between 0 and 1. Thus, the optimal datapoint choice for a certain parameter will always be the one with a weight of 1.

To understand the needed levels of the classification further ranking through the MCDM tool – Best-Worst Method (BWM) as described in Rezaei (2020) was done.

For the BWM calculation, 3 experts in academia in the field of logistics were interviewed for making required pair-wise comparisons. These clusters were internally ranked and then the clusters themselves were compared between each other to achieve "global" weights that are in sum equal to 1. These global weights were used in conjunction with the frequency data to calculate overall weights, as shown in Fig. 2.

[Insert Figure 2 about here]

Finally, a ranking was compiled by the overall weights of each cluster, allowing to equate them to levels of the classification (Table 1).

[Insert Table 1 about here]

3. Results

First level. The division of RLS into centralized and decentralized ones is contingent on the fact that, due to the variety of functions and subsystems of RLS, it is often impossible or unprofitable to have the entire logistics chain within one place or enterprise, especially in the case of a mixed system, where interconnected organizations are included in the reverse supply chain and in their own reverse logistics systems of transnational corporations.

Second level. It is possible to designate a division according to the aim of the RLS. Among others, it is customary to distinguish 5 main areas in reverse logistics for working with returned goods and materials: resale, processing, reuse, recovery and disposal (Agrawal and Singh, 2019). In the event of a return in perfect condition requiring only repackaging, the retailer may put the returned item back up for sale at the original or discounted price. In terms of recycling, some businesses separate and recycle discarded materials (paper, glass, metals and plastics) that are returned as cheap raw materials for industrial producers. Recycling involves the collection of waste and its further use as an inexpensive raw material. Remanufacturing is a process where parts and original elements are taken apart, inspected, and then used as spare parts in repair or production. Finally, disposal is the last option to be taken when there is no remaining or potential value in a returned product. In this case, the materials go to landfills, to incineration stations or into renewable energy systems. Thus, RLS can be classified as disposal systems, as reuse systems and full cycle systems. The former should include systems where the main direction is the reception, evaluation and subsequent disposal of incoming material flows. Reuse RLS includes systems within which materials are evaluated, resold, recovered, reused and recycled. Full cycle systems are those that include the entire range of reverse logistics areas, where at the assessment stage, in addition to making decisions on the acceptance or non-acceptance of materials, they are sent into an appropriate subsystem.

Third level. The division of RLS can be done on the basis of the scope of operations - retail and industrial RLS. Despite the fact that it is usually the buyer returning the goods who is the initiator of the reverse material flow, it should be noted that a seller/distributor can also start the reverse flow by returning a defective batch of goods to the supplier in case of problems with the acceptance of goods, when sending goods back for warranty service, etc. In addition, there are differences between retail and industrial RLS by the nature of the material flow (raw materials, semi-finished products or finished goods) (de Brito and Dekker, 2004), points of contact and transition of the material flow to entities (cargo terminal, warehouse or service center, store, etc.), necessary legal documents for the functioning of the system, etc.

Fourth level. This level includes individual classification features such as the division of systems by territorial coverage. This characteristic takes into account the longest path in the

reverse supply chain: from the return initiator to the last operator. A municipal system implies the ability to carry out all operations within one locality, a regional one - in one region and so on.

Fifth level. The final level of classification is related to the method of processing returns received by the RLS. Separation of systems is possible according to the way they deal with return flows. The simplest approach to managing returns and reverse logistics is a zero-return policy. Return prevention is part of a solid reverse logistics strategy, and measuring and encouraging return prevention activities can increase the predictability and control of backflows (Badenhorst, 2013). It is important to remember that in some countries complete refusal to reimburse the buyer's claims is prohibited by law. As it is a potential option for a RLS, it should be included in the 5th level.

Reverse logistics can be redirected and outsourced to third parties. Many businesses outsource their reverse logistics operations to 3PL providers through distribution of non-essential functions to external partners, allowing retailers to leverage their resources, spread risk, and focus on issues critical to their business survival and future growth (Kulembayeva et al., 2021). Such a partner can play a critical role in the planning and effective implementation of a RLS because they have a clear understanding of the challenges that need to be addressed in reverse logistics as well as in-depth knowledge of industry practices around the world. Hybrid systems include systems where one or more functions are the responsibility of a third-party company and at least one of the functions is performed by the enterprise's own resources. As an opposite, an important type of organization of reverse logistics for retailers is their own return centers for centralized reverse logistics operations. Return centers provide benefits such as consistency in distribution, faster disposal times, and easier identification of trends in return flows to assess product quality, but are also often the costliest option and not suitable for small and medium companies.

A structured and visual representation of the classification is illustrated in Table 2.

[Insert Table 2 about here]

4. Discussion and limitations

In this way it is possible to describe a RLS that is being created or studied in a unified approach, it allows to reference RLS types without overly describing them, as well as to define RLS types for specific research approaches. This paper presents a way to describe various RLS models with different aspects, levels of operation and in different countries, which makes it possible to exclude the individual characteristics of a particular system when considering their common features.

This classification is intended for determining a unified theoretical, practical and scientific basis for RLS research and work. The current disadvantage of this classification might be the issue of classifying systems when they are themselves subsystems. For example, how can one classify a regional network of an electronics distributors' RLS by territory within the international logistics system of a transnational company? Although all reverse logistics functions are performed within one region, it is most likely a regional system, but if viewed in the context of a TNC, which the distributors are subordinate to, it becomes an international system as central departments may be located in other countries. Despite the fact that such cases are mostly rare, the possibility of developing a more accurate classification cannot be excluded and presents an opportunity for future research.

Another limitation is the number of interviewed experts, which offers a future research opportunity as well.

Figures and tables
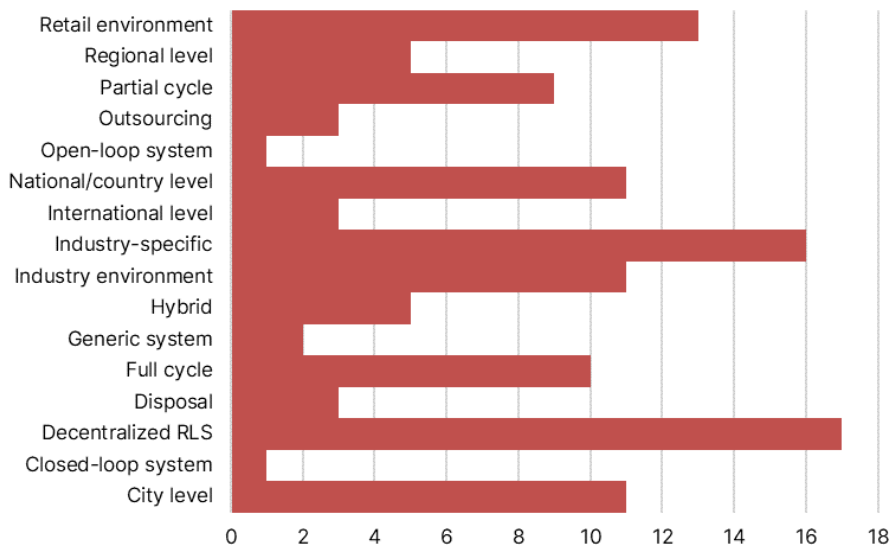
Figure 1 – Frequency of tags in study
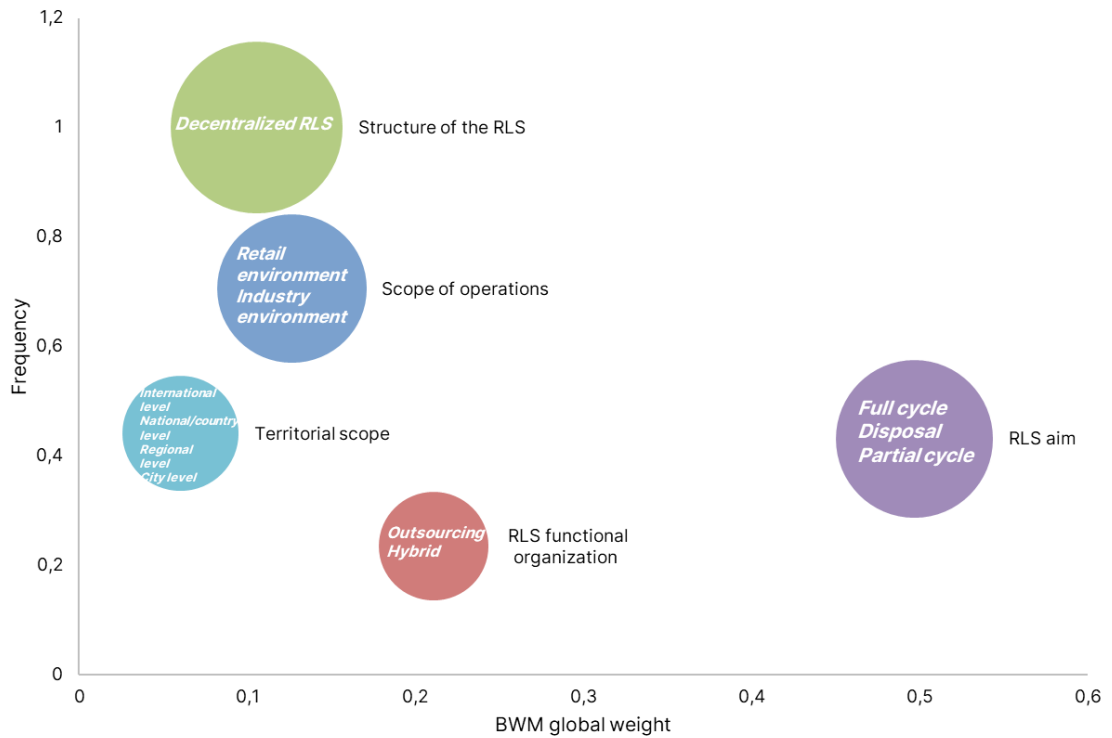
Figure 2 – Frequency and BWM analysis results

Table 1. Final ranking

Cluster	Tag	Overall weight
Structure of the RLS	Decentralized RLS	1,10542
RLS aim	Full cycle	0,92836
	Disposal	
	Partial cycle	
Scope of operations	Retail environment	0,83239
	Industry environment	
Territorial scope	International level	0,50142
	National/country level	
	Regional level	
	City level	
RLS functional organization	Outsourcing	0,44614
	Hybrid	

Table 2. Classification of reverse logistics systems

Level	Sublevel Code	Aspect	Type code	Type
1	ST	Structure of the RLS	CE	Centralized
			DE	Decentralized
2	RA	RLS aim	DI	Disposal
			RR	Reuse and recycling
			FC	Full cycle
3	SO	Scope of operations	RE	Retail
			IN	Industrial
4	TS	Territorial scope	IN	International
			NA	National
			RE	Regional
			MU	Municipal
5	FO	RLS functional organization	ZE	Zero returns policy
			IN	In-house
			OUT	Outsourced
			HY	Hybrid

Formulae

$$Wmax_{d,n} = \frac{x_n}{x_{max}}$$

(1)

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First Steps in Knowledge Mapping to Visualize Faculty Competency Landscape[1]

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Abstract:
The paper is devoted to the issue of the development of knowledge maps aiming to give a big picture view on the faculty competences. Being an effective visualization method knowledge mapping make it possible to manage the intellectual capital of universities and scientific institutions more effectively. We examine knowledge mapping as a useful tool to improve of the quality of information support and management efficiency in an organization. The paper describes the criteria for correct knowledge mapping that can improve the process of managerial decision-making, and thereby reduce the cognitive overload.

Keywords: *knowledge models, knowledge maps, ontologies, knowledge management.*

Introduction

Nowadays companies struggle with significant information overload. Visualization of corporate knowledge in enterprises and organizations creates potential for significant improvement of the quality of information support and management efficiency. However, at the moment, the relationship between the needs of enterprises and organizations and new technologies in the field of knowledge engineering and visual ontological engineering is weak. Models and methods of knowledge visualization are not yet mature enough to solve practical problems of knowledge management and information management. This is especially true for knowledge-intensive enterprises and organizations – universities and research institutes. Information overload and disunity create multiple barriers in the search for partners and contractors for research and development projects.

Often the professional profile and experience of teachers and researchers in higher education are not obvious for an observer. Even within the department, it may not be well-known about the activities of each teacher. The same thing happens at the scale of institutes and universities. Visualization of the knowledge profile of an educational or scientific organization, taking into account the diverse experience of scientific and pedagogical workers, creates the potential not only to improve the efficiency of internal management, but also to search for partners in the external environment, both among organizations in the field of science and higher education, and among organizations of real sectors of the economy.

With the increasing complexity of all processes and products in a rapidly changing environment, the procedures for managing knowledge assets, their location and owners become more and more time-consuming. Knowledge maps will help researchers and educators solve complex information retrieval problems and increase personal efficiency, while organizations gain a competitive advantage and reduce the risks caused by the concentration of knowledge among a small number of experts.

It should be noted that Covid restrictions, online work and partial lockdown have made the knowledge sharing process even more complicated. And now the specifics of the competencies and experience of the teaching staff are not entirely clear even to students and colleagues within their university. Outside of a single institution, the professional knowledge landscape of a team is virtually inaccessible. The relevance of the task is also due to the fact that

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at present there is a shortage of specialists in various scientific fields, and knowledge maps will contribute to the successful identification of such specialists. There is also a certain dissonance between the success in creating knowledge visualization software based on ontologies and the lack of methodology and technology for the formation of practical knowledge bases and knowledge portals for organizations, as well as the means to support them.

Knowledge maps are diagrams that reflect the main intellectual resources, their content, location and owners. Knowledge maps facilitate the search and processing of knowledge by creating visible links between knowledge ("what"), its sources ("where"), holders ("who") and fields of application ("why"). Creating a prototype of such a map will allow integrating and generalizing the disparate knowledge assets of organizations.

Ontologies as a Conceptual Skeleton of a Map

The knowledge map is a basic tool for managing the intellectual potential of a company. By answering the question of where what knowledge is located, it provides employees with quick access to all the experience of the organization. This eliminates duplication of decisions, stimulates innovative activity and allows you to make informed decisions. According to the APQC (American Productivity & Quality Center – an organization specializing in research and development methods to improve the performance and quality of organizations) study, more than 70% of companies consider the knowledge map to be a priority tool for managing intellectual resources in an environment of instability and business transformation (APQC, 2021).

Knowledge maps can simplify the process of finding and processing knowledge by visually demonstrating what knowledge an organization has, where such knowledge is stored, who owns the knowledge, and what certain knowledge is required for the company.

Ontologies as conceptual domain models are one of the most promising approaches to the formation of knowledge bases and knowledge graphs (Gruber, 1993). Ontology development is the core of modern knowledge engineering (Gavrilova et al, 2016; Zagorulko & Zagorulko, 2020). For the preliminary extraction of professional knowledge, the whole palette of knowledge extraction methods is widely used: from interviews, questionnaires, brainstorming and round tables to automated procedures (Deng, 2019; Goncharov & Inkova, 2021). Specialized software is used to structure, formalize, analyze and process data (Krieg-Brückner et al, 2021).

Ontologies serve as a backbone theoretical and methodological framework for knowledge maps. Scientific institutes and universities are centers of knowledge and technology, where teachers and researchers accumulate, transfer and produce knowledge, and also act as expert consultants for organizations in the real sector of the economy.

About Knowledge Mapping

The basis for the study of knowledge maps was laid by such authoritative researchers in the field of knowledge management as Wexler, Leibovitz, as well as Davenport and Prusak. However, neither at the initial stage, nor now there is no consensus on the limits of the application of this tool and the key tasks to be solved. If the first researcher noted the strategic importance of the knowledge map for the formation of a company's competitive advantage (Wexler, 2001), the second one focused on the analysis of gaps in knowledge and their filling (Liebowitz et al, 2000), then the latter considered the knowledge map as a navigator for finding the right specialist (Davenport & Prusak, 1998). Over time, the number of approaches and competing points of view only multiplied.

In the last two decades, many different typologies of knowledge maps have emerged. Early developed typologies have conflicting classification parameters or describe only a small part of the diversity of knowledge maps. A great contribution to this direction was made by the works of Martin J. Eppler (Faisal et al, 2019; Flanagan et al, 2019), the classic of knowledge visualization and the author of the first classifications, which are known and actively cited in the scientific community. The APQC classification of knowledge maps is also widely known, as the

consulting services of APQC in the field of knowledge management and knowledge maps are very developed. At the moment, research covers a wide range of science-intensive areas: from construction (Wang & Cheng, 2022) to artificial intelligence (Corea, 2019).

Criteria for Knowledge Map Development

Knowledge maps visually display knowledge domains, areas, or topics within an organization. They illustrate the distribution of knowledge and expertise among individuals or departments, helping to identify key knowledge holders and knowledge gaps as fig. 1 presents (Innovaltec, 2017).
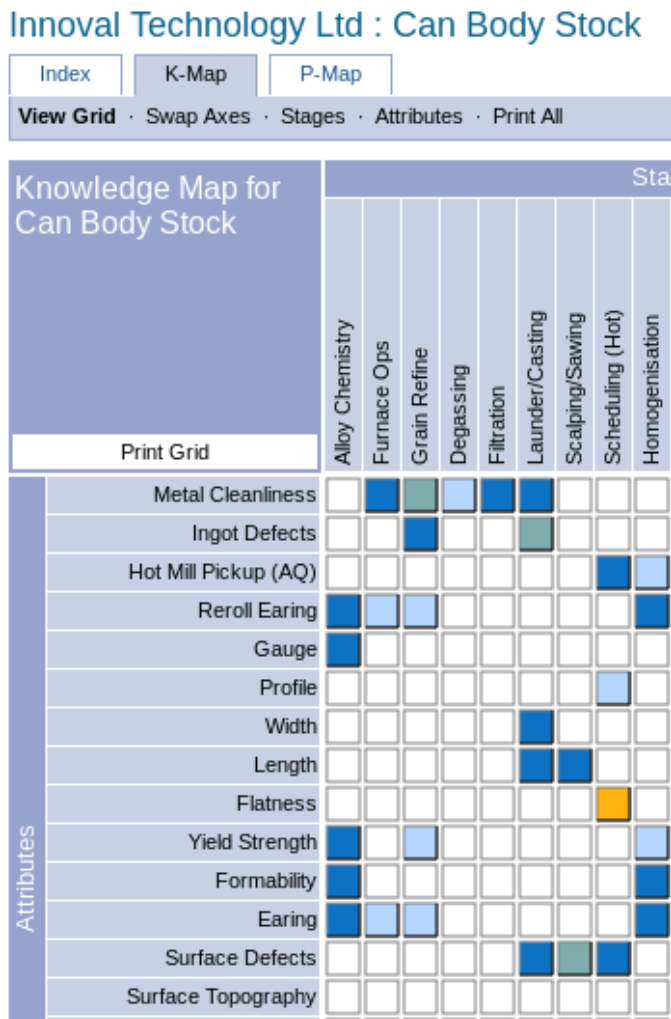
Fig. 1. Part of a K-Map for Can Body Stock

APQC highlights the following benefits of knowledge mapping (APQC, 2022):
• bringing stakeholders together to critically reflect on knowledge related to their work;
• identification of areas and processes where the use of knowledge is critical;
• developing opportunities for value creation by bringing together workers who have not collaborated before;
• facilitating the task of transferring knowledge from experts in certain fields to less experienced employees;
• acceleration of the information search process;
• building capacity to transform tacit knowledge into explicit.

When creating a knowledge map, several criteria should be taken into account in order to ensure its effectiveness in the organization. These criteria were developed based on the quality criteria for knowledge maps distinguished by Vail (Vail, 1999):

The target audience. The first step in knowledge mapping is to determine the target audience and consider who will be using the map and what specific information needs they have. For example, if the map is intended for project managers, then it should contain information about the required competencies related to project management that help in the problem-solving process.

Type of knowledge map. Based on the goals and needs of the organization, it is necessary to determine the type of knowledge map that suits the tasks best. The choice of map type depends on what information the organization needs to improve processes, make decisions and develop competencies.

Structure and visualization. An important aspect of creating a knowledge map is its structure and visualization. The map should be easy to read and understand. Different types of knowledge maps may use different visualization methods, such as charts, grids, graphs, iconic elements or other means of presenting information. The optimal structure of the map should reflect the connections and dependencies between the presented pieces of knowledge so that map's elements can be combined logically in an integrated system.

Update and support. Knowledge maps are not static documents but should be constantly updated and maintained. Organizations should provide mechanisms for updating the information on the map regularly. It is also important to have responsible individuals or teams to keep the map up to date.

Integration with other systems. Knowledge maps can only be effective tools when integrated with other systems and processes in an organization. For example, integration with project management systems or quality management systems can enable better utilization of knowledge and increase the efficiency of the organization as a whole.

Each of these criteria plays an important role in determining the content, structure and use of the knowledge map, contributing to the more effective management and development of knowledge in the organization.

University Specifics in the Empirical Study

Particular attention is paid to knowledge maps of educational institutions and research teams (Sadeghi & Alireza, 2019; Saurabh & Sairam, 2013), since in this area there is no business-specific desire to protect knowledge from transfer and reproduction (Kudryavtsev et al, 2022). The academic community is focused on the efficient use of collective intellectual assets. This means that the potential of a university knowledge map is many times greater than the prospects of a similar tool in other areas. In recent years, there has been a trend towards convergence of research in the field of knowledge maps of universities and library sciences (Deng, 2019) and the integration of maps into the digital learning process (Flanagan et al, 2019). Russian researchers also note good potential of knowledge maps in assessing the intellectual capital of companies, in education and in research (Kozlova, 2016; Mizintseva & Gerbina, 2018).

At the same time, it should be noted that there is clearly not enough research in this area in the Russian Federation, moreover, many authors incorrectly use the term to refer to individual knowledge models (for example, mind maps). While the knowledge map includes the intersection and integration of various projections – WHAT-, HOW-, WHO- and WHERE-knowledge – on each other.

The issue of the development of a methodology for integrating structured data from heterogeneous sources and technology for digital knowledge mapping of various scientific and educational teams is studied in RSF project "Methodology and technology for developing digital knowledge maps for education and research teams''. The project is focused on solving the urgent problem of extracting, structuring, and formalizing the knowledge of members of education and research academic teams to improve the quality of scientific communications, information exchange and positioning in the market of intellectual services. The results obtained will make it

possible to form a visually intelligent landscape of the scientific community, compare the scientific potentials of different scientific teams, identify knowledge gaps as well as areas of potential growth, and also find colleagues for collaboration.

Fig. 2 shows a knowledge map of one of the departments, which gives an idea of the courses taught by teachers of the department.
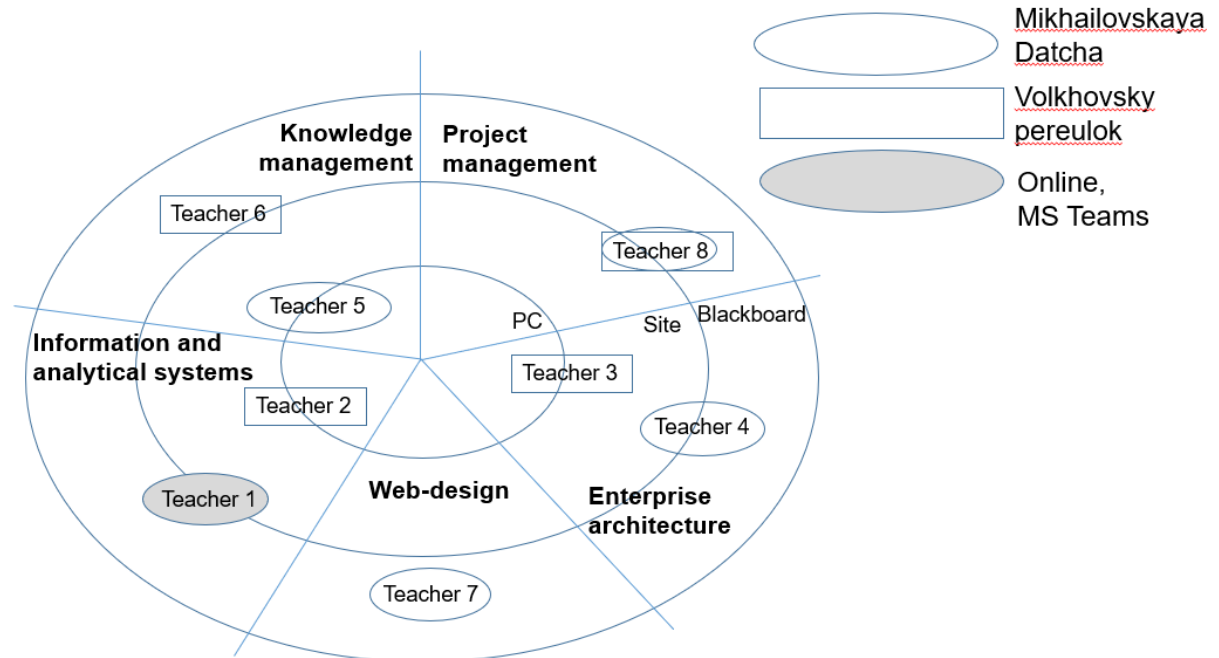
Fig. 2. Knowledge map: disciplines taught at the department

Knowledge map about the disciplines taught at the department clarifies information about the place where the lectures are given: in one of the two campuses or online, as well as the method of storing course materials (on a personal computer, on the website or on the Blackboard e-learning platform).

Survey Methodology and Data Collection Design

A survey questionnaire was developed to collect data from teachers regarding their areas of expertise and experiences in teaching, research, and consulting. The classification of these areas was developed through creative adaptation of the subject areas defined in SCOPUS/ASJC.

A survey was conducted among faculty members to identify their areas of expertise and experience in teaching, research, and consulting. To determine the areas of expertise, teachers selected the appropriate categories in accordance with the developed classification system. Additional aspects were also considered, such as the level of commitment to course updates, teaching experience in various educational programs and the types of research projects in which the teacher participated. The following are the main types and categories of data that were considered when designing the questionnaire:

1. Identification information: full name of the teacher and department;
2. Areas of expertise: expert knowledge domains in which teachers have expert knowledge and areas of competence within each identified knowledge domain;
3. Teaching experience: level of contribution (course updates, development of new courses, creation of training materials or business games), educational program level (bachelor's/master's degrees, doctoral programs, and continuing education);
4. Research experience: types of projects based on the classification of grants (projects with external funding from scientific foundations, projects with external funding from industry, projects with internal funding from St. Petersburg State University), role

in the project team: project manager, subject matter expert, executor, results of the study (theoretical models, analytical reports, research methodology, management methodology, etc.);

5.   Consulting experience: roles (project architect, project manager, or consultant), experience related to teaching and similar to consulting (case development or support of consulting projects).

Taking into consideration these types and categories of data, a survey was designed to collect detailed information on the competencies and experience of teachers in various fields of knowledge and research. The logic of the questionnaire was as follows: each of the teachers identified areas of expertise, and then, for each selected area, noted the keywords that best describe their competencies and level of experience in each of the three dimensions.

Conclusion

Overall, knowledge mapping is an effective method of visualizing information, allowing society or companies to connect experts, access knowledge over time, identify knowledge assets and flow, existing knowledge resources and knowledge gaps (Faisal et al, 2019). The main tools that are most widely used in knowledge mapping require the participation of both experts and analysts.

Knowledge maps are closely related to competency maps and employee competency management, which in corporate decisions are denoted as skills and competencies. According to the observations of well-known analyst Josh Bersin, technologies for working with employee competencies are now actively developing (Bersin, 2020). Knowledge maps as a category of special visual tools used to analyze the knowledge of university teachers can improve the process of managerial decision-making, and thereby reduce the cognitive overload. Such maps increase the image of the university and make the professional landscape of knowledge more transparent.

The approach proposed in the paper is a framework that is developed for knowledge mapping at the university. The first steps in knowledge mapping to visualize faculty competency landscape have been completed: the methodology was developed as well as ontologies forming the basis for knowledge maps, further work on the development of various knowledge maps and dashboard creation is required.

Acknowledgements

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Excess Inventory Management Based on AI: an Exploratory Case Study

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Abstract:
The paper aims to demonstrate how artificial intelligence (AI) could be used in the field of inventory management, including excess inventory reduction. The paper shows several cases in various industry and reveals the trends in the topic. With the evolution of information technology, many actors in this area forecast that these problems in future will be addressed with the help of artificial intelligence. This paper is aimed at an overview of the concept of inventory management and AI. We focus on practical aspects of AI in inventory management. The results demonstrate a conceptual idea regarding how AI can support managing excess inventory.

1. Introduction

In today's challenging times bringing a variety of disruptions and lengthening of lead times across the whole business value chain, organizations are seeking to reduce inventory carrying costs, since the closing margin gaps force businesses to seek for optimization opportunities to stay within targeted profitability. Along with it, the growing consumer expectations require to maintain the gained momentum in improving service levels which brings up the dilemma on how to deal with these objectives especially today.

The companies formulate objectives and group them in the following way:

1. Capital utilization
• Decrease working capital
2. Operational efficiency
• Improve operational cost structure
• Positively impact overall company cash flow
3. Customer service
• Improve service level
• Reduce lead time and increase responsiveness of supply chains

However, to meet these objectives requires answering a variety of complex questions:

How much inventory should be held and in what location?
• What should safety stock levels be?
• Where should pull processes be used?
• What replenishment strategies should be used?
• What is the optimal inventory cost to achieve required service levels?

To successfully answer these questions, businesses need to recognize the challenges the inventory management process bring up today:

1. Siloed inventory management. Planners across the supply chain do not consider the impact of their decisions on the following echelons of the network. There is a lack of centralized inventory governance that manages inventory considering the whole picture.

2. Lack of inventory visibility. Data need to evaluate inventory performance and to take optimized inventory decisions is spread all over isolated systems across the company. Without the right data available, it is hard to make informed data driven decisions.

3. Increasing supply chain complexity. Businesses face higher pressure for high service levels and shorter delivery times alongside with steadily increasing product portfolio to manage. There are emerging more diverse demand needs and channels with steadily widening structure of suppliers.

4.   Multi objective problem by nature. There is not a single right inventory to hold, but an inventory that represents an overall balance between inventory holding costs, service level and sourcing/production capacity and costs.

To systematically address these inventory management challenges, one needs to elaborate a structured multi-horizon strategy to be able to put the right capability at the right time of the planning process. The strategy needs to be divided into three categories of the planning horizon:

1.   Strategic planning (9-18 months). The necessary steps include: 1) Supplier sourcing decisions evaluation, 2) Push/Pull and postponement strategies analysis, 3) Re-positioning Inventory strategies.

The key implied outcome: Achieving Optimal stocking points in supply chain of the business.

2.   Tactical planning (3-9 months). The necessary steps include: 1) Inventory segmentation and stocking policies redefinition, 2) Inventory target levels definition, 3) Inventory service-levels and costs optimal balancing, 4) Inventory drivers evaluation (e.g. sourcing decisions, forecasts), 5) Service times commitment evaluation.

The key implied outcomes: 1) Optimal replenishment policies in every location of the supply chain, 2) Optimal inventory parameters (Safety stock levels, Reorder Points, Optimal batch/lot sizes etc.). 3) Optimal service levels definition.

3.   Operational planning / execution (0-3 months). The necessary steps include: 1) Targets deviation prediction and root cause analysis, 2) Re-optimization of MEIO parameters, 3) Inventory re-balancing across the supply chain, 4) "What-if" scenarios evaluation and comparisons (e.g. evaluation of service level changes impact on inventory etc.).

The key implied outcomes: 1) The definition of inventory alerts and root cause capabilities, 2) Adjusted inventory parameters.

2. Main body of the paper

The approach being suggested has stem from the concept of artificial intelligence, which has gained increasing attention in the recent time. According to, AI normally refers to the ability of machines to learn from experience, adjust to new inputs and make decisions on series of performance as a human with intelligence [Duan et al., 2019]. Based on modern cases and studies, there are four main areas of implementation of AI [Helo, Hao, 2021]:

1. Learning systems that can adapt behavior according to dynamically observed data.
2. Situation-aware systems which can understand the prevailing conditions, and adjust behavior according to modes and situations
3. Autonomous decision-making systems which can execute decisions.
4. Systems that are able to process streaming images, video, audio and non-structured text type of data

Nowadays AI has a big impact on inventory management. Implementing up-to-date IT solutions in the sphere of management of inventory is very important as it has been shown by Soegoto et al. [Soegoto et al, 2020].

The reason of implementing AI is that this technology could find a better balance between service level and inventory cost in the circumstances of increasing complexity and volatility of supply chain and operations management.

Many key players have tried already to benefit from implementing AI for improving inventory management systems, for instance Amazon, Walmart and eBay. The tasks of such advanced systems may include, but not limited to, monitoring inventory levels in real-time and reordering materials when they reach a threshold. There is a variety of software vendors providing specialized IT products in this area, for example - PTC (Servigistics), Oracle and Syncron in the manufacturing service inventory systems, and Scandit and Logility in the fashion industry.

As demonstrated by Chowdhury on example of pharmaceutical industry, AI can be used in each of the stages of the entire supply chain of a firm. [Chowdhury, 2021]

3. Method (including sample and measures description)

The approach to implement this structured strategy includes three consecutive stages:

1.   Inventory diagnosis
2.   Inventory optimization pilot
3.   Use case scaling with ongoing monitoring

All cited stages imply the use of Applied Intelligence approach which enables to complete design and implementation of Intelligent Supply Chain by means of AI technologies.

In accordance with established practice, the results achieved through the implementation of this approach create added value and provide multiple pay backs:

1.   10-30% reduction in inventory and working capital through decrease of ordering cost and optimized stock
2.   10-30% improvement of asset utilization through increased availability and capacity utilization
3.   2-10% increase in service levels through defined inventory policies
4.   2-10% reduced operational costs enabled through improvement of global coordination across supply chains.

The cited stages are disclosed in detail in the following passages.

Stage 1. Inventory Diagnosis.

To implement the stage, one needs to acquire the following groups of data: 1) Historical demand data, 2) Forecast data, 3) Material supply and costs data, 4) Historical inventory levels, 5) Inventory planning parameters, 6) Location data

The stage includes three consecutive steps:

1)   As-Is visibility on the main inventory position KPI to identify potential paint points: inventory volume variance, safety stock coverage, service level delivered, low performance alerts.

2)   Segmentation: the classification of each SKU according to its supply and demand behaviour to assess which corrective actions may be applied. There are different ML-based segmentation algorithms: DBSCAN as a density-based concept, K-means as a standard non-hierarchical concept, separate hierarchical concepts. AI tools today can select already the segmentation method itself.

3)   Value targeting including segment (cluster) specific analysis to evaluate the main drivers and actions that can help improve the performance of the overall inventory (e.g., SLOB analysis, production policies analysis, inventory drivers' analysis).

Stage 2. Inventory optimization pilot.

The pilot implies the usage of AI approach and includes several steps.

1.   Unitary Costs Modelling. The step includes building a reliable cost function which truly represents the current supply chain costs.

2.   Segmentation. A definition of "a priori" inventory policies and target service levels as well as an identification segments eligible for MEIO (Multi-echelon inventory optimization).

3.   MEIO Baseline Run & Validation trough Digital Twin. The step includes building a validated digital twin which represents the supply chain processes of a company in a reliable way.

A digital twin is a virtual supply chain replica that represents hundreds of assets, warehouses, logistics and material flows, and inventory positions. Using advanced analytics and artificial intelligence (AI), the digital twin simulates the supply chain's performance, including all the complexity that drives value loss and risks. By means of Digital Twins one is able to consider supply chain processes' uncertainty and simulate them for the right risk assessment and automatically set self-learning intelligent inventory triggers through mathematical optimization and ML.

4.   MEIO Optimization. The step includes finding the optimal inventory parameters across the network minimizing the overall costs at targeted service level. To complete the step, the simulation-based optimization is used to determine the "to-be" supply chain network of the company. MEIO is used to determine the optimal combination of threshold (ROP) and order quantity (ROQ) for each line item to minimize overall costs. To optimize costs (or PROFIT) through inventory management, all company costs in terms of SKU (Stock Keeping Unit) are divided into three mutually affecting blocks: storage costs, order costs, losses from shortages. The revenue side may be also taken into account thus transforming the initial problem into maximizing the overall profit at each echelon by using the optimal combination of ROP and ROQ.

First, the optimization engine run takes place including:

o Genetic Algorithm used for the intelligent selection of inventory parameters to simulate scenarios

o Global optimization minimizing the objective function of Total supply chain cost (i.e. holding, ordering, backlog and lost sales cost etc.) at targeted service level.

Once the optimization inventory parameters defined, the output from the scenarios is translated into simulation engine as a second step. The simulation experiments include several steps:

o Simulation of the as-is or to-be network to test what the real behaviour would be for a specific scenario

o Testing of stochasticity of the real supply chain by simulating lead times, forecast error and demand based on the historical distribution

o Stress-testing of network capacity availability on multiple scenarios including testing of the robustness of the system as well as the risk associated to each solutions undertaken

5.   "What-If" Scenarios modelling to assess potential impacts of various operational and strategic decisions on the state of the supply chain network (e.g. forecast accuracy variations, network changes etc.)

The cited steps give a huge support in a successful transformational journey of the company towards resilient and agile supply chain network.

To enable a successful implementation of the Inventory optimization pilot it is necessary to support the optimization/simulation engines with high-quality data:

o Material and Locations Master data

o Transportation & Manufacturing Lanes for Theoretical Lead Times, BOM & Costs

o Real Replenishment Lead Times (Purchase orders, Work orders, Stock transfer orders)

o Independent Demand & Forecast data (sales orders, forecast data)

o Auxiliary data:

o Stock Units of Measure (SUOM)

o SUOM Material Dependant

o Currency data

o Time Units of Measure

Stage 3. Use case scaling with ongoing monitoring

In this stage it's crucial to set up the continuous monitoring of performance with customized dashboards:

• Inventory view

o Visualize overall health of inventory across all networks (On Hand and Projected) with ability to drilldown to BU and Product Family level

o Comparison of actual inventory vs forecast/budget

o Inventory projection based on the on-hand inventory, expected receipts and demand.

• Lead time health and variability

o View of lead time from raw material to finished good, incl. details on each step of the value chain (e.g., production, quality, transportation, warehousing)

oFor each product and each step in the value chain a user can identify lead time outliers (actual vs. planning lead time)

oLead time health parameter comparing the actual vs. planned lead time & lead time variability.

• Early warning system

oSafety stock alarms enable to quickly identify the products which have excess safety stock or risk of future stock out.

oIdentify the % of the total stock available for use and % of blocked, under quality or in progress(semi-finished)

oIdentify the % of stock ageing due to shelf-life issues and take action to e.g., avoid write-offs or allocate to different markets.

• Executive alert management dashboards

• List of alerts including their criticality to work by exception, incl. future stock outs / over stock, write offs, stock at risk due to shelf-life ageing alarms.

4. Empirical results and conclusions

Amidst COVID-19 pandemics Amazon faced a challenge of increasing inventories. As a result of agile monitoring, it begun tempering inbound shipments to their DCs with a focus on prioritizing high demand products such as household staples and medical supplies. Such quick re-shift allowed to satisfy increased demand and avoid significant working capital "stuck" in stocks. At the same time Amazon adjusted the way sellers operate, they changed how restock limits work. Amazon allowed to re-stock in limited quantities per category (regular items, oversize footwear, apparel to name a few). This use case does seem relatively simple unless we take into consideration the network behind: Amazon operates >175 fulfilment centers around the world in >46m square meters of space that process and store the products of >6.3m sellers. To manage such complexity, there is a proprietary set of AI algorithms starting from demand forecasting models to inventory management tools. These algorithms are working both ways: top-down from Amazon to the seller and bottom-up from seller to Amazon meaning that sellers can actually review and adjust parameters and outcomes through a specifically designed seller portal. As an example, the inventory performance dashboard sends an alert when stock quantities are running low and provides demand planning and forecasting to suggest recommended optimum inventory levels and shipment timelines.

2. Another good example is a healthcare company that developed a proprietary tool for demand planning, forecast accuracy improvement, transportation costs reduction, lead time reduction, and safety stock reduction. This tool allowed to assess the stock levels in the near real-time and simulate safety stock impact based on consumer behavior changes. Within the heart of this modelling is an interesting AI algorithm that leverages decision trees and random forests based on dynamic factors including but not limited to lead times, actual & lost sales (3-year history), deals win-loss history, historical stock levels and even weather. By piloting this tool in selective European countries more than 10% of safety stock was reduced without changes in the service levels.

3. Excess inventory management can be also targeted using AI-algorithms: one of the European-based industrial manufacturers faced a problem of high inventory costs and decided to apply an AI-based algorithm. The algorithm is linking the turnover & stock analysis to sales recommendations. On the 1st step open orders volumes from each ERP system and existing stocks by SKU by warehouse are passed to the algorithm to update distributions, recalculate turnover and classify whether this SKU is in high / medium / low demand. On the 2nd step SKUs that are classified as being in low demand with high stocks and low turnover are provided back to the sales managers with a threshold-based discount system. The lower the turnover is, the higher usually the discount is. Discount size also takes in consideration profit function: storage and transportation costs are assessed to limit discounts that can be provided. Also for each type

of the SKU there is a minimum order quantity that do not allow sales managers sell below specified limits. Interesting to add that SKUs that are in high demand and usually ran out of stocks are also part of the algorithm: for them the recommended price is increased to potentially balance turnover.

Further investigation should be done though to detect the benefits and costs for using AI in excess inventory management, especially what is concerned to the accurate data problem. Case analysis for some particular firm that uses AI in inventory management would be beneficial for this further study in the field.

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Discovering ICT Profiles and Leveraging Complementarity for Enhanced Performance

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Abstract:
The study focuses on information and communication technologies (ICT) adoption and their complementarity, and investigates almost 30,000 Russian companies across 30 industries. The companies are analyzed based on their ICT profiles, which refer to any combination of information systems implemented in the company. Using association rule techniques, the study identifies ICT profile by coverage, complexity and uniqueness for each industry. Moreo- ver, 28 out of 93 ICT profiles are beneficial for Russian companies, while 3 are destructive. The obtained information will be useful for different actors to make informed decisions. Companies will understand technological strategies of their competitors, government will find it useful for developing policy on supporting digitalization.

1. Introduction

Information and communication technologies (ICT) are already a familiar part of eve- ryday life. Companies actively use modern means of communication, such as the Internet, to communicate with customers and build business processes. According to Rosstat, the absolute majority of companies have access to the global network by 2021. Nevertheless, the Internet is just one of the basic tools, so-called General Purpose Technologies (Karim et al., 2022). The list includes common technologies that act as a basis on which rarer technologies, the so-called Enabling Technologies, will already be layered, which are rare, specific, which makes them difficult to replace. Within the framework of the Resource-Based View (RBV), such Enabling Technologies are considered as strategic resources (see Barney et al., 2001; Karim et al., 2022) since their scarcity and extreme usefulness allows a company to achieve success in the market in which the company operates. The success is expressed primarily in a larger market share, and its source is the greater flexibility of the company, which allows adapting to constantly changing conditions, and a lower level of costs due to the fact that technologies allow compa- nies to automate many processes.

In particular, ERP (Enterprise Resource Planning) is considered the most popular tech- nology. This system combines many operations, starting with human resources management and sales and ending with financial management, marketing and asset management – areas that affect any enterprise (Hitt et al., 2002). However, even such a multitasking and useful technol- ogy as ERP has a low level of implementation. Rosstat data for 2021 reveals that only 13.8% of enterprises have this technology. Considering more specific systems, for example SCM (Sup- ply Chain Management), a much lower level of usage is allocated – 4.8%. Yet the situation is still positive: the share of enterprises using at least one of the three systems – CRM (Customer Relationship Management), ERP (Enterprise Resource Planning), SCM (Supply Chain Man- agement) – is steadily growing. In 2003, the share of such enterprises was at the level of 3.6%, while in 2019 it was 20.5%. Given the growing share of enterprises using technology, it can be concluded that gradual digitalization is in demand among Russian firms, and given the low base, the potential for digitalization is still great.

Nonetheless, the number of technologies is not limited to just three. There is a much

larger number of narrower technologies tailored to special classes of tasks. This can cause problems across companies facing the process of digitalization for the first time: almost every business has many specific processes, which means that for greater effect it is necessary to introduce more technologies that need to be combined into one working system. Accordingly, there is a problem of finding complementary technologies. To facilitate this process, this work is aimed at an empirical analysis of current patterns in the implementation of technologies. Drawing on literature review only few studies addressed the question of ICT combination (Chou et al., 2005).

The study aims to find what combinations of information technologies, which are called as ICT profiles, are used across 31 industries.

2. Methodology

2.1. Association Rules

To find these combinations, association rules technique was applied (Agrawal R. et al., 1994). The technique calculates dependent and independent probabilities of events allowing to trace connections between them, the connections are called rules. In the frame of the study, an implementation of a technology by a company is treated as an event and the obtained rules are treated as ICT profiles.

The method is predominantly used in retail industry. The information gives insight in how the data must be structured. Every observation of a dataset must reflect technologies used by a company as if it was a transaction of payment for a basket of products. Table 1 serves as an example of a dataset structure: technologies are listed horizontally, and transactions are listed vertically. Moreover, the dataset contains information about industry of a company which is essential for creating subsets for further analysis by industry. Each element of a dataset (starting with the third column) represents information whether a technology was implemented by a company (1 – if Yes; 0 – if No).

Table 1. Example of a database appropriate for association rules analysis.

Transaction	Industry	ERP	BI	BData	HRM	CRM	IoT	DM	...
1	Retail	0	0	1	1	1	1	1	...
2	Mining	1	1	0	1	1	0	1	...
3	Light manufacturing	1	1	1	0	0	1	0	...
4	Light manufacturing	0	0	0	1	1	0	1	...
5	PR and marketing	1	0	1	1	1	1	0	...

For example, the fourth transaction describes a company which has implemented HRM (Human Resources Management), CRM (Customer Relationship Management) and DM (Document Management) and operates in light manufacturing industry.

To infer useful information from a dataset, two parameters are then calculated for each industry (reference to formulas written below). Support reveals information about unconditional probability to meet two technologies together while confidence is responsible for conditional probability of usage of a technology given that the other has already been implemented. It is also important to note that the parameters can cover more than two technologies. Basically, there are two events: A and B, thus, we can consider event A as an implementation of several technologies rather just one.

This paper focuses on frequently used technologies in combination, rather than on causal relationships. Therefore, the focus is on the level of support provided. The most popular combination within the industry is known as the ICT profile by coverage. The largest combination of technologies is referred to as the ICT profile by complexity. Finally, combinations of tech-

nologies that are unique to a particular industry are called ICT profiles by uniqueness.

2.2.   Mann-Whitney

Obtained ICT profiles are then used to compare median level of productivity among companies using an ICT profiles and companies not using it inside an industry. Mann Whitney test is applied due to non-normal distribution of productivity variable.

2.3.   Data

The data was collected from TAdviser which is an aggregator of information about usage of technologies by Russian companies. Information on implementations covers almost 30 thousand companies and covers about 100 hundred technologies. On the data ICT profiles were obtained.

In order to get financials for analysis of ICT profiles efficiency, data on top companies by sales in each major industry was downloaded from SPARK and then merged to the dataset with IT implementations. The problem is that TAdviser does not hold information on legal identifications of companies. Therefore, company names from TAdviser and SPARK had been matched by Levenshtein distance algorithm, and correctness of the matches was manually verified.

Merged data on implementations was then transformed in the way that companies once implemented a technology were considered as using a technology until the end of the time period of observations.

3.   The Preliminary Results

The results reveal different ICT combinations across different industries (Table 2).

It can be seen that among ICT profiles by coverage the profile consisting of two technologies namely Video conferencing and SaaS is the most ubiquitous across all industries. Since SaaS is more of a business process rather than a technology (Appendix 1), it means that subscription-based video conferencing is a very popular mean of communication in companies.

BPM, CRM, ERP and other managing IT systems are also popular in combination which tells about their complementarity. Some industries have distinct ICT profiles signifying about their specialization. For instance, in logistics and distribution industry the complex ICT profile includes technologies such as satellite communication and navigation and security and control, and trade and restaurant business include systems which automate sales as well as warehousing system (WMS).

It is also seen that among ICT profiles, which could have been tested due to sample size, there are three destructive profiles (highlighted in grey) in terms of productivity. 28 ICT profiles are, on the other hand, bring value to companies (highlighted in green). Other ICT profiles either didn't show any significant impact or were absent in the database with financial data.

Table 2. *Revealed ICT profiles of Russian companies across industries.*
Successful ICT profiles are green colored while destructive have grey color.

OKVED – Industry name	ICT profile by coverage	ICT profile by complexity	ICT profile by uniqueness
81.2 - Activity for housing provision	SaaS, Video conferencing	BPM, CRM, SaaS, EDM	TMS, FMS, Satellite communication and navigation
92 - Activity in the field of culture and sports	SaaS, Video conferencing	BPM, HRM, SaaS, EDM	Video surveillance systems, Access control and management systems
63.1 – Communication services	IaaS, PaaS, SaaS	BPM, CRM, SaaS, IS, Data center	Video conferencing, IS
70.2 - Management consulting, including personnel	SaaS, Video conferencing	BPM, CRM, ITSM, SaaS, EDM	
13 - Textile industry activity	IS, EDM, SRS	IS, EDM, SRS	ERP, Trade automation systems, Accounting systems

OKVED – Industry name	ICT profile by coverage	ICT profile by complexity	ICT profile by uniqueness
16 - Forestry and woodworking activity	BPM, CRM, SaaS	BPM, ERP, SaaS, EDM	BI, ERP, HRM
52.1 - Warehousing activity	SaaS, WMS, Logistics information system	TMS, Logistics information system, Security and control systems, FMS, Satellite communication	SCM, WMS
28 - Production of machinery and equipment	ERP, SaaS, EDM	BPM, CRM, SaaS, EDM	PLM, CAD
24 - Production of metal products	BI, EAM, ERP	BPM, CRM, ITSM, SaaS, EDM	BI, EAM, ERP
68 - Real estate operations activity	BPM, HRM, SaaS, EDM	BPM, HRM, SaaS, EDM	BPM, ITSM, EDM
06 - Crude oil and natural gas extraction	BPM, HRM, SaaS, EDM	TMS, Security and control systems for vehicles, FMS, Satellite communication, EDM	SCADA, Automated process control system
85 - Education activity	IT outsourcing, Server platforms	BPM, HRM, SaaS, EDM	
84 - Public administration	SaaS, Video conferencing	BPM, CRM, SaaS	BI, Data Mining
10 - Food production activity	SaaS, Video conferencing	CRM, ERP, Trade automation systems, Accounting systems	TMS, Logistics information system
18 - Printing activity	ERP, SaaS	Call centers, CMS, CRM, Accounting system	ERP, SaaS
73.1 - Marketing activity	SaaS, Video conferencing	BPM, CRM, ITSM, SaaS, EDM	IaaS, PaaS
60.2 – Television, radio broadcasting	Call centers, IP telephony	ITSM, SaaS, IS, IT outsourcing	IP telephony, SaaS
01 - Agriculture, forestry, and fishing activity	SaaS, Video conferencing	TMS, Logistics information system, Security and control systems, FMS, Satellite communication	Robotics, Security and control systems for vehicles
65 - Insurance and reinsurance activity	BPM, CRM, ITSM, SaaS, EDM	BI, CPM, CRM, ERP, HRM, IS, Corporate portals, EDM, SRS, Accounting systems	Call centers, IP telephony, SaaS, EDM
23 - Construction activity and production of building materials	SaaS, Video conferencing	TMS, Security and control systems for vehicles, FMS, Satellite communication and navigation	

OKVED – Industry name	ICT profile by coverage	ICT profile by complexity	ICT profile by uniqueness
47 - Retail trade, except for motor vehicles and motorcycles	SaaS, Video conferencing	BI, Data Mining, Data Quality, OLAP	BI, OLAP, WMS
46 - Wholesale trade, except for motor vehicles and motorcycles	Trade automation systems, Accounting systems	SCM, SRM, WMS	BI, Trade automation systems
84 - Public administration activity	SaaS, Video conferencing, EDM	BI, Big Data, BPM, Data Mining, ERP, SCM, SRM	BPM, Digitization of government functions, Corporate portals
49 - Road transport and motorcycle activity	SaaS, Video conferencing	TMS, Logistics information system, Security and control systems for vehicles, FMS, Satellite communication	Call centers, OSS/BSS
55 - Hotel and restaurant business activity	Trade automation systems, Accounting systems	BPM, SaaS, EDM	
21 - Pharmaceutical production activity	SaaS, Video conferencing	BPM, CRM, SaaS, EDM	ERP, MIS
64 - Financial intermediation, except for insurance and pension funding	BI, Data Mining, Data Quality, OLAP	BI, CRM, SaaS, IS, IT outsourcing, Remote banking service systems., EDM	SaaS, Video conferencing, IS, Remote banking service systems.
20 - Chemical production activity	SaaS, WMS, Logistics information system	BPM, CRM, SaaS, EDM	EAM, ERP, SaaS
35 - Provision of electricity, gas, steam, and air conditioning supply	SCADA, Automated control system for power engineering facilities, Automated process control system	ERP, HRM, SaaS, EDM, SRS	SCADA, Automated control system for power engineering facilities, Automated process control system
69 - Legal and accounting services activity	SaaS, Video conferencing	BPM, CRM, ITSM, SaaS, EDM	
05 - Coal, crude oil, and natural gas extraction activity	BPM, HRM, SaaS, EDM	BI, ERP, HRM, SaaS, EDM	ERP, Logistics information system

4. Conclusion

The information obtained from the analysis reveals patterns of technology implementation by companies. The results will provide companies deciding on the introduction of ICT with an opportunity to assess their competitive environment, alternative ICT profiles and govern- ment with information for making policy on supporting digitalization. It is seen that not all ICT profiles are beneficial for companies.

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Evaluating the Effects of Diverse Strategies on Team Performance in the Face of Shocks

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Abstract:
The paper aims to investigate the classical strategic choice dilemma of "diversification vs spe- cialization" in the context of exogenous shocks, using the framework of the resilience con- cept. The dynamic and rapidly evolving nature of the E-sport industry, coupled with the com- plexity of the game Counter-Strike: Global Offensive, make it an ideal platform for testing the effectiveness of diversification strategies and organizational resilience. As a result of empiri- cal analysis, we find both the significance of strategy variables, namely concentration on a certain map, and the significance of team composition variables, including the average age of the team and the number of players speaking the same language.

Keywords: *team performance, resilience, exogenous shock, diversification, Esports*

1. Introduction

The paper addresses a fundamental question that managers and policymakers face when designing their strategies, namely, whether to focus on a narrow set of ac- tivities or to diversify across multiple activities. The first strategy is named "speciali- zation", while the second one "diversification". The wide variety of empirical studies established different relationship (Le, 2019). These studies revealed that there is no one-size-fits-all answer to this question, as the preferable strategy depends on the company's goals and the requirements of the market. Diversification can help a com- pany spread its risk and explore new opportunities, but it can also lead to a lack of fo- cus and dilution of resources. Specialization, on the other hand, can help a company

become an expert in a particular area and build a strong reputation, but it can also limit growth opportunities and leave the company vulnerable to changes in the market. Ulti- mately, the decision to pursue diversification or specialization should be based on careful analysis of the company's strengths, weaknesses, opportunities, and threats, as well as the demands of the market and the competition.

Despite dilemma of diversification vs specialization is widely discussed topic in strategic management, only few studies investigated it through the lens of exoge- nous shocks. At the same time exogenous shocks are becoming increasingly common in today's world, and can have significant implications for firms' performance and sur- vival (Röglinger et al., 2022). Therefore, this paper focuses on the concept of resili- ence, which explores an organization's ability to anticipate, prepare for, respond to, and adapt to gradual changes and unexpected disruptions in order to survive and thrive (Denyer, 2017). By using the resilience concept, the paper offers a new perspective on this strategic choice dilemma, which can help firms to better navigate uncertain and turbulent environments. We seek to reproduce high level of uncertainty with exoge- nous shock, considering that exogenous shock is unanticipated, low-likelihood, poten- tially high-impact events originating from an organization's environment (Chakrabarti, 2015). It affects organizations by forcing them to adapt their strategies, business mod- els, structures, and business processes to react to changing conditions and avoid ex- tinction (Röglinger et al., 2022).

We also address team resilience concept, while teams that are able to effec- tively handle

shocks and adapt to unexpected situations are often more successful in the long run. These shocks can cause a team to lose momentum, become demoralized, or struggle to adapt to new circumstances. Psychological and management literature

highlights the importance of team's resilience and its development (see, for example, Morgan, Fletcher, and Sarkar 2013; Gucciardi et al. 2018). Resilience at a team level captures team processes of effectively managing pressures and adjusting positively following adversity (Hartwig et al., 2020). Even if events are not adverse, teams have adapt their processes to complete their task (Maynard et al., 2015). Team-based struc- tures become widespread in companies and other organizations, as well as in sports. Moreover, the mechanisms of adaptation can be more clearly observed on a team level than on organizational one (Baard et al., 2014). Therefore, it is important to investigate how teams effectively manage challenges that may disrupt team functioning (Hartwig et al., 2020).

This paper aims to determine the optimal level of diversification that can effec- tively respond to external shocks and enhance organizational/team performance.

We utilize data from E-sport field, specifically from the game Counter-Strike: Global Offensive (CS:GO) considering that it provides a unique setting for testing the impact of exogenous shocks on organizational performance and team resilience. Es- ports organizations operate in a highly dynamic and rapidly evolving industry where external shocks such as changes in game mechanics, new regulations, and unexpected player departures can significantly affect team performance. Additionally, CS:GO is a complex game that requires high levels of coordination and communication among team members, making it an ideal platform for studying team resilience.

Furthermore, the esports industry has experienced significant growth in recent years, with revenues expected to reach $1.5 billion by 2023. This growth has led to in- creased competition, which further highlights the importance of organizational diversi- fication and resilience. By studying the impact of external shocks on esports organiza- tions and their ability to adapt and perform, researchers can provide valuable insights into how organizations can effectively respond to external shocks and enhance their overall performance.

One example of an external shock that can affect CS:GO teams is a change in the game's map pool - a set of virtual arenas where teams compete. CS:GO has a set of maps that are used in competitive play, and the game's producer can choose to add or remove maps from this pool. This can significantly impact team performance, as dif- ferent maps require different strategies and skillsets. Map change represents an exoge- nous shock for three reasons. Firstly, it disrupts familiarity and forces to learn new strategies, secondly it eliminates tactical advantage if team specialized in certain maps and thirdly, it upsets competitive balance potentially giving an advantage to one team over the other. The advantages of using CS:GO context are the following. First, the shocks are exogenous to teams' performance, repeat over time and are similar in na- ture. Second, we observe esports teams over time and can analyze their adaptation to a shock using different time windows considering before and after shock period. Third, the detailed statistics on individual and team levels are available. Particularly, map choosing strategy of each team before and after shock can be collected.

In answering the question how much team should be diversified in map strat- egy to be resilient, we try to contribute to the organizational/team resilience concept by studying the impact of diversification vs specialization map strategy on change in team performance under exogenous shock.

2. Literature review
Team adaptation and resilience
Hartwig and coauthors (2020) argue that team resilience is a product of interac- tive processes between individual resilience of team members. Team resilience out- comes such as team performance depend on not only individual and team resilience

inputs but also from resilience behavior and processes aimed at preparing for and preventing negative effects of adversity and learning from past challenges. Gucciardi et al. (2018) stress the importance to operationalize the concept of team resilience func- tioning and propose to do it through team performance trajectories, that is, patterns of performance over a specific temporal period in which the team faced an adverse event. Specifically, they suggested to conceptualize team resilience functioning as "team per- formance outcomes after exposure to an adverse event relative to levels of functioning prior to that adversity" (Gucciardi et al., 2018, p. 736).

The discussion of team resilience in sports context is relatively new, and earlier studies have focused on the individual level. Holt and Dunn (2004) considered individual resilience among professional youth soccer players and found it as one of the main competencies for individual success. Particularly, being able to thrive under pres- sure and responding positively to failures were found important. Fletcher and Sarkar (2012) reveal that positive personality, motivation, confidence, focus, perceived social support are major psychological factors which help Olympic champions to achieve op- timal sports performance. One of the first papers on team resilience in sports is a study of Morgan, Fletcher, and Sarkar (2013), which investigated interview themes. Using the context of elite sports, the authors revealed four main resilient characteristics of sport teams: group structure, mastery approaches, social capital, and collective effi- cacy. However, some topics related to team resilience and adaptation become wide- spread in sports literature. Whereas coping with pressure is considered to be one of the main qualities related to individual resilience (Morgan et al., 2013), sports research ex- tensively explored the issue of choking under pressure and confirmed deterioration of individual performance in pressure situations in many sports (for example, Baumeister and Showers 1986; Böheim, Grübl, and Lackner 2019; Bucciol and Castagnetti 2020; Harb-Wu and Krumer 2019).

The empirical investigation of team resilience or adaptation relies mostly on questionnaire surveys (Meneghel et al., 2016; Wiedow & Konradt, 2011) or interview approach (Morgan et al., 2013). Meneghel et al. (2016) measure team resilience using items related to the ability to perceive experiences constructively, perform positive adaptive behaviors, and develop tolerance for uncertainty. Longitudinal analysis of performance adaptation frequently uses computer-based scenario tasks (Baard et al., 2014) to analyze decision-making on both individual (Holladay & Quiñones, 2003; Lang & Bliese, 2009) and team (Porter et al., 2010; Randall et al., 2011) levels. Thus, using alternative data-driven approach based on secondary real-world data can provide additional insights into the team resilience issue.

3. Data and method

CS:GO is a first-person shooter video game that has gained significant popular- ity in the gaming and esports communities (Bednárek et al., 2018). Two teams of 5 people compete in the game – terrorists and counter-terrorists. The goal of both teams is either to eliminate the enemy team, or to detonate a bomb for the terrorists and to defuse it for the counter-terrorists. Each match on a professional level can consist of 1 to 5 maps played, on each map the winner is the first team to reach 16 points in 30 rounds or to win overtime if points are tied after 30 rounds played.

We collected information about matches played by professional teams from December 2015 to April 2023. For data collection we used the most popular website with statistics on professional matches – HLTV.org. Our dataset consists of 58623 matches. A total of 107719 maps were played, with an average of 1.837 maps per match and a median of 2.

Number of shocks used for analysis - 14. These are events of both removing and adding maps. There are 5 pairs of events in the analysis when one map was re- moved and a new one was added on the same day. There are also 3 events when maps were added without the removal of another one and 1 event when a map was removed without replacement.

For further research, the dataset was processed to show the parameters of teams'

composition and their performance on the date of the shock. Thus, we got a new dataset, which contains 6656 lines, where each line is a specific team for the date of one of the shocks and parameters for this team.

To control the performance of the teams, the following statistics were used: the average value of the teams' KD and the average number of rounds won by the team.

KD is calculated by dividing the number of kills by the number of deaths. KD is statis- tic based on individual player performance, but also include an element of teamwork - since things like good communication, grenade support, and so on are important for a successful game of each player. The average number of rounds won is based on the performance of the entire team, as it shows the number of rounds in which the team outperformed the opponent and won.

Table 1. Descriptive statistics for dependent variables

Variable	Mean	SD	Min	Max
Performance metrics (for 3-month time window)				
change_kd	1.015	0.217	0.431	2.452
change_rounds	1.039	0.351	0.188	6.857
Observations	6656			

Variables responsible for the composition of the team, as well as for the strat- egy for choosing maps and trainings, were chosen as independent variables. Variables for map selection strategy and preparation include number of games played by team before shock, share of games on deleted map, HHI index for a measure of team games diversification on different maps. We also control average rank of team rivals for team level control. In HLTV rating teams are ranked from 1 to infinity where the lower is rank, the stronger is team.

Variables for the composition of the team are the number of players who speak the same language, the average age of the team members, the maximum age difference in the team, the number of changes in the teams' line-up in 6 months period before the shock.

Table 2. Descriptive statistics for independent variables

Variable	Mean	SD	Min	Max
Strategy (for 3-month time window)				
Proportion_on_deleted_map	0.0686	0.136	0.0	1.00
HHI	0.3483	0.217	0.1505	1.00
Number of games	15.54	19.36	1.0	135.0
Team composition				
speak _one_language	4.386	0.998	1.00	5.00
average_age	21.9	2.165	14.8	30.8
max_age_delta	5.085	3.006	0	18.0
shifts	3.038	7.05	0	94.0
Teams' level				
average_rank	107.20	58.32	1.00	355.0
Observations	6656			

4. Empirical results

In Table 3, we report results for individual performance, while Table 4 contains the results for team performance. The coefficients for the control variables align with expectations. Our discussion focuses on the Herfindahl-Hirschman Index (HHI) of the maps played, as this variable reflects the team's strategy. In all the models presented in Tables 3 and 4, both the linear and squared terms are statistically significant. The turn- ing point of the inverted U-shaped curve is illustrated in Figures 3 and 4. As shown, there is an optimal point where the effect of HHI is maximized. This turning point var- ies over time after a shock: higher concentration yields better results in the short term, while in the long term, the turning point is lower. Therefore, in the long term, the ef- fect of concentration starts to decrease earlier. These results hold true for both individ- ual and team performance.

We also found a significant impact of the level of the team and the variables of its composition on the team resilience. Firstly, since the teams are sorted in the ranking according to the principle the lower the rank, the stronger the team, the team level demonstrates a consistent positive impact on both individual and team performance, indicating that lower-ranked teams tend to face challenges in adapting to shocks and maintaining their performance levels. Secondly, average team age positively influ- ences performance, suggesting that teams with more experienced and older members have a higher likelihood of successfully navigating shocks and exhibiting resilience. Lastly, the number of players speaking the same language shows a positive but rela- tively small effect on performance, highlighting the benefits of effective communica- tion and coordination within teams during challenging situations.

Table 3. Regression results for individual performance

	KD (individual performance) N months after					
	(1)	(2)	(3)	(4)	(5)	(6)
HHI	0.900***	0.980***	0.907***	0.940***	0.942***	1.019***
	(0.251)	(0.237)	(0.232)	(0.228)	(0.236)	(0.179)
HHIsq	-0.368*	-0.464**	-0.435**	-0.482**	-0.463**	-0.663***
	(0.219)	(0.207)	(0.203)	(0.200)	(0.206)	(0.156)
average_age	-0.004	-0.003	-0.003	-0.004	-0.005	-0.008***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
isdeleted	-0.017	-0.026	-0.026	-0.026	-0.025	-0.024
	(0.025)	(0.024)	(0.023)	(0.023)	(0.024)	(0.018)
speak_one_language	0.017**	0.017**	0.014*	0.012	0.012	0.002
	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)	(0.006)
shifts	0.0002	0.0004	0.0004	0.0004	0.0004	0.0005
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.0005)
max_age_delta	-0.001	-0.0002	-0.002	-0.001	-0.001	0.00001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
average_rank	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Proportion_on_deleted_map	-0.064	-0.101	-0.102	-0.105	-0.103	-0.097
	(0.085)	(0.081)	(0.079)	(0.078)	(0.080)	(0.061)
Constant	1.057***	1.019***	1.048***	1.052***	1.048***	1.118***
	(0.157)	(0.148)	(0.145)	(0.143)	(0.147)	(0.112)
teams	Yes	Yes	Yes	Yes	Yes	Yes
maps	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,235	1,235	1,235	1,235	1,235	1,235
Adjusted R^2	0.061	0.067	0.057	0.053	0.053	0.059
F Statistic	3.057***	3.281***	2.897***	2.762***	2.780***	2.976***

Note: $^{*}p<0.1; ^{**}p<0.05; ^{***}p<0.01$
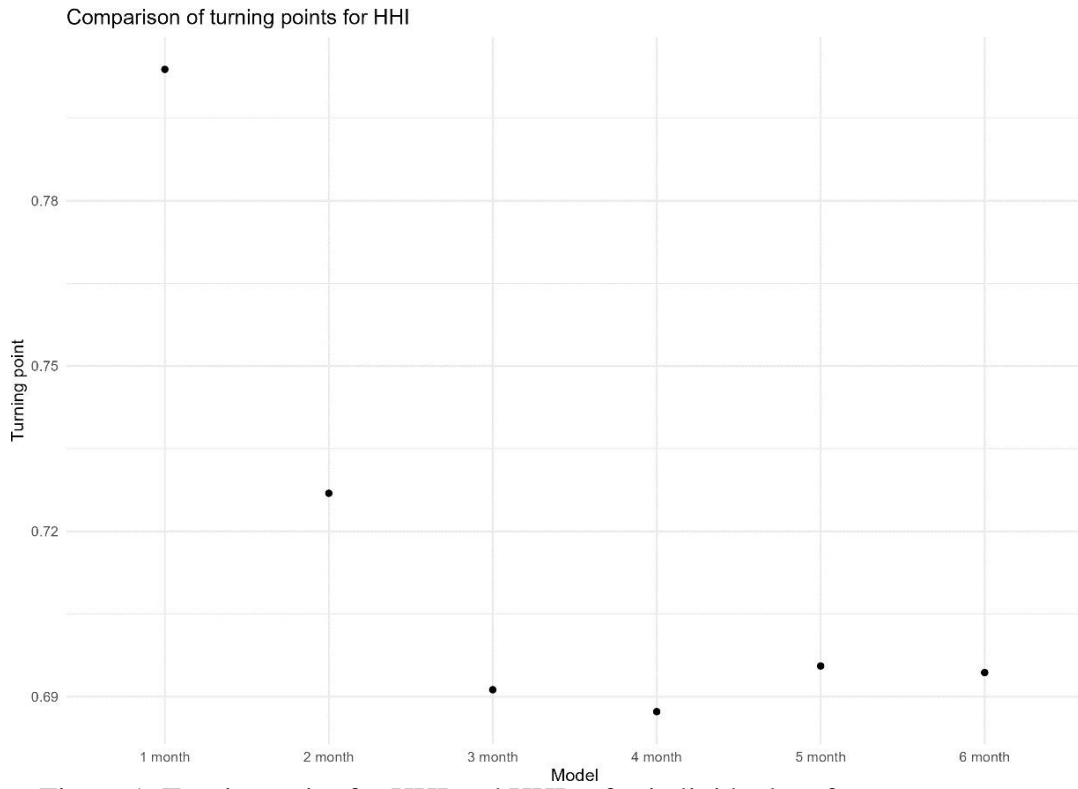
Figure 1. Turning point for HHI and HHIsq for individual performance

Table 4. Regression results for team performance

	Rounds won (team performance) N months after					
	(1)	(2)	(3)	(4)	(5)	(6)
HHI	0.852***	0.989***	1.098***	1.080***	1.055***	1.091***
	(0.268)	(0.244)	(0.244)	(0.236)	(0.230)	(0.230)
HHIsq	-0.530**	-0.680***	-0.794***	-0.786***	-0.759***	-0.786***
	(0.229)	(0.208)	(0.208)	(0.201)	(0.196)	(0.197)
average_age	0.139**	0.158***	0.158***	0.153***	0.158***	0.149***
	(0.062)	(0.057)	(0.057)	(0.055)	(0.053)	(0.053)
speak_one_language	0.012	0.016**	0.015**	0.011	0.012*	0.013*
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
shifts	0.0003	0.001	0.0003	0.0004	0.0005	0.0003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
max_age_delta	0.004	0.004	0.003	0.003	0.002	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
average_rank	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.0004**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Proportion_on_deleted_map	0.021	-0.031	-0.017	-0.008	-0.0001	-0.015
	(0.066)	(0.060)	(0.060)	(0.058)	(0.056)	(0.056)
average_age2	-0.003**	-0.004***	-0.004***	-0.003***	-0.004***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.641	-0.932	-0.945	-0.845	-0.905	-0.829
	(0.711)	(0.646)	(0.647)	(0.625)	(0.610)	(0.610)
map	Yes	Yes	Yes	Yes	Yes	Yes
team	Yes	Yes	Yes	Yes	Yes	Yes
Observations	581	581	581	581	581	581
Adjusted R^2	0.051	0.075	0.066	0.067	0.071	0.063
F Statistic	1.851***	2.268***	2.106***	2.126***	2.192***	2.057***

Note: $^*p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$
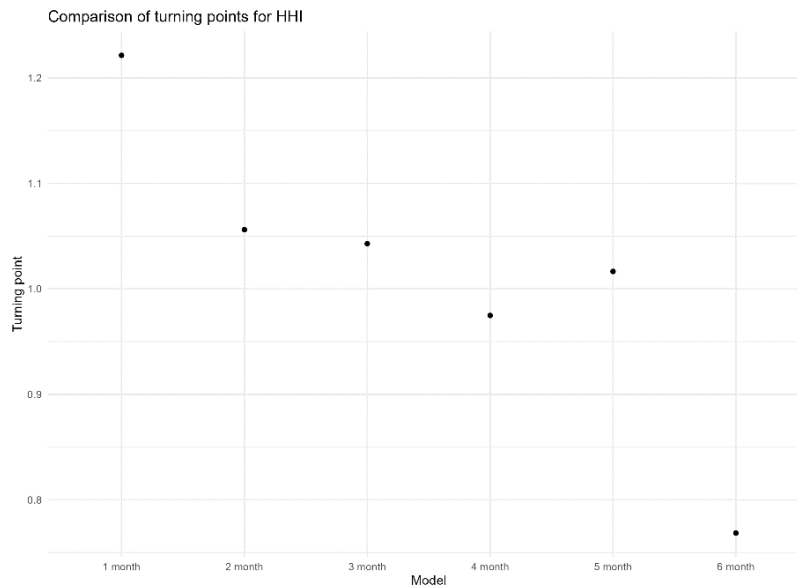
Figure 2. Turning point for HHI and HHIsq for team performance

5. Conclusion

In this study we analyze the effect of diverse strategies on team performance in case of shocks, specifically focusing on the dilemma of diversification versus speciali- zation. Our empirical test is based on the context of the esports industry. We find that the optimal level of diversification for teams exists. It allows to respond effectively to external shocks and enhance performance. The study contributes to the understanding of team resilience and provides insights for organizations operating in dynamic and rapidly evolving conditions.

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The influence of Internet of Things on Customer Experience in Retail

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Abstract:
The main goal of this research is to identify the influence of Internet of Things on the customer experience and customer loyalty and their interconnections in retail. Brand loyalty here is presented as a specific competitive advantage that a company receives if it enhances customer experience. It is expressed by the specific actions that a customer does that creates benefits for the company. The main results are the following. The relations between customer experience and customer loyalty were identified. Internet of Things smart devices were identified and ranged based on the customers' opinion.

Keywords. *Internet of things, loyalty, Internet of Things, retail.*

1. Introduction

In recent years, the environment in which companies compete is changing faster and stronger than ever before. The competition between retailers is growing and attracting customers is becoming increasingly expensive. In such conditions, the most modern and environmentally friendly way to stand out in the market is to improve the experience that customers have when they interact with the business. Customer will have experience with or without companies, but it is better for business to start worrying about how it fits in customers lives.

Most of the articles where the customer experience was studied mentioned loyalty as a result of improved customer experience. Loyalty is the widespread indicator that companies seek to monetize today. Long-term and mutually beneficial relationships with customers are the key to business stability during the period of economic transformation. However, according to the McKinsey study, up to 70% of loyalty programs do not achieve their goals. Thus, companies should seek for replacements for the traditional loyalty programs and create loyalty using other instruments.

Internet of Things (further can be reduced to IoT) is a developing concept that is in great demand now and will be even more in demand in the future. At the same time, in the rapidly evolving retail landscape, consumers' needs still drive their purchase decisions. Yet new technologies such as IoT, newer business models, and big data/predictive analysis suggest that the shopping process is going to change drastically in the nearest future (Grewal et al., 2017).

The big reason to pay attention to the Internet of Things were market indicators. Globally the IoT market in retail in 2020 was estimated at 35,63 billion dollars, the predicted size of the market in 2026 is estimated at 67,60 billion dollars (Karin, 2021).

The IoT have been already widely used in manufacturing and in logistics, where it has already proved its usefulness. In academic articles, Internet of Things is considered mostly from the perspective of implementation in supply chain management and inventory management. The role of this technology in creating experiences for customers and in direct contact while shop clients make their shopping is understudied. But at the same time, it has great potential and may change people's daily habits in shopping.

Besides considering customer experience and Internet of Things, it is valuable to pay attention to the brand loyalty, its nature and its connection with customer experience. Customer experience has an influence on attraction and retention of customers and investigations in such a direction could be valuable for decision makers in marketing.

Additionally, smart devices that are used in the IoT assemblages could bring value to a customer's experience.

As a result, for this research the following research questions were also formulated.

- How are customer experience and brand loyalty interrelated in retail industry?
- Does the IoT influence the interrelations between customer experience and brand loyalty?
- How does Internet of Things influence perceived customer experience in retail?
- How does Internet of Things influence brand loyalty in retail?
- What IoT devices could be used to increase in-store customer experience?

2. Internet of things and marketing in retail

2.1. Internet of things in retail

Around 20 years ago the traditional retail system has changed. All this time companies tried their best to develop methods to gather valuable information and make sure to provide the consumer with exactly what he needs and avoid unnecessary costs. Due to the increase in the competition companies are even more concerned about retention of their customers. The major driving force in the IoT technology in retail industry is to provide customers with the best inside store experience (Singh et al., 2020).

Today retail companies have started to implement some of the IoT technologies in order to get insights into customers' needs and deliver better promotions and boost sales. Some possible things used by companies are the following: smart shelves with RFID tags and readers on goods and surface of the shelve, Bluetooth beacons, robots, digital signages (Singh et al., 2020).

Current levels of implementation and investment levels into IoT for CPG (consumer packaged goods) and retail industry is lower than other sectors (Kindström et al., 2013).

The ultimate objective of the connectivity of devices and data is to provide value-added services to users. The context information could be gathered from different sources broaden by the IoT systems. Retail companies get the information not only from the cashier's check but also from mobile apps, cameras, smart shelves, beacons, etc. The customers in their turn get more detailed information from different sources.

The applications of IoT in retail are various and could be split into two segments: those, which directly consumer/shopper facing and those, which more related to business infrastructure and processes. The first segment contains following examples of practices: geo-targeting, personalized offers, customized purchase experience cross selling and upselling tailored pricing, direct payment, automatic replenishment, drawing shoppers to store, in store digital interactive screens, gamification, product and offer cocreation. The second segment of infrastructure and process related practices contains following examples: shopper in store movement and behavior monitoring, intelligent store ambient and store layout, loyalty program, dynamic pricing, demographic and behavioral targeting, inventory and stock management, supply chain management, collaborative supply chain, tracking assets and equipment, payment process, in-store staff management, seamless cross channel experience, real-time processes and activities monitoring, new business models and revenue streams. Examples of technological solutions for IoT are the following: RFID, NFC, BLE, Wi-Fi, Zwave and others (Singh et al., 2020).

2.2. Customer experience concept

Recently, customer experience (CX) has been closely studied by companies. The reason is that CX is one of the important factors that helps to maintain competitive advantage. Customers now have greater influence on companies, since they tend to have more information about products, services, competitors, prices, etc. Nowadays, if a company wants to have a competitive advantage it will not be enough just to provide customers with a simple product or service.

Customers seek more than just mere services and products but experiences they would like to pay for (Pine and Gilmore, 1998). It is necessary to provide them with something that customers will memorize. And if this experience is positive, they are more likely to visit a company in the future to buy products or use its services again.

Customer experience is a personal thing that occurs at different levels and involves both the customer, the product (service), and the company that offers it (Gentile et al., 2007). CX is totally subjective and internal, and it is generated through different contact points with a company (Meyer and Schwager 2007). Thus, it is not limited by the stage of purchase, but also applied to activities before, during and after a purchase (search, purchase, consumption, after-sale support, etc.). All activities influence the current decision and repurchase intentions in the future.

Customer experience created not only by factors that a company can control (price, service, interface, retail atmosphere), but also by the elements that a retailer cannot control (influence of other people, purpose of shopping, etc.).

Customer experience is holistic in nature, incorporating the customer's cognitive, emotional, sensory, social, and spiritual responses to all interactions with a firm (Lemon & Verhoef, 2016). It is the internal and subjective response customers have to any direct or indirect contact with a company (Meyer & Schwager, 2007). There are also more definitions of the customers experience in the literature. It has multidimensional view and is identified by five types of experiences: sensory (sense), affective (feel), cognitive (think), physical (act), and social identity (relate) experiences (Schmitt, 1999). Customer experience in retail is a multidimensional and holistic construct, that involves the customer's cognitive, affective, emotional, social, physical responses to the retailer (Verhoef et al., 2009). Customer experience is subjective, internal consumer responses (sensations, feelings, and cognitions) and behavioral responses evoked by brand-related incentives that are the parts of a brand's design (Brakus et al., 2009). Grewal (2009) has identified customer experience as something that includes every point of contact at which the customer interacts with the business, product, or service. Zhao and Deng (2020) described the concept as a feeling of consumers in the shopping process affected by retailer's services, product price, quality, and shopping environment.

To sum up the most complete definition of customer experience was given by Verhoef et al. (2009). Thus, customer experience is a holistic multidimensional construct. This feeling involves cognitive, emotional, affective, social, and physical responses. It appears in interconnection between customer and retailer. Customer experience encompasses all experience throughout the whole customer journey.

2.3. Customer experience dimensions

There is no consensus in the academic community about what customer experience includes and into what parts it can be decomposed. Some dimensions are more common, others are used in fewer articles. More than that the approach to the dimension of the customer experience depends on what area or industry it is studied in. Knowing the customer experience dimensions helps to deeper understand the concept itself and allows to find right instruments to estimate it.

There are several approaches to identify dimensions (attributes, or factors) influencing customer experience in retail industry. As it was mentioned above in some definitions of the customer experience, the concept includes cognitive, emotional, sensory, social, and spiritual responses. These dimensions were identified by Lemon and Verhoef (2016), but sometimes researches suggest extra aspects in addition to previously presented five types of responses. To be more specific and to explore these dimensions more in depth consider a classification presented in the article by Camila Bascur and Cristian Rusu (2020):

• Cognitive. This component involves mental processes of a person, in addition to conscious thoughts. The offer might engage people in expressing their creativity and approaches

to problem solving.

• Emotional. This component involves the affective system of a person, which generates feelings, emotions, moods.

• Sensorial. This component is focused on stimulating or affecting the senses (hearing, sight, touch, smell and taste) to awaken various sensations in people.

• Relational. This component involves a person, beyond their social context, their relationships, or ideal self. The offering could leverage this aspect of customer experience by encouraging people to consume product or use a service together.

• Pragmatic. This component occurs when a person performs a practical act. It includes the factor of usability, which exists on all stages of the product life cycle.

• Lifestyle. This component relates to the values of people that represent their lifestyle or behavior. Frequently such products provide this type of experience since the offering itself or its consumption embodies certain values.

These dimensions were also used by other authors considering customer experience. Exactly such or similar definitions were used in articles written by Schmitt (1999), Gentile et al. (2007), Verhoef et al. (2009), Brakus et al. (2009), Lemon and Verhoef (2016). These studies were considering customer experience in experiential marketing domain.

However, there are other approaches to the dimensions of the customer experience. They are dedicated to the specific characteristics. Other approaches presented further would be more functional and service related. Grocery retailers mainly create loyalty primarily because of the quality of their service and not the quality of the product, since they don't have opportunities to adapt the products, while the service quality is under their control. For example, Grewal et al. (2009) consider customer experience dimensions as factors that depend on the microenvironment of the organization (promotion, price, merchandise, supply chain, location). Similar dimensions were provided by Ismail (2001): store environment, service interfaces, store atmosphere, service quality, price). Jones (1999) suggested: personnel, service elements, selection, price, design, display, layout, atmospherics, social aspects, tasks, the purchase, time, mood.

2.4. Customer experience in retail

Traditionally, retail companies were concentrated on selling goods from physical locations. Customer experience was predicated around elements defined by physical nature of touchpoints. Thus, the main factors were directed to the reachability of the shops, helpfulness of staff, availability of products customers are looking for, convenient return policies, etc.

However, retail companies started to implement technologies more actively to go online. In such condition, customer experience has also evolved. Now it consists of multiple interactions in several touchpoints to make sure that customer needs are satisfied no matter what option is chosen to contact with the company. Successful retail brands use omnichannel approach. That means that they combine digital and physical channels. At the same time striving as much as possible to work as a single business without distinguishing into online and offline parts. Many traditional retail stores now use the power of electronic commerce to satisfy their customers' needs and make a company's products as accessible as possible. In current realities omnichannel approach is the necessity for business to maintain the growth, however, it requires customer experience management across multiple touchpoints what cause additional challenges.

A lot of efforts are being made towards listening to the customers in order to get feedback to make sure that all aspects in omnichannel approach are convenient and optimized. Thus, many retailers invest their resources into instruments to collect customers' opinions, different methods of experiential retailing, technologies to combine digital and offline storefronts, customer loyalty and retention mechanisms.

In online retail, one of the main factors is the speed. It concerns the time a customer needs to make a purchase or to find desired information, make a comparison between products and

make a decision. In order to provide clients with such opportunity to get fast access to everything they need, a company should constantly collect feedback (Delighted, 2020).

The IoT is a tool used more and more often in the area of customer experience management, aiming to increase customers' satisfaction, loyalty and trust.

3. Methodology

3.1. Hypothesis formulation

It is widely believed that the use of Internet of Things increases capabilities of delivering a superior customer experience and that IoT has the potential to create new and innovative ways to understand and influence customer behavior. (Kocher, 2017; Martin, 2017; Raftery, 2017; Rossi, 2017).

Customer loyalty get a significant attention in research since the appearance of the loyalty loop is a desired outcome of a customer journey for any brand (Court et al., 2009). In the recent research on customer loyalty, two constructs are considered as its strongest predictors: customer experience with the brand and commitment of a customer to the brand. Positive customer experience with the brand creates a sense of brand value for the customer and this way contributes to the formation of loyalty (Petzer & Roberts-Lombard, 2021). In addition, positive experience may lead to the higher appreciation of the brand, development of attachment of the customer to it and, as a result, commitment of the customer to the brand (Siqueira et al., 2021). And commitment to the brand was also found to positively influence the customer loyalty (Fullerton, 2005). Based on that, we put forwards the following hypotheses:

H1: Customer Experience has a positive impact on Commitment
H2: Commitment has a positive impact on Customer Loyalty
H3: Customer Experience has a positive impact on Customer Loyalty
H4: IoT strengthen the impact of Customer Experience on Commitment
H5: IoT strengthen the impact of Commitment on Customer Loyalty
H6: IoT strengthen the impact of Customer Experience on Customer Loyalty
H7: Customer Experience with IoT is significantly higher
H8: Commitment with IoT is significantly higher
H9: Customer Loyalty with IoT is significantly higher

3.2. Selection of factors

There are several popular methodologies, that are used to estimate customer experience, brand loyalty or customer satisfaction. They are represented by simple surveys, that include one or several questions that suggest giving a particular score on a Likert Scale. The following metrics can be used: NPS, CSAT, CES, CSI.

Customer commitment scale was adapted from the Houkooper's (2018) work. The scale considers both sides of commitment attitudinal and continuance. Thus, covering both the emotional component, which is not always rationally explained, and the pragmatic part, expressed in the benefits and losses that arise when changing companies.

Customer loyalty presented in the straightforward format. Scales for this metric were adapted from different sources, however, it clearly shows to dimensions of customer loyalty. First is interconnected with repeated purchases (the action made by the customer) and the second describes advocacy options (recommendations, therefore increasing the number of customers).

Structural Equation Modelling (SEM) method was implemented to test research hypotheses.

4. Empirical results and conclusions

Nine hypotheses are tested, hypothesis H6 was not confirmed. In this study, we see an overall positive effect of the application of IoT methods on customer experience and company loyalty. However, an unconfirmed hypothesis suggests that the Internet of Things does not increase influence directly, but through commitment.

The study showed that customers rate their customer experience, as well as their potential loyalty to the company, much higher if they have a perception of some unique offer in the format of the experience offered to them by the store. Thus, it can be said that the Internet of Things can serve as a marketing tool.

This research can show companies that the use of the Internet of things gives them a competitive advantage in the form of a loyal audience. This study also shows a general trend towards digitalization.

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Efficiency of Investments in The Digitalization of Nuclear Power

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Abstract:
The proliferation of renewable energy sources and their high penetration into energy systems are crucial for a new global energy mix. Nuclear power, providing 10% of global electricity production, experiences turbulence under the energy transition. On the one hand, nuclear power plants (NPPs) are a stable, reliable and clean energy source. On the other hand, high investments in renewables force nuclear to become cheaper to remain competitiveness. Besides, the energy transition increases attention to the safety of NPPs adjusting to a flexible (non-baseload) operation. Digitalization is known as one way to solve nuclear challenges. Authors propose to evaluate the effectiveness of investments in digitalization as an impact on the reduction of the cost, timing and increase the safety of NPP projects. The paper considers the effectiveness evaluation of the investments in digital twin for the French EPR-1650 reactor and estimates the acceptable investment increase when the reactor is in flexible operation.

1. Introduction

The climate change debate dates back to the 20th century with the Club of Rome's «Limits to Growth» report, published in 1972. In 2015, the Paris Agreement elevated climate change to the status of a global agenda and now it is known as the climate crisis. Today, more than 110 countries at the governmental level have pledged to achieve zero carbon dioxide emissions by 2050-2060, including Russia, China, the United States, and others. In the energy sector, the agenda of abandoning hydrocarbons in favor of renewable energy sources has become particularly urgent due to the energy crisis that has intensified in recent years. The desire of a number of countries to ensure energy security and socio-economic stability has revived interest in nuclear power as a local, largely autonomous source of power. In addition, as we know, NPPs do not emit greenhouse gases during energy production, and therefore are the second most powerful source of carbon-free electricity generation among existing technologies after hydropower plants.

Rapid development of renewable energy sources (wind, solar) and their rapid cheapening form new challenges for nuclear power such as loss of the main advantage of NPPs - low cost of electricity production, and adaptation to new technological conditions, namely to operation in variable power mode. Modern technical and economic conjuncture, in which the nuclear power industry finds itself, urges to search for new solutions to meet the needs of the electricity market and preserve the competitiveness of NPPs.

Digital transformation of the world's economies and business processes is one of the possible ways to improve nuclear power. The potential of digitalization in nuclear power can be realized at all stages of the NPP life cycle, from research and development, design, construction and installation work, to operation, maintenance and repair, and decommissioning. Investments in digitalization are part of the capital costs of NPPs and can reach hundreds of millions of dollars. Efficiency of investments in digital solutions and their application for improvement of NPP characteristics, the authors of the article propose to evaluate in relation to the main parameters of NPP competitiveness – cost and lead time of construction, stability and safety of power generation. The proposed approach of estimation of the acceptable volume of investments in digitalization is relevant for use by the management of nuclear industry enterprises when developing digital strategies.

2. Investments in the digitalization of NPPs as a tool to strengthen the position of nuclear power in the new energy mix

2.1 The role of nuclear power in the global transition to carbon-free energy generation

Currently, the world reactor fleet consists of 413 power units with installed electric capacity of ~ 368 GW. In 2021, nuclear power produced 2,653.1 TWh of electrical energy, which accounted for 10% of the world's total electrical energy production. *(International Energy Agency (IEA), 2022a)*

Carbon-free development of the energy complex involves a combination of sources of variable power (wind, solar) and base load sources, such as NPPs, hydroelectric power plants, power plants using biofuel, geothermal power plants. The flagships of the global energy transition to carbon-free generation are solar and wind power plants. Their installed capacity today exceeds 1600 GW, which is 4 times more than the world's NPP capacity. The average growth rate of the installed capacity of renewable energy sources outstrips the expansion of the world nuclear reactor fleet by 60 times *(IEA, 2022a)*.

The reason for high rates of renewables development is price reduction of the technologies, which, in turn, is provided by investments exceeding investments in nuclear power by more than 7 times.

Nevertheless, nuclear power is an indispensable component of the new global energy mix to achieve the goal of carbon-neutral energy by 2050. Experts from the International Energy Agency note that meeting the world's growing demand for electricity will require doubling the existing reactor fleet capacity to 812 GW in 2050, and the annual rate of commissioning of new capacities will be 27 GW by 2030, which is more than 10 times higher than the speed of reactor construction today. *(IEA, 2022b)*

Acceleration of spread of nuclear power technologies is possible with strengthening of NPPs competitiveness through improvement of their technical and economic parameters. The main comparative indicator for energy technologies is levelized cost of electricity (LCOE). In the most general form expression for an LCOE (which for shot we will denote by C, USD/kWh) is given in *(Kharitonov et al. 2021)*:

$$C = \frac{(AK + Y)}{E}, \tag{1}$$

K – capital costs of the power unit (USD), Y – operating costs (USD/year), E = $W_{installed}$ · 8760 · CF – annual production of electricity supplied to the market (kWh/year), expressed as a product of the installed capacity ($W_{installed}$, kW), number of hours per year (8760 hours) and capacity factor (CF, %); A – effective rate of capital cost amortization (1/year).

According to expression (1) nuclear power requires high capital costs (K contribution to an LCOE reaches 60-80%), relatively low operating costs and maximization of power generation. Therefore, reducing the capital cost and improving the NPP operation are critical to the competitiveness of nuclear power. The development of a new generation of reactors with improved characteristics must take into account the levelized cost of electricity of competing renewable sources, which will reach less than USD 50/MWh by 2030. This will require a dramatic reduction in the capital cost of NPPs. To achieve an LCOE at USD 40-60/MWh for nuclear power, a 2.5-fold reduction in capital costs (less than USD 2,000/kW) will be required.

2.2 New technological requirements for the NPPs operation in the conditions of the energy transition

The high penetration of weather-sensitive renewables in the power grid places technical limitations on the energy infrastructure, as well as on conventional power plants, regarding controllability and regulation of volatile electricity supply and demand.

One way to strengthen the role of nuclear power in the emerging power system with a predominance of variable energy sources is to enable NPPs to operate in variable power mode. The operation of NPPs in variable power mode involves changing the plant's capacity within a regulated range (30%-100% of capacity) during the day. Achieving flexibility in power system

negatively affects the economic component of NPP energy production. Decrease in capacity factor which characterizes efficiency of actual use of full capacity of NPP from 85% to 50% according to the formula (1) increases an LCOE (with other things being equal) more than in 1,5 times. Besides, maneuvering of NPP power increases importance of NPP safety factor, because operation of NPP in variable power mode increases load on materials of core, wear and tear of reactor unit equipment, mechanical, electric and other equipment *(Panov S. (n.d.).*

The safe operation of NPPs is a key factor in the development of nuclear power. For example, the accidents at Chernobyl NPP (1986) and Fukushima-1 NPP (2011) led to a slowdown in the construction of NPPs and the abandonment of nuclear power in a number of countries. Such major accidents are rare, but emergencies and incidents leading to a complete reactor shutdown occur every year. The experience of operating NPPs from 2015 to 2017 *(Nuclear Energy Agency (NEA) & International Atomic Energy Agency (IAEA), 2020)* shows that unplanned shutdowns of power units due to incidents or unplanned extension of the maintenance and repair period of PWRs (the most common reactor type, 306 units, 69% of the world reactor fleet, 291 GW) account for 20% of total outages of power units. The emergency situations and incidents at NPPs are associated with the human factor, as well as with technical malfunctions of equipment. *(Titov & Barbin, 2023)*

Thus, increasing the flexibility of NPP operation in response to the spread of renewable energy sources forms the requirements to improve the accuracy of monitoring the performance of NPP equipment, reducing the human factor in NPP management, modeling various modes of operation, as well as finding ways to improve economic performance.

2.3 Digital twin of the NPP

In response to the challenges of the global energy transition, the development and application of the NPP digital twin is singled out as one of the tools for solving new operational, technical and economic problems of nuclear power.

The NPP digital twin concept includes a virtual copy of a physical object, in this case, a power unit, which is updated and enriched with data during the operation of the object; based on the data obtained, the model can predict the behavior and state of the object, transmit information or control actions to the physical object *(Prokhorov et al., 2020)*. Digital twin technology is already actively used in the automotive industry, aircraft construction and shipbuilding. The use of the digital twin has proven to reduce the labor intensity and the number of field tests during product development, and the transfer of more changes and costs to the initial stages of the life cycle (design) is expressed in the reduction of the final cost of the object. *(Borovkov et al., 2019)*

In the Russian nuclear power industry there are several examples of software and hardware complexes designed to simulate individual complex physical processes, operation of NPP equipment. The most comprehensive development of a digital twin of NPP was achieved when creating a virtual-digital NPP with VVER reactor for Novovoronezh NPP Unit 2. The purpose of creating a virtual copy of the NPP is to enable verification of design solutions, information support for the operating organization throughout the entire NPP life cycle.

As an example of the development of a digital twin abroad, it is interesting to consider the experience of France. EDF, a monopolist in the French NPP construction and operation market, led the «Digital Reactor» (Réacteur Numérique) project in 2021 to create a digital twin reactor, which will enable ultra-realistic modeling through built-in detailed multiphysics models, train NPP personnel, and accelerate the passage of safety inspections and licensing after power unit upgrades and improve NPP operating characteristics. *(Levesque, 2021)*

Achieving better performance and technical and economic characteristics of NPPs using digital twins can be costly. Creating a digital twin requires taking into account the multi-component nature of a NPP, its long life cycle (more than 60 years of operation), and the large number of entities/data carriers involved in the design, construction and operation of a NPP. Unfortunately, among the public information there is not enough data on investments in the development of digital twins. The available data, for instance, for EDF's Digital Reactor of USD

36 million, the authors of this article believe to be an underestimate. The basis for this opinion is the availability of estimates for Building Information Modeling (BIM models), the foundation for further assembly of the digital twin of the facility. Estimated investments in BIM for large industrial facilities reach 0.15%-0.91% of capital costs *(Ham et al., 2018)*. For a 1650 MW French EPR reactor power unit, the cost of BIM development can exceed USD 77 million. Investments in the development of a digital twin of a NPP can exceed this value many times over.

3. The research questions and methods

Investments in digital technologies, including digital twin, for NPPs are in the capital component of the cost of electricity. The criterion of their effectiveness, according to the authors, should be the reduction of cost and lead times of NPP construction, increase of operational safety. *(Kharitonov et al., 2021)*

Let's suppose that as a result of digitalization of NPP design and construction processes the capital and operational costs as well as production of electricity for sale have changed by relative values $c=\Delta C/C$, $\chi=\Delta K/K$, $\gamma=\Delta Y/Y$ and $\varepsilon=\Delta E/E$ respectively. Then, based on expression (1), the relative change in the levelized cost of electricity will be:

$$c = -\frac{\varepsilon}{1+\varepsilon} + \frac{\chi + (Y/AK)\gamma}{(1+\varepsilon)(1+Y/AK)} ,$$ (2)

Y/AKj – the ratio of the operating and capital components of the cost of electricity before digitalization. The relative change in capital costs as a result of digitalization can be expressed by the difference $\chi=\chi_D-\chi_C$, where χ_D is the relative increase in capital costs due to investments in digitalization, χ_C, is the relative decrease in capital costs of power unit construction due to digitalization. The resulting economic effect of digitalization should consist in the reduction of C, i.e. the right side of expression (2) should be negative, $c<0$. It follows that the increase in capital costs due to investment in digitalization should not exceed the value:

$$\chi_D < \chi_c + \varepsilon\left(1 + \frac{Y}{AK}\right) - \gamma\frac{Y}{AK} .$$ (3)

As can be seen, the greater the effect of reducing the cost of building a power unit (the greater the χ_C), the greater the costs are allowed for digitalization.

This paper proposes to evaluate the efficiency of investment in a NPP digital twin using the example of the French EPR power unit (table 2) with constant operation (CF=85%).

Table 2. Technical and economic parameters of the EPR-1650 power unit
(IEA, 2020)

Parameter	Value
Unit Power, MW	1650
Capacity Factor, %	85
Annual electricity production, TWh	12,286
Discount rate, %	7
Relative capital costs, USD/kW	5132
Total capital costs, USD billion	8,468
Relative operating costs (O&M), USD/MWh	14,26
Relative fuel costs (Fuel), USD/MWh	9,33
Annual operating costs (O&M+Fuel), USD billion/year	0,290
Effective rate of amortization of capital costs, 1/year *(Kharitonov et al., 2021)*	0,0845

For the initial investment in the digital twin it is proposed to take the estimated EDF cost of USD 36 million. For current-generation NPPs, the main advantage of using a digital twin are a reduction in the cost of NPP operation ($\Delta Y<0$) and improvement of safety (reduction in the probability of unplanned reactor shutdowns, $\Delta E>0$). Hence, consider scenarios $\Delta Y= -10\%$, -

20%, -30%. Using formulas (1)-(2) we obtain the following calculation of efficiency of digital twin application for power unit of current-generation NPP (Fig.1).
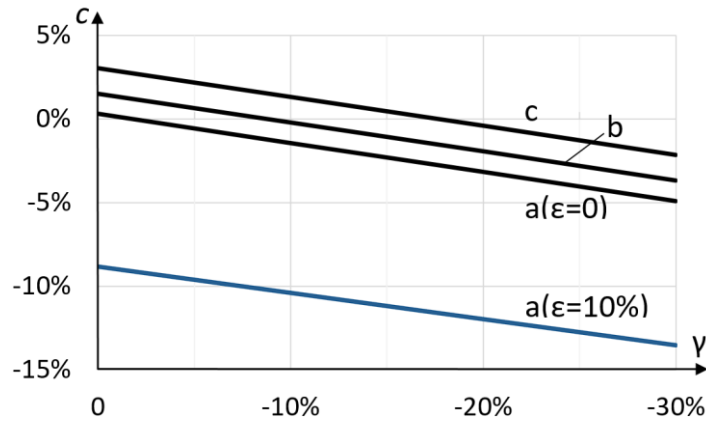
Fig. 1 Relative change in the present value of electricity ($c=\Delta C/C$, %) as a function of reduced operating costs ($\gamma=\Delta Y/Y$, %), and electricity production due to reduced unplanned reactor shutdowns ($\varepsilon=\Delta E/E$,%) for a given investment (χ_D) in a digital twin (a, USD 36 million), for an investment increase of 5 times (b), for an investment increase of 10 times (c) for the current-generation reactor.

For next-generation reactors embedded in the power system with a large share of variable energy sources, the use of digital twins will require not only improved NPP performance, but also lower capital costs to maintain the competitiveness of nuclear power. In order to achieve and exceed the performance of the world's best examples of carbon-free energy production (USD 40-60/MWh), a possible increase in investment in digital twins should be estimated. Using formulas (2)-(3) for a reactor operating in variable power mode (CF=50%), we obtain that reducing ε by more than 40%, while reducing capital costs χ_C by 60% and operating costs γ by 10% allows maintaining the current LCOE for nuclear power with investments in the digital twin not exceeding 3% of the capital costs. If the levelized cost of electricity c is reduced by 25% to a level competitive with solar and wind power, while reducing capital costs χ_C by 80%, investment in the digital twin can be increased to 23% of capital costs.

4. The results to be reported

According to the obtained calculations (Fig.1), the reduction of operating costs of NPPs with current generation reactors through the development and application of a digital twin allows to reduce the LCOE in the range of 1-3%. The increase in investment in this technology is fair until the effect on the LCOE reduction becomes negative, despite the reduction in operating costs. In case the digital twin allows to increase NPP safety, namely to minimize emergency situations, and as a consequence unplanned power unit shutdowns, the increase of investments into digitalization even by 10 times is economically justified.

In case of consideration of new generation reactors with necessity to operate in variable power mode, efficiency of digital twin should be expressed not only in improvement of operational characteristics, but also in reduction of capital expenses of NPP for design and construction of NPP. This is possible due to detailed modeling and search for the most optimal design and technological solutions, as well as research of experience of behavior and condition of equipment during operation of a power unit and taking into account the obtained knowledge at earlier stages of NPP life cycle. Investments in digitalization for next-generation reactors can reach from 3% to 23% if the digital twin can reduce capital costs by 60-80%, which is necessary to integrate nuclear power into the new energy mix with a high share of renewable energy sources.

In conclusion, achieving the competitiveness of nuclear power through digitalization is not limited to digital twins. Among the actively mastered digital technologies are Building Information Modeling (BIM models), virtual NPP, artificial intelligence, robotic technologies,

and virtual reality. Investments in the portfolio of digital solutions for NPPs, according to the authors of this article, should also be evaluated in relation to indicators of reduced capital costs, operating costs, increased power generation and improved safety of NPPs.

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Intelligence Maps as a Tool for Designing an Intersubjective Problems Solution Support System

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Abstract:
The application of new intersubjective approach to problems solution management can be supported by modern information tools, in particular, computer decision support systems. The purpose of the research is to find and use tools that facilitate the design process of decision support systems for managing intersubjective solution of problems situations of actors in organizational systems. To mutually enhance the intellectual potential of people and the capabilities of information and communication technologies in the process of designing decision support systems, it is proposed to use intelligence maps as a means of visual demonstration of the mental field. One of the modern software tools for building intelligence maps - Free Mind - has been selected and used.

Keywords: *intersubjective management, problem situation, decision support system, ontology, intelligence map, precedent.*

1. Introduction

Decision–making in the management of organizational systems is based not only on objective data characterizing their internal and external environment, but also on subjective data and knowledge of subjects - unstructured and poorly formalized. The addition of traditional management with intersubjective management of the solution of problem situations of actors (active members of organizational systems experiencing intellectual difficulty about getting out of problem situations in which they find themselves and begin to carry out cognitive activities to solve them) exacerbates the problem of decision-making by the fact that the possibility of solving the situation is based precisely on the exchange of subjective knowledge by actors, allowing them to see different edges of the problem. Since intersubjective management is just beginning to develop, and so far a methodology has been developed for its application in organizational systems (T.V. Moiseeva) [8] based on the theory of intersubjective management (V.A. Vittikh) [13-16], further work in this area focuses on the use of information tools that can support the process of problem situations solution [9]. The processes of building personal ontologies of actors and their communication in order to build a common ontology containing a solution to the problem can be supported by modern information tools, in particular, computer decision support systems (DSS), to mutually enhance the intellectual potential of people and the capabilities of information and communication technologies.

The aim of the study is to find and use the tools that facilitate the design process of the described DSS.

2. An intersubjective approach to managing the problem situations solution in organizational systems

V.A. Vittikh's intersubjective management of problem situations solution belongs to the category of subject-oriented management [5], which uses the potential of people in the process of finding a way out of problem situations.

A problem situation in the theory of intersubjective management is considered to be an intellectual difficulty of the subject, which cannot be solved by him independently, if he begins active work to find a way out, understands that it was impossible to find a solution on his own. Therefore, other participants in this problem situation should be found and look for a solution together. This understanding of a problem situation differs from the generally accepted understanding of emergency, non-standard, critical and other situations in which it may be known in advance and prescribed what to do when they occur. Among the tasks that an actor is forced to solve, starting from the moment of realizing the existence of a problem and ending with obtaining a solution, we highlight the following:

- presentation of data held by an actor to other actors;
- building an actor's personal ontology;
- organization of actors' communications;
- negotiating with each other;
- building a general ontology of the problem situation [7].

Since decision-making is based not only on the data presented by the authors, but also on their implicit knowledge, intuition and other non-formalized data [6], it cannot be fully assigned to a DSS-type system. Its functions include informational and methodological support for actors in the process of solving the tasks listed above.

Modern tools that help to comprehend the situation and visualize the result [2-4] were analyzed. When designing the DSS (i.e., at the initial stage of its development), a methodology for presenting mental models in the form of intelligence maps was chosen to manage the intersubjective solution of problem situations of actors in organizational systems from.

3. The use of intelligence maps in the design of an intersubjective problem solution support system

The methodology of presenting mental models in the form of intelligence maps turned out to be a convenient tool for displaying conceptual structures for brainstorming and combining the knowledge of two types of professionals – theorists in the field of intersubjective management, and specialists who know the methodology of information systems development. The Free Mind software product was chosen to build intelligence maps [1].

Intelligence maps were formed and later used in the construction of DSS to represent mental models of such areas as:

- the structure of the DSS and the functions of the elements of the DSS architecture;
- algorithmization of the management decision-making process based on intersubjective approach.

1. Before starting the practical development of a DSS for the settlement of problem situations using an intersubjective approach, it is necessary to think over and analyze the ratio of the main objects of the system and their functions, as well as to think over the constituent elements of each object. Therefore, the construction of a common field of knowledge in the subject area "DSS for solving problem situations using an intersubjective approach to management" began with the presentation of the main functions assigned to the means of information and methodological support for actors. The ontological model of an intersubjectively oriented DSS is a "division" into blocks depending on the functions performed by the main

objects of the DSS, as well as their subsequent division into constituent elements. The analysis of the functions showed that a DSS structure combining traditional elements of such systems is possible [10, 17, 18] (Fig. 1).

PrS – problem situation
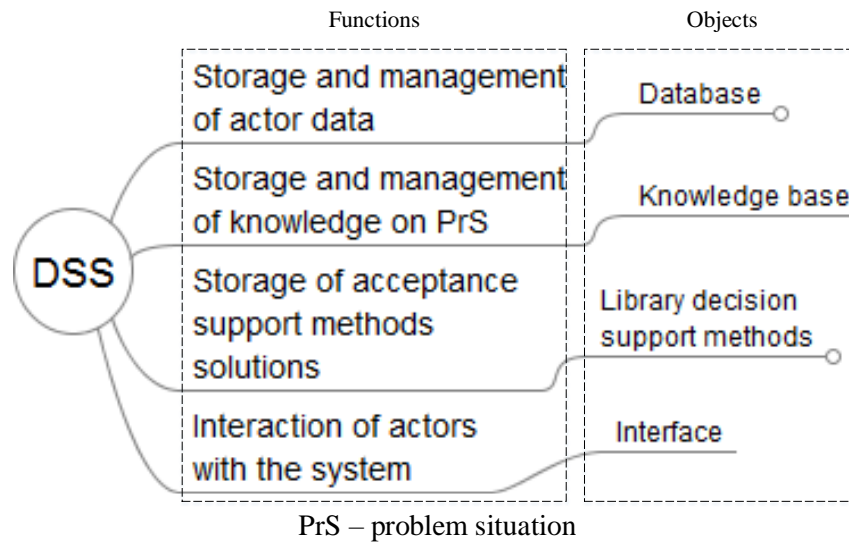
Fig. 1 – An ontological model of an intersubjectively oriented DSS

The "classical" structure of the DSS for the settlement of problem situations of actors consists of the following generally accepted objects:

- database – for storing and managing actors data;
- knowledge base – for storing and managing knowledge on problem situations;
- library of decision support methods – for storing decision support methods;
- actor-user interface – for actors to interact with the system.

In order to best agree and understand each other, developers of an actual intersubjectively oriented DSS and theoretical scientists in the field of intersubjective approach to problems solution management need to agree on a "technical task": to determine which functions should be implemented using various blocks (main objects) of the system. Ontological models of the main objects of the system can simplify the process of understanding each other.

2. The database consists of external, internal and experimental data sources, normative and reference materials related to the theory of an intersubjective approach to managing the solution of problem situations (Fig. 2). External sources include data that participants in a given problem situation have little or no influence on (for example, legislative acts, early-formed documents, resolutions, etc.). Internal sources include data related to a specific problem situation and received from actors. These are the answers to the questions what?, when?, where?, why?, how?, etc. in the context of this problem situation. Experimental data sources contain a description of the results of the performed actions.
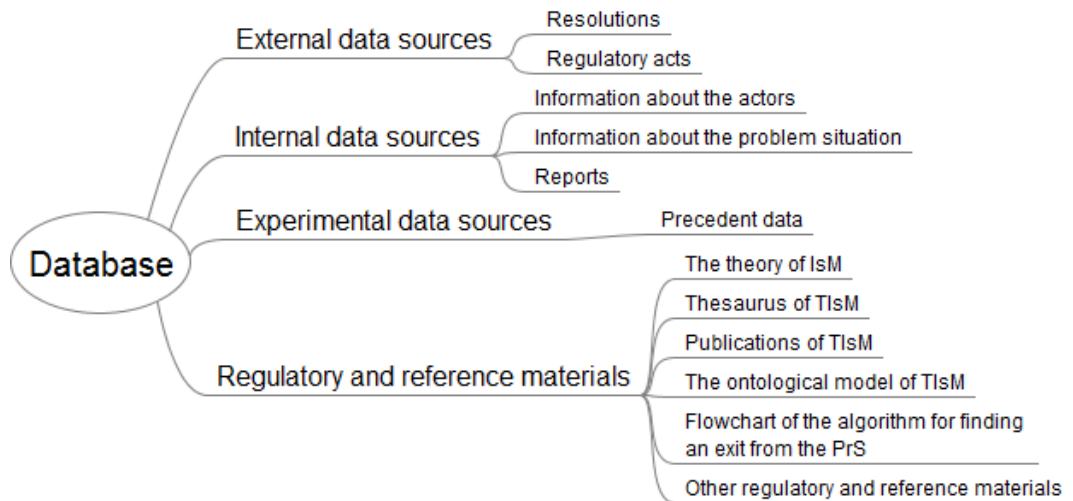
IsM – intersubjective management
TIsM – theory of intersubjective management
PrS – problem situation
Fig. 2 – An ontological model of the intersubjectively oriented DSS database

3. The knowledge base is a repository that contains a database of rules. Basing them the system provides knowledge (information) useful for actors, a library of precedents, personal knowledge of actors on problem situations in the form of personal ontologies and a database of knowledge representation models (Fig. 3).
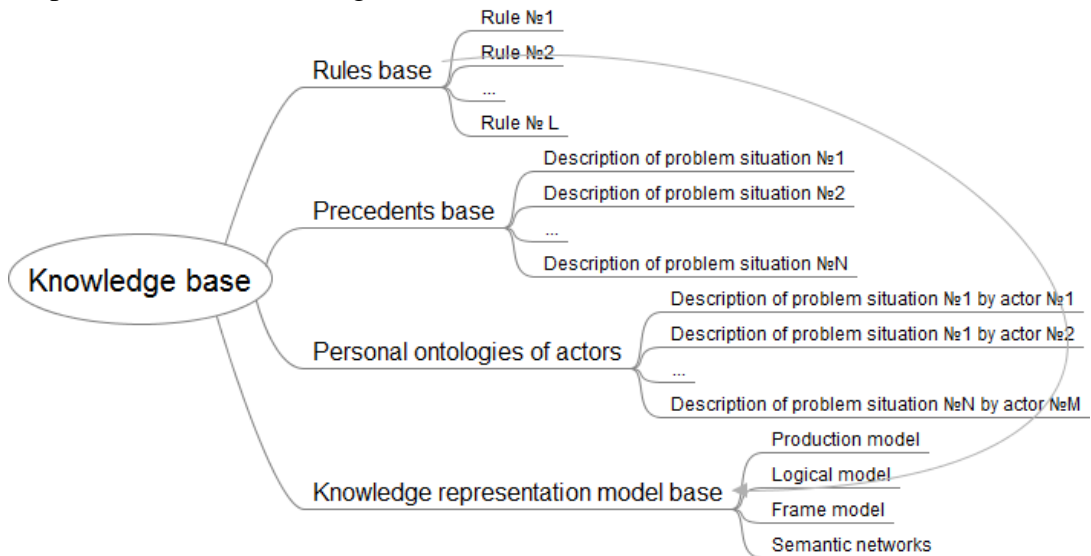
Fig. 3 – An ontological model of the knowledge base of the intersubjectively oriented DSS

4. When forming a library of decision support methods, the following fundamental factors were considered:

• the need to take into account subjective assessments as the most important in the analysis of problem situations of this group of actors;

• the use of the developed DSS by non-professional users-actors;

• building personal ontologies of actors and further building a common ontology as a result of communications;

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• the impossibility of the traditional creation of the objective function and optimization of some parameters, since the actors, starting to solve the problem, do not yet know what is the answer to their question.

In accordance with the algorithm for solving problem situations based on an intersubjective approach, an ontological model of the library of decision support methods was built (Fig. 4). The library includes methods, tools and models that help actors in solving problem situations, such as, for example:

• methods of conducting discourse;
• methods of choosing a solution from possible alternatives;
• methods of mathematical modeling and operations research;
• visualization methods, etc.

5. A user interface is being developed for actors to interact with the system (Fig. 5). Using the main menu and the module menu, users-actors access the database, knowledge base and library of decision support methods, as well as actions related to solving specific problem situations, for example, initiating a discussion on the situation, discussing its options permissions and obtaining a result based on a built-in general ontology that contains the answer to the question of what needs to be done.

6. The key feature of the system is the formation of a library of precedents, which is filled with their description and the actual results of solutions in the solved problems situations. This is the most difficult and interesting stage, which requires understanding how to compare the current analyzed problem situation with many precedents from the library. Each precedent represents the actors' past experience or knowledge that other actors would be able to use. The purpose of the precedent library is to assist new actors in problem situations solving, using the experience of problem situations solving of other actors, and reducing the time to achieve the set goal [11, 12].

The precedent search algorithm consists of five stages (Fig. 6).

At the first stage, a group of users-actors involved in one problem situation determines the name of the problem situation and its keywords.

At the second stage, the names and keywords entered by the user are compared with the names and keywords of already recorded precedents from the library. If a match is found, the transition to the third stage follows.

At the third stage, users are presented with the search results, and they can select the most appropriate cases for further analysis.

At the fourth stage, each participant in a problem situation is given the opportunity to study the chosen precedent, i.e.:

• view attached materials (including drawings, graphs, documents, etc.);
• get the opinion of other users factors during negotiations;
• change his personal ontology of the problem situation based on the new data received;
• present his point of view to other actors during negotiations on the problem situation and precedents.

At the last stage, a group of users-actors makes a conclusion about making a decision on this precedent - whether the solution proposed by the library is suitable for solving this problem situation completely, or perhaps it contains a hint that will help adapt some elements of the precedent for this problem situation.

Based on this intelligence map (Fig. 6), an algorithm was developed to search for precedents corresponding to the desired problem situation among the precedents stored in the library in the DSS.

PrS – problem situation OM – ontological model
Fig. 4 – An ontological model of a library of decision support methods for an intersubjectively oriented DSS

The user-actor interface

1. Home page
  1. Solution of problem situation (the essence of the IsM is the solution of the PrS briefly for actors)
  2. Materials
    1. Regulatory and reference materials (permanent part)
      1. The theory of IsM
      2. Thesaurus of TIsM
      3. Publications of TIsM
      4. The ontological model of TIsM
      5. Flowchart of the algorithm for finding an exit from the PrS
      6. The media about the solution of the PrS using TIsM
      7. Other regulatory and reference materials
    2. Regulatory and reference materials (the variable part is for each actor individually, depending on his participation in the PrS)
  3. Problem situation
    1. List of open PrS (permanent part) with the possibility of joining
      1. Choosing a PrS (joining a group)
        1. Keyword formulation (no more than 10 words)
          1. Comparison with keywords of other actors and adjustment of keywords
          1. Formation of a personal ontology of the PrS
            1. Formulation of the proposed solution
            2. Viewing solutions offered by other actors
          2. Viewing personal ontologies of other actors
        2. Viewing keywords of other actors
        3. Regulatory and reference materials for PrS
        4. Regulatory and reference materials from permanent part
        5. Materials on decision-making methods
        6. Materials on electronic communication
        7. Materials on the means of presentation and transmission of information
    2. History (list of precedents, results of the solution of the PrS) (permanent part)
    3. Creating a new topic for a new PrS role "moderator"
      1. Formulation of the name (no more than 10 words)
      2. Description of the PrS   Building an ontology of the PrS
      3. Keywords formulation (no more than 10 words)
      4. Sending information to all actors registered on the site about the start of a new topic
    4. List of PrS with personal participation indicating the role in each of them (moderator/participant) and the ability to change them
      1. Selecting the PrS from the list

2. Site search

3. Personal account
  1. Participation in the PrS
    0. Personal information
    1. My current PrS (with the possibility of changing)
    2. My authorized PrS (with the possibility of changing)

IsM – intersubjective management   PrS – problem situation   TIsM – theory of intersubjective management

Fig. 5 – An ontological model of the actor-user interface of an intersubjectively oriented DSS

Fig. 6 – The algorithm for precedents searching in the DSS

3. Materials and methods

The research used methods of management theory, decision theory, comparison, as well as knowledge engineering and artificial intelligence. With the help of system and diachronic analysis and synthesis, the main functions and objects of intersubjectively oriented DSS were determined. To graphically display the results, methods and tools of cognitive visualization of information were used, in particular, the software tool for constructing ontological models FreeMind.

4. Conclusion

In the course of the conducted research on the search for tools that facilitate the DSS design process for managing intersubjective solution of problem situations of actors in organizational systems, it was proposed to use a means of representing mental models in the form of intelligence maps. From an extensive set of software tools for implementing the technology of building intelligence maps, the Free Mind software product was selected.

The following results were obtained:

- mental (ontological) models of the main elements of an intersubjectively oriented DSS are presented in the form of intelligence maps;

- the knowledge of theorists in the field of intersubjective management and knowledge of specialists who know the methodology of information systems development are combined.

Structured knowledge, presented in the form of intelligence maps, subsequently formed the basis for the construction of a DSS based on ontologies (Fig.7).
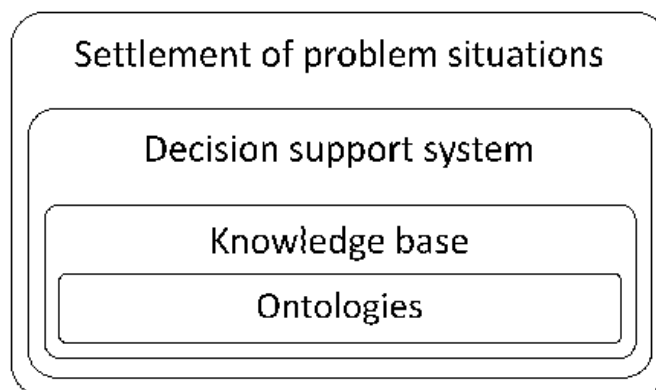
Fig. 7 – The ideology of an intersubjectively oriented DSS

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Coordinating Buyback Contract for a Supply Chain with Limited Funding

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Abstract:
The paper investigates coordination of a supplier-retailer supply chain wherein retailer faced with limited funding. Coordination mechanism studied in the paper is the buyback contract.
The term 'limited funding' indicates the situation where retailer's holdings of cash are insufficient to pay the supplier for the chosen order quantity, so the retailer considers two forms of credit – bank loan and trade credit.
The solution shows that buyback contract does not coordinate the considered supply chain with neither form of credit. However, it allows to achieve conditional coordination of the supply chain as defined in (Berezinets et al., 2020) for the case of uniform distribution of demand.
It is also proved that if the supplier offers a conditionally coordinating buyback contract and trade credit with an interest rate lower than the bank's rate, the retailer always chooses trade credit as it improves his profit, and also the supplier's and supply chain's profits.

Keywords: *supply chain, coordination, buyback, contract, trade credit*

1. Introduction

Contracts are a well-known mechanism of supply chain coordination widely studied in the literature on supply chain contracting. Although approaches to defining coordination differ, this paper follows one of the classic works in the field written by Cachon (2003) and considers coordination as maximization of supply chain profit while maximizing individual profits earned by the firms involved in the supply chain through the use of various mechanisms, including contracts. For the contract to be coordinating, supply chain parties must reach an agreement about its parameters so that their profits and the supply chain profit achieved their maximums. The agreement about the contract parameters is reached through decision-making process run by both supplier and retailer during their negotiation.

Existing research suggests that companies can save up to 80% on transaction costs with generally accepted rules and procedures related to contracting. However, only 48% of business entities actually run an organized process of contract management (Berezinets, Meshkova, Nikolchenko, 2019).

As contracts' application is basically ubiquitous, the buyback contract is widely applied in the industries, like grocery retail, fashion retail, publishing and consumer electronics, where the product's life cycle is short. This contract is defined by the set of such parameters as:

- The wholesale price – the price at which the supplier sells her product to the retailer,
- The order quantity – the amount of product that retailer decides to order from the supplier, and
- The buyback price – the price which the supplier promises to pay the retailer at the end of the selling season for all the items left unsold from the quantity ordered by the retailer before the start of the selling season.

This contract type can be a great means for supply chain coordination and boosting its total profit, but supply chain parties often fail to reach the contract terms that would allow

coordination, and eventually get lower profits.

The paper considers the supply chain that consists of one supplier and one retailer that is faced with limited funding. The term 'limited funding' indicates the situation where the retailer's holdings of cash are constrained and might be insufficient to pay the supplier in exchange for the amount of the product he decides to order. In these circumstances, the retailer considers two forms of credit – bank loan and trade credit (supplier financing).

Scholars in supply chain contracting have been showing interest to the financing issues faced by the supply chain firms. However, those papers mostly consider the contract types other than the buyback contract and examine only one form of financing, focusing on different aspects of limited funding, like working capital management or bankruptcy risk tolerance (Xiao et al., 2017; Fu, Liu, 2019).

Besides, the issue of limited funding has grown since the start of the COVID pandemic. Recent research on the state of US supply chains carried out by SAP (2022), one of the world's largest enterprise software companies, found that along with a decrease in revenue faced by 52% of businesses, 54% of businesses faced the need for taking new financing measures, such as business loans.

Therefore, the paper aims to consider the problem of supply chain coordination with buyback contract and also to address the issue of limited funding by examining the supply chain wherein retailer has limited funds and considers two forms of credit – bank loan and trade credit provided by his supplier.

2. Relevance of the paper to the track topic

The track for submission of the paper is Operations Management and Business Informatics, Decision-making in supply chains, finance, marketing, HR, strategy and business transformation.

As the paper is related to supply chain contracting and focuses on the profit maximization by supply chain firms, it is straightforward to conclude that the problem studied is essential for management in general. Another aspect considered in the paper is credit for the short-term financing of procurement decisions made by the supply chain firms, thus the considered problem is also related to financial resources management.

The models constructed and solved in the paper are then combined into the algorithm for selecting the buyback contract so as to achieve conditional coordination and choose the credit form that ensures the highest profit improvement. This selection algorithm can serve as a starting point in negotiations over the terms of the buyback contract and support the decision-making process in order to reach profit improvement of all the supply chain parties.

Thus, the results presented in the paper are primarily addressed to the specialists in the field of supply chain management that are engaged in the decision-making process related to the contract management, which as mentioned above affects the performance of the supply chain and its financial result.

3. The research questions and methods

Research methodology includes quantitative modeling and case method.

The paper aims to construct and solve the model of the buyback contract to analyze its coordinating properties in the supply chain with limited funding and also to develop the algorithm for selecting the buyback contract that would allow to achieve conditional coordination of the supply chain with limited funding.

To achieve the overall goal of the research, the following research questions are to be answered in the course of the study. Firstly, whether the buyback contract can coordinate the supply chain with limited funding. Secondly, whether the buyback contract allows to achieve conditional coordination of the supply chain with limited funding. Thirdly, what form of credit is preferable for the supply chain with limited funding when applying the buyback contract. And finally,

how the parameters of the buyback contract can be selected during the negotiation between the members of the supply chain with limited funding.

4. The results to be reported

The paper considers conditional coordination and according to its definition requires the model of the wholesale contract to be constructed. Hence, the model of this contract type is built and solved both for the general case and the case with uniform distribution of the product demand. To study coordination, the models of the buyback and wholesale-price contracts are built for the general case. Since the definition of limited funding states that the retailer's cash can either be enough or not enough to pay the supplier for the chosen order quantity, each models includes two cases to consider: with retailer's sufficient funds and with retailer's necessity to borrow. In the second case, two cases corresponding to bank loan and trade credit are considered.

The solution mathematically justifies that buyback contract does not allow to achieve coordination of the supply chain with limited funding in neither case (neither with retailer's sufficient funds, nor with bank loan or trade credit). Coordination is impossible since the supplier's profit does not achieve its maximum. The solution shows that the wholesale-price contract does not coordinate the supply chain with limited funding either.

To study conditional coordination, the model of the buyback contract is constructed for the case with uniform distribution of the product demand. Conditional coordination is defined as in (Berezinets et al., 2020).

The solution shows that with both forms of credit there exists a conditionally coordinating buyback contract that maximizes the retailer's and supply chain's profits, and improves the supplier's profit compared to the profit she earns with the wholesale-price contract. The case with retailer's sufficient funds coincides with the solution proposed by Berezinets et al. (2020) and confirms that conditionally coordinating buyback contract can be determined when there are no financing constraints faced by the retailer.

The conditions to be satisfied in order to achieve conditional coordination are identified for the cases with both forms of credit. They show that for the buyback contract to be conditionally coordinating both with bank loan and trade credit the supplier's negotiating power must be greater than the retailer's. Otherwise, the wholesale-price contract can be more beneficial to apply.

It is proved that the trade credit offered by the supplier along with the conditionally coordinating buyback contract provides all the supply chain firms with profits that are higher than with the bank loan raised by the retailer. Thus, with buyback contract rational retailer would prefer trade credit to bank loan as it allows to improve his own profit, as well as the supplier's and supply chain's profits. This conclusion is in line with those made by Kouvelis and Zhao (2012). For the trade credit to be preferable to the bank loan, specific condition for the interest rate charged for the trade credit must be satisfied; this condition is identified for the case of uniform distribution of the product demand.

The wholesale-price contract with trade credit is also compared against the wholesale-price with bank loan. Comparative analysis is carried out for the case of the product demand distributed as uniformly and shows that with this contract type trade credit is also preferable to bank financing. The condition imposed on the trade credit rate for this conclusion to hold is also identified.

The models and their solutions are then combined into the algorithm for contract selection. This algorithm allows to select a contract out of six alternatives that combine two types of contract and two forms of credit. Those alternatives are as follows:

- Conditionally coordinating buyback contract
  - With retailer's sufficient funds,
  - With trade credit,
  - With bank loan, or

- Wholesale-price contract
  - With retailer's sufficient funds,
  - With trade credit,
  - With bank loan.

According to the proposed algorithm, the selection process starts from the value of the wholesale price that has already been agreed by the supplier and retailer. The selection of the contract parameters is based on their formulas derived through modeling. The buyback type of contract is selected when the supplier's negotiating power is greater than 0.5 and exceeds the negotiating power of retailer; the negotiation aims to select the wholesale-price contract out of the given alternatives when the situation is opposite and the retailer's negotiating power exceeds the supplier's power. If an agreement about the contract parameters and form of credit is not reached, the contract is completely rejected.

The solution proposed in the paper can be used as a tool to support decision-making in the negotiations over the buyback contract so as to reach profit improvement by all the supply chain parties.

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Re-thinking Entrepreneurship in Times of Uncertainty

Linking Post-materialism to Opportunity Recognition: The Role of Entrepreneurial Self-efficacy

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Abstract:
This study investigates the role of postmaterialism as one of the crucial national culture dimensions in entrepreneurial opportunity recognition with an emphasis on entrepreneurial self-efficacy as a potential mediator of this relationship. The study hypotheses are tested based on the GEM APS data 2019 combined with the World Values Survey data. The findings suggest that individuals in post-materialist societies are less likely to develop alertness to entrepreneurial opportunities. Interestingly, this relationship is mitigated by entrepreneurial self-efficacy. As such, post-materialism has a paradoxically competing influence on recognition of entrepreneurial opportunities, revealing a negative direct effect on the probability of entrepreneurial opportunity recognition as well as a positive indirect effect on it via an increased self-efficacy.

Introduction

National culture plays a crucial role in determining levels of entrepreneurial activity in a country. Research shows that cultural values shape individuals' entrepreneurial behaviors, such as entrepreneurial intentions, start-up attempts, and innovative activities (Shane 1993, Bowen, De Clercq, 2008). Theory of post-materialism introduced by Inglehart (1977; 1997; 2008) has become one of the most prominent approaches to culture conceptualization in entrepreneurship research. In general, post-materialism theory states that with development of capitalism, increased economic prosperity and post industrialism prevalence in some societies, less people face poverty and significant material constraints both in their early years and further in the life. As a result, in such countries, there is a clear shift from survival-based material values towards post-material values focused on self-expression and well-being. On the contrary, in societies where gratification of basic human needs is not guaranteed, material values are still dominating. This study investigates how national cultural values influence recognition of entrepreneurial opportunities and how individual cognition affects this relationship. As such, this research links post-materialism theory with self-efficacy concept to examine institutional- and individual-level drivers of entrepreneurial opportunities identification and argues that in strong post-materialist societies, individuals have stronger abilities of entrepreneurial opportunity recognition; however, this relationship is mediated by the individual's self-efficacy belief.

Superiority of either materialist or post-materialist values has direct implications for entrepreneurial activity. Intergenerational shift in values towards post-materialism has led to less attention being paid to gaining high economic income in a number of countries. Hence, if entrepreneurship is viewed as an activity with a primary purpose of generating monetary rewards, one could expect a negative relationship between post-materialism and entrepreneurial activity levels. This assumption has been confirmed by Uhlaner and Thurik (2007) in their study of post-materialism impact on the rates of total entrepreneurial activity across 27 countries. At the same time, other studies revealed that societal post-materialist orientation towards self-expression and well-being is conducive to higher rates of opportunity-driven entrepreneurship as well as social entrepreneurial endeavors (Hechavarria, 2016; Stephan et al. 2014). At the individual level, Morales and Holtschlag (2013) found that in countries with strong prevalence of self-employment, people with post-materialist values are less likely to become entrepreneurs as

compared to countries with lower self-employment rates. Further, Hechavarria et al. (2017) showed gender differences in terms of entrepreneurial value creation goals under the influence of post-materialism, women being more responsive to post-materialist in terms of their goals change. Extant studies however do not fully embrace the mechanisms of post-materialism influence over the individual entrepreneurial outcomes (Morales, Holtschlag, 2013; Uhlaner, Thurik, 2007). At the same time, cultural aspects have been shown to impact formation of personal traits that can facilitate or impede one's decisions about entrepreneurship as a career choice (Minola et al., 2016). It might be therefore inferred that the overall societal post-materialist orientation can shape individual entrepreneurial outcomes through nurturing certain personal characteristics and psychological predispositions. These mechanisms might be directly linked to individual cognitive trait that long has been considered central for defining individual proclivity to entrepreneurship – entrepreneurial self-efficacy (Hsu et al., 2019). Combining the country-level cultural orientation with individual entrepreneurial cognition, this study suggests the following hypotheses:

H1: Country-level post-materialism is negatively related to individual entrepreneurial opportunity recognition;

H2: Entrepreneurial self-efficacy competitively mediates the relationship between post-materialism and individual opportunity recognition.

Method

The study hypotheses are tested using data from the 2019 Global Entrepreneurship Monitor (GEM) Adult Population Survey (APS) and country-level data from the World Values Survey as well as additional manually collected institutional country-level data. GEM is one of the pioneering initiatives that collects data about entrepreneurial attitudes, perceptions, intentions, and activity. The dependent variable – entrepreneurial opportunity recognition - is obtained from the GEM APS (2019) dataset and reflects the whether or not the respondent sees good opportunities for starting a business in the next six months in the area where he/she lives. The measure of perceived entrepreneurial self-efficacy was also extracted from the 2019 GEM APS dataset. It captures the respondent's assessment of the whether he/she has the knowledge, skill and experience required to start a new business. The data about post-materialistic cultural values was obtained from the World Value Survey and European Value Survey's seven multiyear waves since 1981 (1981-1984; 1990-1994; 1995-1998; 1999-2004; 2005-2009; 2010-2014; 2017-2019) (Inglehart, 1977, 2003). This measure is based on Inglehart's four-item postmaterialism index (Hechavarria et al., 2017). The combined dataset constitutes a cross-sectional panel grouped by country, combining observations at the individual and country levels. Multi-level design allows simultaneous consideration of country-level and individual-level factors. Therefore, the multilevel mixed-effects linear regression was employed to test the hypotheses.

Results

Hypothesis 1 examines whether post-materialism is related to the individual's alertness to entrepreneurial opportunities. The results show a negative and statistically significant coefficient for the post-materialism variable. Further, we additionally introduced self-efficacy perception and performed the mediation analysis following the recommendations of Baron, Kenny (1986), Hayes (2009), and Zhao et al. (2010). Hypothesis 2 examines whether the individual's perception of his/her entrepreneurial self-efficacy mediates the association between post-materialism and individual's alertness to entrepreneurial opportunities. The results revealed that post-materialism relates positively to entrepreneurial self-efficacy, which subsequently translates into higher probability of entrepreneurial opportunity recognition, supporting in this way hypothesis 2.

The findings suggest that individuals in post-materialist societies are less likely to develop alertness to entrepreneurial opportunities. Interestingly, this relationship is mitigated by entrepreneurial self-efficacy. As such, post-materialism has a paradoxically competing influence on recognition of entrepreneurial opportunities, revealing a negative direct effect on the probability of entrepreneurial opportunity recognition as well as a positive indirect effect on it via an increased self-efficacy.

Implications

This study links post-materialism theory with self-efficacy concept to examine country- and individual-level drivers of entrepreneurial opportunities identification and argues that in strong post-materialist societies, individuals have lower levels of entrepreneurial opportunity recognition; however, this relationship is mediated by the individual self-efficacy belief. Theoretically, this study adds to the research on cultural values and entrepreneurship, representing an attempt to resolve the controversy in the outcomes of extant research. Previous studies found a negative relationship between post-materialism and entrepreneurial activity: the higher was the level of post-materialism the lower was the rate of entrepreneurial activity (Uhlaner et al., 2002; Uhlaner, Thurik, 2004; Uhlaner, Thurik, 2007). Contrary to this, several other papers revealed a positive relationship between post-materialism and engagement in certain types of entrepreneurship (Stephan et al., 2014; Hechavarria, 2015; Hechavarria et al., 2016). This study complements this stream of research by revealing competing effects of post-materialism (direct and indirect via self-efficacy) on recognition of entrepreneurial opportunities, thus shedding the light on the mechanism linking country-level cultural values to individual predispositions towards entrepreneurship.

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Table 1. Multilevel mixed-effect linear regression results

	Model 1	Model 2
Age	-0.0003	-0.0002
	(0.0002)	(0.0002)
Gender (female)	-0.00007	0.012
	(0.008)	(0.008)
Regulative institutional dimension	0.055	0.055
	(0.038)	(0.037)
Normative institutional dimension	0.074**	0.072**
	(0.034)	(0.034)
Cognitive institutional dimension	-0.039	-0.040
	(0.037)	(0.037)
GDP per capita (log)	-0.081*	-0.070
	(0.047)	(0.047)
Unemployment rate (log)	0.018	0.021
	(0.043)	(0.043)
Country population (log)	0.020	0.021
	(0.027)	(0.026)
Level of education	-0.016***	-0.019***
	(0.002)	(0.002)
Postmaterialism	**-0.0156*****	**-0.0164*****
	(0.006)	(0.006)
Self-efficacy perception		**0.0363*****
		(0.003)
Constant	4.137***	3.915***
	(0.532)	(0.524)
Observations	107179	107179
Log-likelihood	-178400.8	-178314.8

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 2. Mediation analysis results

	Estimate	95% Confidence interval	
		Lower limit	Upper limit
Controlled direct effect	-0.072***	-0.0817	-0.0628
	(0.005)		
Natural indirect effect	0.003***	0.0027	0.0039
	(0.0003)		
Total effect	-0.069***	-0.0785	-0.0595
	(0.005)		

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Factors Affecting Entrepreneurial Intention to Adopt Digital Technologies During Crisis: The Case of Russian SMEs

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Abstract:
This paper addresses a current research gap and promotes understanding of how crises affect digital entrepreneurial behavior in the context of the Russian economy. The goal of this study is to identify determinants of entrepreneurial intent regarding digital adoption during crisis in Russian Federation.
The study's underpinning model, based on the Theory of Planned Behavior, postulated that three constructs—personal valuation of digital entrepreneurship, subjective norms related to entrepreneurship, and the perception of the ease of implementing digital technologies during crisis—shaped entrepreneurial intentions.
The analysis was based on the Global Entrepreneurship Monitor 2021 data set for Russia. Upon analyzing the determinants using a logit model, three important determinants which have positive influence were identified: the government's response to the crisis; the knowledge, skills required to start a new business and assessing the opportunities presented by the crisis. Previous experience with digital technologies has a negatively influenced entrepreneurial intentions to adopt digital technologies.

Keywords: *entrepreneurship, entrepreneurial intention, entrepreneurial determinants, digitalization, digital adoption, crisis*

1. Introduction

The digital economy plays a key role in stimulating economic development and social change, especially in times of crisis characterized by economic inefficiency. Digital entrepreneurship can catalyze innovative solutions and mitigate the adverse effects of crises, ensuring economic resilience and continued growth (Giones &. Brem, 2020). However, the factors influencing the intention of entrepreneurs to participate in the digital economy, especially during crises, are not yet fully understood.

Previous studies have examined various aspects of entrepreneurial intentions (Krueger et al., 2000; Linan et al., 2015), and some have begun to explore the role of digital technologies in entrepreneurship (Nambisan, 2017). However, the intersection of these areas – determinants of entrepreneurial intentions for digital adoption in times of crisis – remains underexplored. Thus, there is a significant gap in our understanding of what motivates entrepreneurs to use digital solutions during difficult times.

The object of the study is entrepreneurial intentions in the context of the introduction of digital technologies during crises. The subject of the study is the specific determinants that influence this intention among Russian entrepreneurs. The goal of this study is to identify determinants of entrepreneurial intent regarding digital adoption during crisis in Russian Federation.

2. Relevance of the paper to the track topic

2.1. Benefits of Digital Adoption for Entrepreneurs

The rapid pace of technological development in recent years has led to an increasing focus on digitalization and the adoption of digital technologies in business operations. Digital technologies have enabled businesses to collect, store, analyze and transfer data more efficiently than ever before, resulting in increased customer engagement, processes' efficiency, and overall business performance. In times of crisis, the latest of which was COVID-19, the adoption of digital technologies can play a decisive role in adapting to the new environment and retaining

customers. Entrepreneurs who are able to effectively adopt and leverage digital technologies during times of crisis may be better placed to survive and sustain growth. However, existing academic discourse on digital entrepreneurship mostly provides succinct insights into the opportunities, success factors, and barriers that arise within the digital landscape as the profound impact of digital technologies on entrepreneurship is only beginning to unveil itself within entrepreneurship literature (Özay & Özay, 2022).

2.2. Entrepreneurial Intention to Digital Adoption

Entrepreneurial intention can be understood as the cognitive representation of the actions an individual intends to perform to establish an entrepreneurial venture in the future. It is a self-acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some future point (Thompson, 2009). Digital adoption in entrepreneurship involves an intentional and strategic process where entrepreneurs perceive the usefulness and feasibility of a particular technology, leading them to decide to integrate it into their business activities (Abushakra et al., 2022). The intention to adopt technology can be seen as a specific form of entrepreneurial intention – an intention to start a new business that makes strategic use of digital technology.

The entrepreneurial intention towards technology adoption can be understood as a function of attitudes towards technology, perceived behavioral control regarding technology use, and subjective norms around technology in the entrepreneurship context (Saghafian et al., 2021).

2.3. Digital Adoption During COVID-19

The COVID-19 pandemic has instigated a paradigm shift in how businesses operate, compelling them to undergo rapid digital transformation (Kumar et al., 2020). The accelerated adoption of digital technology was not a matter of strategic choice, but a means of survival. Enterprises, entrepreneurs, and consumers alike have been forced to adapt swiftly to the digital landscape to endure the crisis. (Ratten, 2021; Andrews & Zhu, 2021; Kronblad, 2021).

Since the beginning of the COVID-19 pandemic, this adoption rate accelerated. According to the Russian Public Opinion Research Center (RPORC, 2020), about 34% of companies in Russia increased their use of digital technologies during the first wave of the pandemic. Notably, this figure reached 51% for companies in the IT sector. At the same time 18% of Russian businesses reported difficulties in adapting to digital technologies, citing factors such as lack of digital skills among employees and financial constraints as key obstacles.

2.4. Formation of Intention on Digital Adoption

The Theory of Planned Behavior (TPB) offers a comprehensive understanding of individual behavior by considering attitudes, subjective norms, and perceived behavioral control. Its focus on entrepreneurial intention aligns well with the research objective of examining intention towards digital adoption during a crisis (Bosnjak, 2020). TPB's flexibility allows for the inclusion of additional relevant variables, providing a more comprehensive understanding of the determinants. The framework has practical implications for stakeholders, allowing them to design interventions and strategies to promote digital adoption. Overall, TPB provides a robust theoretical foundation for understanding the cognitive and social factors shaping entrepreneurial behavior in the context of digital adoption (Salisu, 2020; Rustiana et al., 2020. With regard to entrepreneurial intentions for digital adoption during crises, three following constructs can be used:

1) Positive or negative personal valuation of digital entrepreneurship: whether entrepreneur themself has a positive or negative attitude towards entrepreneurship associated with the use of digital technologies or services as a profession/occupation (also known as digital entrepreneurship);

2) Subjective norms referred to entrepreneurship: whether entrepreneur think, their peers and/or significant others believe, they should start their own business (become entrepreneur);

3) Perception of easiness of implementing digital technologies in business during crisis: assessment of how easy or difficult and/or beneficial it is to implement digital technologies in their business during unstable political/economic situation/other form of crisis.

3. The research question(s) and methods

As the research intends to investigate the determinants affecting entrepreneurial intentions with regard to digital adoption in Russia, this paper aims to answer the following research question:

Q: What factors will influence the intention of Russian entrepreneurs to implement digital technologies during crises?

To answer this question, established theories and empirical evidence to identify potential determinants of entrepreneurial intention towards digital adoption will be drawn upon. These determinants will then be incorporated into research model.

Several factors were included in the model in accordance with the characteristics of each of the constructs described earlier. Personal valuation of digital entrepreneurship during crisis includes prior experience of digital adoption and the fear of failure. Previous instances of interactions with digital technologies, have a positive influence on entrepreneurs' intention to adopt IoT (Kronblad, 2021, Bhatt et al., 2022). One of the most important aspects related to it is the fear of failure, which arises from the human tendency to either avoid risks or take them (Cacciotti et al., 2020; Nefzi, 2018). At the same time, the perception of potential obstacles and problems directly triggers the activation of fear of failure, which subsequently makes it difficult to assess and use opportunities (Kollmann et al., 2017).

Subjective norms referred to entrepreneurial digital adoption includes network factors and government's response. Since individuals often look to others for cues on how to behave, especially in situations of uncertainty such as during a crisis, if entrepreneurs perceive that their peers and significant others believe they should try participating in an entrepreneurial activity (of any kind), they are more likely to intend to do so themselves (Hsu et al., 2022). External factors, particularly government actions, play a significant role in shaping an entrepreneur's intention for digital adoption. Government actions can influence the digital adoption process in several ways. For instance, the government can provide financial incentives, such as grants or tax breaks, to encourage entrepreneurs to adopt digital technologies. Moreover, the government can also create a conducive environment for digital adoption by implementing policies that promote digital literacy and infrastructure development for entrepreneurs (Sambasivan et al., 2010).

Perception of easiness of implementing digital technologies in business during crisis depends on opportunity recognition and entrepreneurial skills and knowledge. Entrepreneurs who are able to recognize opportunities in the digital space are more likely to adopt digital technologies (Kuckertz et al., 2020). Moreover, the study by Shahin et al. (2020) found that entrepreneurship programs that encourage the development of creative computational solutions to socially relevant problems can significantly increase entrepreneurial intention. The level of digital skills and knowledge significantly influences the adoption of digital technologies (Al-Dmour et al., 2021, Kautonen et al., 2022), entrepreneurs with higher digital skills and knowledge are more likely to recognize the benefits of digital technologies and thus are more inclined to adopt them. This is particularly true during a crisis when the need for digital transformation becomes more apparent. The authors further argue that digital skills and knowledge can enhance an entrepreneur's ability to adapt to new technologies, thereby facilitating the digital adoption process. The determinants are incorporated into research model (Figure 1).
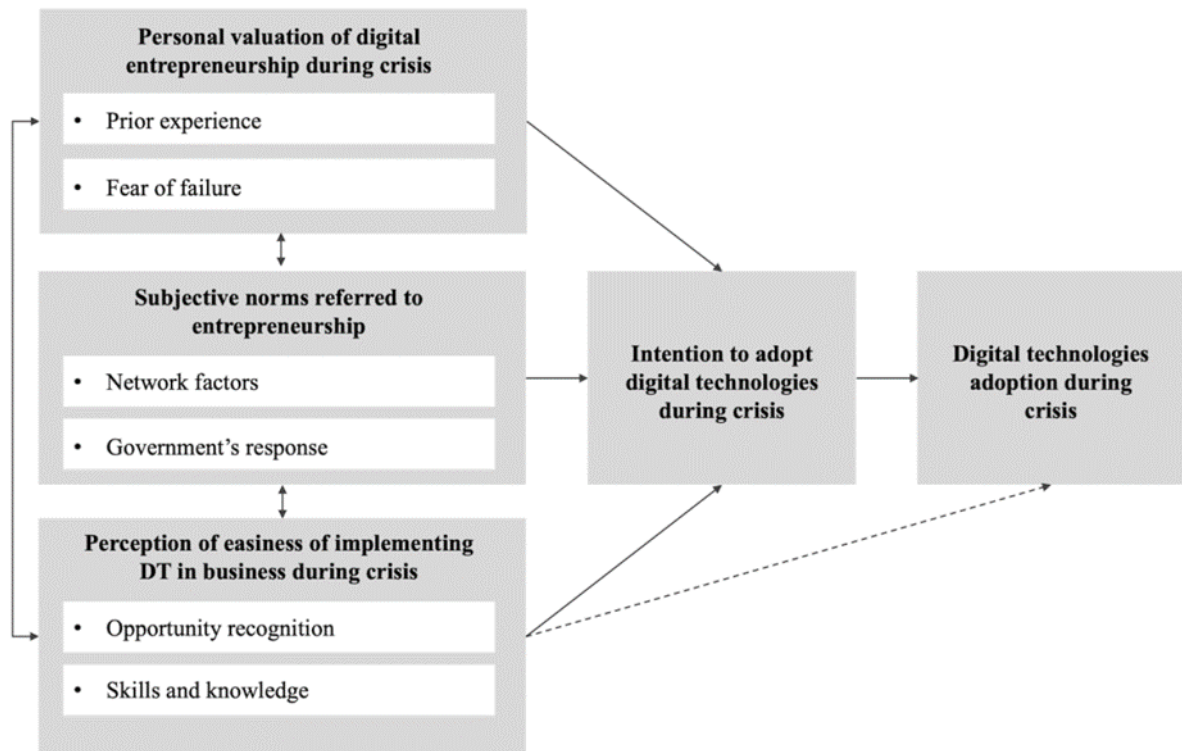
Figure 1. Formation of entrepreneurial intention towards digital adoption during crises model

The data used as the basis for this testing was taken from the Global Entrepreneurship Monitor Database (GEM) of 2021. The use of GEM data for this research ensures that the analysis and conclusions drawn are based on robust and reliable data. As such, the subsequent analysis and interpretation of the GEM data for Russia for the year 2021 will provide meaningful insights into the determinants of entrepreneurial intention towards digital adoption during a crisis, since during this year the COVID-19 pandemic effects were felt especially strongly, due to the non-standard situation and social unpreparedness to face the likes of it. Therefore, the assumption is put forward, that the results obtained on these data can be "spread" to other crisis situations in the future.

In this research, the analytical method selected to assess the determinants of entrepreneurial intention towards digital adoption during crises is logistic regression analysis (logit model). The application of logistic regression analysis within the framework of the Theory of Planned Behaviour (TPB) is both common and productive. It allows to accurately measure the relationship between its key constructs.

GEM data is assigned for the corresponding variables were to each construct of the theoretical model (Table 1).

Table 1. Description of variables

Variable	Name in the dataset	Description	Construct
Dependent variable			
Entrepreneurial intention	CPTEC H2	Your business will use more digital technologies product or service in the next six months?	Dependent variable
Independent variable			
Fear of failure	FRFAI	Fear of failure	Positive or negative

	L			personal valuation of digital entrepreneurship during crisis
Prior experience	H1	CPTEC	In response to the coronavirus pandemic, is your business making use of digital technologies for selling your product or service?	
Network factors	EN21	KNOW	How many people do you know personally who have started a business or become self-employed in the past 2 years?	Subjective norms referred to entrepreneurship
Government's response	VRES21	CPGO	Has government so far effectively responded to the economic consequences of the coronavirus pandemic?	
Opportunity recognition	RT21	CRSTA	Starting a business is more difficult/easy than year ago	Perception of easiness of implementing digital technologies in business during crisis
Opportunity recognition	OW21	CRGR	Opportunities for growth are better/worse than last year	
Opportunity recognition	WOPP21	CPNE	Coronavirus pandemic provided new opportunities that you want to pursue with this business?	
Skills and knowledge	L21	SUSKI	Has knowledge, skill and experience required to start new business	

4. The results to be reported

The analytical procedures performed on the data involved both correlation (Figure 2) and logistic regression analyses (Figure 3).

```
           | CPTE~2_B CPTE~1_B CPGOVR~B CPNEWO~B CRGROW_B CRSTAR~B SUSKIL21 KNOWEN21 FRFAIL21
-----------|----------------------------------------------------------------------------------
  CPTECH2  |  1.0000
 CPTECH1_B | -0.2509   1.0000
 CPGOVRES_B|  0.0624  -0.0698   1.0000
 CPNEWOPP_B|  0.2668  -0.3020   0.2544   1.0000
  CRGROW_B | -0.1709   0.1053  -0.1644  -0.2212   1.0000
  CRSTART_B| -0.0595   0.0144  -0.1243  -0.0857   0.2403   1.0000
  SUSKIL21 |  0.1705  -0.0541  -0.0279   0.0372   0.0028   0.0414   1.0000
  KNOWEN21 |  0.0742  -0.0372   0.0269   0.0689  -0.0540  -0.1027   0.0498   1.0000
  FRFAIL21 | -0.0622  -0.0089  -0.0093  -0.0382   0.0325   0.0435  -0.0921  -0.0371   1.0000
```

Figure 2. Correlation analysis

```
Logistic regression                          Number of obs    =       237
                                             LR chi2(8)       =     36.50
                                             Prob > chi2      =    0.0000
Log likelihood = -125.58267                  Pseudo R2        =    0.1269
```

CPTECH2_B	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
1.CPTECH1_B	-.9115943	.344449	-2.65	0.008	-1.586702	-.2364867
1.CPGOVRES_B	-.3798172	.3570999	-1.06	0.049	-1.07972	.3200857
1.CPNEWOPP_B	.8916685	.4186525	2.13	0.033	.0711248	1.712212
1.CRGROW_B	-.6383782	.3404553	-1.88	0.061	-1.305658	.028902
1.CRSTART_B	.2072736	.325804	0.64	0.525	-.4312905	.8458377
1.SUSKIL21	1.181831	.4328107	2.73	0.006	.3335379	2.030125
1.KNOWEN21	.2525426	.4058195	0.62	0.534	-.542849	1.047934
1.FRFAIL21	-.4743709	.3569236	-1.33	0.184	-1.173928	.2251865
_cons	-1.177905	.6329446	-1.86	0.063	-2.418453	.0626439

Figure 3. Logistic regression analysis

It was found that the logit model was significant (prob > chi2 = 0.0000). The significance of the model demonstrates that it is a useful tool for explaining the variability in the dependent variable. The p-value of four variables – CPTECH1, CPGOVRES21, CPNEWOPP21, and SUSKIL21 – and the constant were less than 0,05, indicating statistical significance. In other words, these variables have a meaningful influence on the dependent variable. Overall, the model's significance, in the context of the study, denotes that the chosen factors indeed impact entrepreneurial intention towards digital adoption during a crisis.

Four important determinants were identified: the government's response to the crisis; the knowledge, skills and experience required to start a new business; previous experience with digital technologies during the crisis; and assessing the opportunities presented by the crisis. Notably, previous experience with digital technologies during the crisis had a negative impact, while other determinants positively influenced entrepreneurial intentions to adopt digital technologies.

The consequences of these discoveries are varied. For entrepreneurs, the importance of having the necessary knowledge, skills and experience is emphasized. Educational institutions have a key role to play in cultivating these abilities. Businesses, large as well as small and medium-sized, can use this information to increase digital readiness and agility in times of crisis. Finally, governments are highlighted as key players in shaping the entrepreneurial ecosystem and providing the necessary support during crises.

Further research can build on the findings by expanding geographic coverage, using longitudinal design, exploring other potential influencing factors, and integrating qualitative research methods for better understanding. In addition, studying the impact of the effectiveness of digitalization on various business outcomes can provide more complete information.

This study has expanded our understanding of the complex interplay of factors that influence the intentions of entrepreneurs to adopt digital technologies in times of crisis. It is hoped that the findings from this study can be used by entrepreneurs, educational institutions, businesses and governments to better deal with future crises and create a more resilient entrepreneurial ecosystem.

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Possibilities to Take into Account the Uncertainty Factor in the Management of Return Flows

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Abstract:
The report discusses the possibilities of taking into account the uncertainty factor in the management of return flows. The formalization of the uncertainty factor is considered on the basis of the theory of fuzzy sets and on the basis of a complete group of events. The presented approach allows using a discrete intervention model of a uncertainty case. This synthesizes procedures for choosing the best alternatives according to many criteria with decision optimization procedures under uncertainty. Partial criteria reflect the economic and technological parameters of managing return flows and the return policy of the marketplace. They consists of two groups of criteria: the first is a subject to the influence of the uncertainty factor; the second is not. The presented algorithm for the appropriate adoption of multicriteria decisions takes into account the features of the management of return flows.

Keywords: *uncertainty factor, return flows, e-commerce, fuzzy sets, multicriteria choice*

1. Introduction

Today the growing influence of the uncertainty factor has a destabilizing effect on the functioning of supply chains. Difficulties in restoring economic ties after the pandemic, as well as due to sanctions pressure, lead to the need to overcome supply chain gaps in various areas, including e-commerce. It turned out that such difficulties lead not only to failures and to delays in supply chain processes. In particular, e-commerce in the context of isolation and changes in the structure of consumption in favor of Internet delivery has received an impetus for rapid growth and development. In this case, a number of features and difficulties arose, among which we note the following. 1) A significant increase in the uncertainty of the external environment and the demand factor. 2) Exacerbation of contradictions in the relationship between participants in supply chains, due to the corresponding factor of uncertainty. 3) Difficulties in the analysis of supply chains due to the lack of reliable information and drastic changes in consumer behavior and anti-crisis strategies of companies. 4) Decreased accuracy of forecasting and extrapolation of data, since, in particular, pre-pandemic statistics are less and less able to explain new phenomena, especially those caused by the uncertainty factor. These features, of course, led to lack of coordination in the management of supply chains, and especially in the management of return flows. Thus, the study of problems of this type is becoming more and more relevant. Accordingly, this paper explores the possibilities for dealing with uncertainty in the management of return flows.

2. Approaches to accounting for uncertainty in the management of return flows

Uncertainty factors in the management of return flows are related to the incompleteness and / or inaccuracy of the available information about their parameters in the conditions of instability of internal processes for processing returns, as well as the variability of the external environment. At the same time, the content of this concept, as well as the choice of approach to accounting for the uncertainty factor, depend on what (and to what extent) information is unknown within the specific models of the analyzed supply chains. In particular, stochastic supply chain models assume that at the time of the decision, some statistics are available or can

potentially be obtained on the analyzed indicators in previous periods. However, in the format of models that require taking into account the uncertainty factor, it is a priori assumed that such statistical information is inaccurate and not sufficiently reliable. In particular, the required information about the parameters of the distribution laws of the corresponding random variables will just be unknown. At the same time, two main approaches to accounting for the uncertainty factor in the management of return flows are known in the scientific literature: based on the theory of fuzzy sets and based on the full group of random events.

1.1. *Formalization of the uncertainty factor based on the theory of fuzzy sets.* In 1965, L. Zade proposed a special concept of a fuzzy set. The principal innovation was the use of the concept of the so-called membership function of an element in the analyzed set. At the same time, the membership function of a particular element in such a set could take any values from the interval [0; 1]. This approach just characterizes the fuzziness of the result when determining whether an element belongs to the corresponding set. In turn, various logical operations on fuzzy sets were additionally developed, and the so-called linguistic variable was formalized. In addition, fuzzy numbers of various types were formalized [Gogue, 1967], which can form fuzzy data for various tasks. Later, based on the theory of fuzzy sets and fuzzy logic (see, for example, [Bojadziev, 1997]), various methods and models were developed to improve the quality of decisions made in any area of management.

In particular, in relation to logistics research, supply chain models under conditions of demand uncertainty have become the most popular in practice. For example, in [Petrovic, Xie, Burnham, 2008], a distribution network is modeled under conditions of uncertainty in the demand of many customers, which are described by discrete fuzzy numbers. Fuzzy values of the demand, in turn, generate fuzzy values for the amount of stocks in the network. Of course, this requires the development of methods and models of inventory management under conditions of uncertainty, and specifically in a fuzzy environment. Among domestic studies, it should be noted the works that are devoted to the issues of inventory management under uncertainty. At the same time, if in some works [Свиридова, 2014; Косоруков, Маслов, 2019] stochastic inventory management models were developed taking into account the normal distribution of demand, while in others they are adapted to take into account any fuzzy data. In particular, in the work [Косоруков О.А, Свиридова О.А. 2012] used fuzzy numbers with a triangular distribution in models for optimizing the time of delivery appointments, using random deviations in delivery times and demand for goods to model. As you can see, fuzzy approaches to decision-making in logistics and supply chain management, as well as modeling processes in a fuzzy environment, have given a significant development to the methods and models of inventory management. The approaches presented in these works, in our opinion, may well be used in the management of return flows, if instead of the uncertainty of demand, the uncertainty of the return value is taken into account.

1.2. *Formalization of the uncertainty factor based on a complete group of random events.* Let the probabilities of the corresponding random events cannot be estimated. In such a situation, one speaks of making decisions under conditions of uncertainty. Such tasks just allow reflecting the specifics of specific processes in management practice. We are talking about the format of models when there are no reliable statistical data on a number of parameters of the analyzed processes, moreover, related to possible random external influences. The features of the analysis of such models are related to the fact that in these situations it is not possible to use decision-making methods under risk. Of course, in the format of such studies, of course, special models of discrete intervention of the case are used. For decision-making problems under uncertainty, a wide arsenal of methods for choosing the best solutions has been developed. Such an arsenal is represented by both traditional and special selection criteria, in particular, allowing to take into account the specific individual attitude of the decision maker (DM) to the specifics

of the existing uncertainty factor for the final economic result [Мушик, Мюллер, 1990; Бродецкий, Гусев, Шидловский, 2020].

In addition, attention should be paid to the following feature. Practical managers, of course, will immediately note that decision-making methods for optimization problems under many criteria are even more relevant in these areas [Бродецкий, Гусев, Мазунина 2018; Бродецкий, Гусев, Шидловский, 2020]. Thus, as we see, for real applications in practice, managers will need decision-making methods that allow them to simultaneously take into account both the features of choice according to many criteria and the features of taking into account the uncertainty factor. Accordingly, the solution of the above problems of analysis and optimization under conditions of uncertainty for specific supply chains will often have the following specifics. Namely, such optimization models will a priori additionally have a more complex format, which should take into account the above features of optimization procedures. In particular, this implies that, first of all, for each alternative, the final economic result under a certain external influence will be represented precisely by a number of indicators of the corresponding particular criteria, and not by one specific number (as is customary in the attributes of decision theory under uncertainty). This feature is due to the fact that in addition to the uncertainty factors, when optimizing decisions, it is also necessary to take into account a large number of other factors, (which noted for example in [Бродецкий, Гусев, Мазунина 2018; Бродецкий, Гусев, Шидловский, 2020]).

3. Features of accounting for the uncertainty factor in the choice by many criteria in reverse flow control problems

When managing return flows under conditions of uncertainty, it is important to find the desired balance of interests between customers, sellers and the marketplace. In particular, an overly strict refund policy can lead to some customers leaving the marketplace. At the same time, excessive liberalization of the terms of returns causes losses for sellers. Therefore, the requirement to take into account many criteria in the formation of the desired return policy provides for a multi-criteria approach, taking into account the following types of indicators. 1) Economic indicators - total costs for cargo handling of the return flow. 2) Other cost criteria that characterize the costs of managing returns, including possible return rates that marketplace may charge customers. 4) Indicators of the throughput of the logistics network of returns. 5) The number of returns with a particular configuration of the return policy. 6) Indicators of the level of service provided to sellers and customers of the marketplace. 7) The average time of transportation of the return to the seller and the number of sellers who left for a certain period. [Герами, Гусев, Саркисян, 2022]. Thus, the problem of managing return flows will need to be formalized as a problem of multi-criteria choice.

To solve problems of multi-criteria choice, it is customary to use the methodology of decision making by multiple criteria (multiple criteria decision making - MCDM), in which the analyzed indicators are called "partial criteria". In the general case, the multi-criteria approach provides for the consistent implementation of special procedures when setting and solving the following selection problem. 1) Agreeing on a list of particular criteria, their indicators and corresponding units of measurement, as well as their initial optimization directions. 2) Determining the weights of particular criteria, if necessary, based on the chosen method of their formalization. 3) Implementation of procedures for choosing the best solution, for example, using the MCDM methodology.

Further, in the format of the presented study, we will restrict ourselves to situations where it is supposed to use any of the direct-type selection criteria developed in the theory [Шикин, Чхартишвили 2000; Ларичев, 2002; Ногин, 2004; Подиновский, 2019]. At the same time, in order to a priori reduce the chances for the possibility of the impact of negative phenomena of inadequate choice (in relation to the corresponding procedures of multi-objective optimization), further, the following is assumed. It is accepted that in order to use the selection criterion

specified by the decision maker, it is the following approach that will be implemented. Namely, we are talking about an approach that correlates with a special format, moreover, the so-called generalized selection criteria [Бродецкий, Гусев, Мазунина 2018; Бродецкий, Гусев, Шидловский, 2020].

So, when optimizing decisions correlated with the analysis of supply chains, as already noted, a synthesis of various special selection procedures may be required. These will be procedures correlated with decision-making methods under uncertainty, as well as procedures correlated with optimization methods under many criteria. The possibilities of this synthesis for the applications were considered in [Brodetskiy, Gusev, Shidlovskii, 2021]. Nevertheless, in practice, the synthesis procedures developed in this work, of course, may require their special generalization and/or modification. In particular, as already emphasized, such a situation, for example, takes place when the impact of external factors will be correlated only with a certain set of given partial criteria (and not all a priori specified such criteria, as was accepted in [Brodetskiy, Gusev, Shidlovskii, 2021]). The corresponding modification is presented in [Бродецкий Г. Л., Гусев Д. А., Шидловский И. Г., Свиридова О. А. 2023], where the specifics of the developed approach and the corresponding algorithm of computational procedures are given. It works for the case when partial criteria are in the form of two groups of such criteria (in one - partial criteria that are influenced by the uncertainty factor; in the other - not). The corresponding algorithm of these procedures is presented below, taking into account the specific features of the return flows. The necessary five steps of such an algorithm are given in Table. 1.

Table 1

Modified algorithm for multicriteria decisions for controlling return flows under uncertainty

tep	Content	Features of return flows
	Formalization of the analyzed alternatives with indication of particular criteria and their indicators, as well as the specified selection criterion in the format of optimization procedures for many criteria. Partial criteria are presented in the form of two groups of criteria: 1) the first group, for which, according to the decision of the decision maker, it will be necessary to take into account the impact of the uncertainty factor. 2) the second group of other particular criteria, for which, according to the decision of the decision maker, such accounting is not required	The first specified group of partial criteria will further take into account the impact of the uncertainty factor associated with the parameters of the return flow itself. The second group of partial criteria will be based on the rules of the marketplace return policy, which are not related to the parameters of the return flow and are not affected by uncertainty factors.
	Formation of a complete group of events to take into account the uncertainty factor and setting the selection criterion in the format of comparison and optimization procedures under uncertainty	The specified complete group of events will be taken into account only in relation to the first group of partial criteria, which just characterize the parameters of the return flow
	Determination of selection	Such indicators are correlated

	criteria indicators in the format of comparison and optimization procedures for many criteria for all alternatives (for each random event from the full group)	with the corresponding types indicated above, which characterize the economic and technical features of returns management.
	Formation of the required utility matrix based on the selection criterion indicators found in the previous step	The utility matrix rows will correspond to the analyzed alternatives, moreover, its columns will correspond to the previously formalized complete group of random events
	Comparison and determination of the best alternative based on the selection criteria specified in step 2 using the resulting utility matrix	As a result, the best alternative will be found in relation to the analyzed return flow management procedures.

Note that a specific set of partial criteria and the corresponding selection criteria are consistent with the decision maker, taking into account its relationship to data and to the uncertainty factor.

4. Conclusion

The report discusses the possibilities and features of multi-criteria returns management, taking into account the uncertainty factor and parameters of return flows, as well as the return policy. An algorithm for the appropriate adoption of multicriteria decisions is presented, taking into account the features of the management of return flows.

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Big Data and SMEs Performance in Crisis: the Case of Russia

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Abstract:
Due to its superior value delivered to customers, competitors, and the supply chain, big data (BD) has recently drawn significant attention from academics and has been growing exponentially over the last years. This paper investigates the ability of small and medium firms to manage big data in their performance outcomes. Considering different characteristics of big data, the study tries to estimate the specificity of its effects in context of small firms on emerging market during pronounced period of pandemic crisis. Based on the findings from regression analysis we may conclude on the existence of such differences between different big data dimensions, as well as about their contingency on external environment fluctuations.

Keywords: *big data, firm performance, crisis, SMEs*

Introduction

There has been an increasing interest on big data and business analytics in management literature; mainly from companies which are always looking for generate new insights into consumers, competitors, and supply chains (Ghasemaghaeim, 2021). For example, many firms (e.g., eBay, Amazon) have started to analyze large volumes of social media data (e.g., consumer comments) to discover patterns in data in providing personalized offers to their customers (Akter et al., 2016). Netflix, as an example, utilizes more than one billion consumer reviews to forecast customers' movie tastes and suggest movies that best fit their preferences. Big data is increasingly becoming a critical firm resource – a resource that could help firms to generate business insights (Ghasemaghaei and Calic, 2019; Wamba et al., 2017). However, there is a lack of understanding about the impact of big data on generating data-driven insight. Data refers to the raw facts that reflect the characteristics of an entity or event (Detlor, Hupfer, Ruhi, & Zhao, 2013).

Whilst management scholars have begun to unpack the positive relationship between big data utilization and financial performance (Irani and Love 2000; Love et al. 2020), uncertainty exists about the relationship between big data characteristics and performance of small and medium-sized enterprises (SMEs). To investigate the role of BD in SMEs outcomes, we formulated the following research questions:

What is the impact of big data characteristics (volume, velocity, variety, veracity) on performance of SMEs? What is the role of context in these relationships?

Theory and Hypotheses

Big data in this study is considered as high-volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision making, and process automation (Gartner, 2022). Investments in new technologies use to be expensive, and companies expect a significative return of them. Big data insights can be used by businesses to introduce disruptive innovations, improve supplier development, increase customer satisfaction, take advantage of marketing capabilities, improve innovation capabilities, and be more ambidextrous, all of which will ultimately improve firm performance.

H1: Firm reliance on big data (BD) characteristerized by large volume (a), high velocity (b), variety (c), and veracity (d) is positively related to performance outcomes

The relationship between BD-performance is higher in generous contexts, which means that, in situations of high munificence, the business value generated through BD will strengthen the firm's competitive edge (Vitari and Raguseo, 2020). Big data can be used by firms to learn more about their environments. Organizational learning theory suggests that information acquisition, operationalized here as big data utilization, can result in adaptability to an organization's environment (Huber, 1991). Contingency theory also claims the larger the number of elements involved, the more complex is environment. Thus, we formulated moderation hypothesis:

H2: Environmental complexity positively moderates the relationship between firm reliance on BD characterized by large volume (a), high velocity (b), variety (c), and veracity (d) and firm performance, such as the higher complexity the stronger link between BD and performance.

The theoretical model is summarized on figure 1.
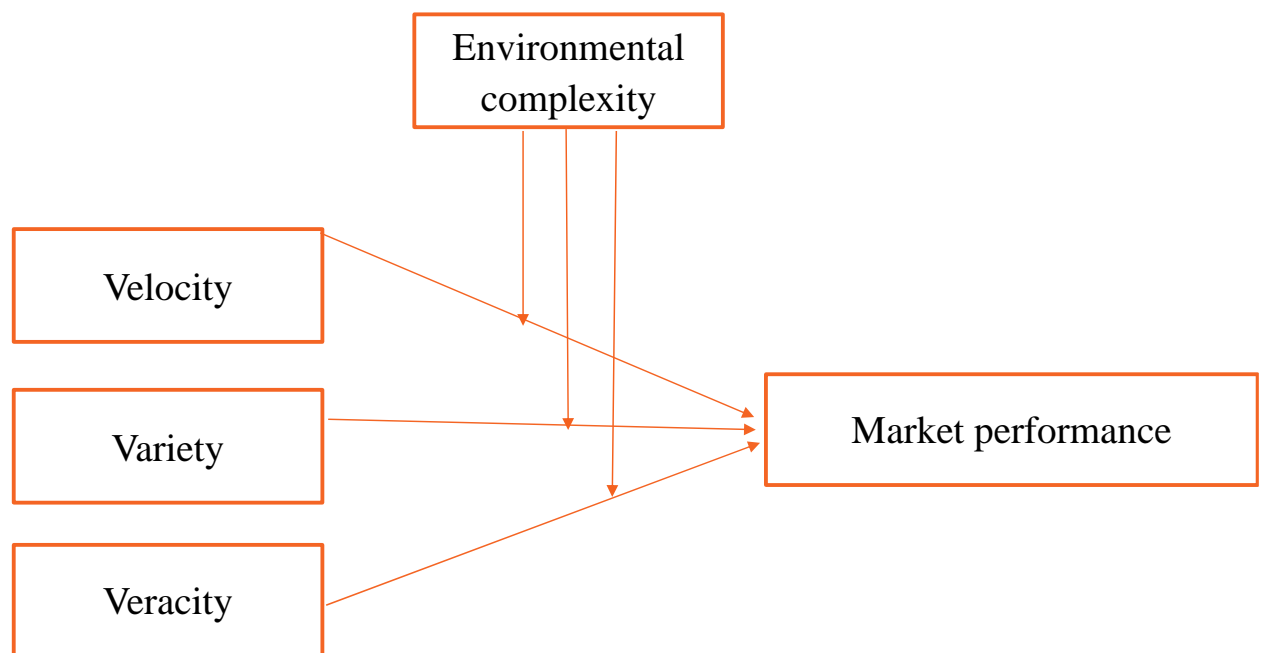
Figure 1. Theoretical model

Methodology
To test the proposed hypotheses, small and medium sized enterprises (SMEs) in Russia were surveyed in November 2021 – January 2022. Data were collected by independent analytical firm. The respondents represented top managers or/and founders of small firms from various types of industries expect governmental organizations and agricultural ventures. The final sample for the analysis counted for 307 firms.

Regression analysis was utilized to test the theoretical model. The measurements of the variables are presented in Table 1.

Table 1. Operationalization of variables

Variable	Measure
Big data characteristics	7-point Likert scale on BD usage
Human capital	1 – limited access; 7 – full access 7-point Likert scale
Social capital	
Physical capital	
Financial capital	
Environmental complexity	The level of complexity on 7-point Likert scale
Control variables *Firm age* *Firm size* *Industry*	In years Number of employees Categorical variable (1 – manufacturing, 2 – services, 3 - construction etc.)

OLS regression results are presented in Table 2.

Table 2. Regression results

	Model 1	Model 2	Model 3
Direct effects			
Firm age	0.002	0.003	0.003
Financial capital	0.086*	0.051	0.060
Human capital	0.185**	0.177**	0.153**
Physical capital	-0.016	-0.031	-0.029
Social capital	0.116*	0.083	0.079
Firm size	-0.001	-0.000	-0.000
Industry	0.019	0.018	0.014
Volume		0.120**	0.126**
Velocity		0.008	0.009
Variety		0.074	0.068
Veracity		0.023	0.030
Environmental complexity (EC)			0.374
Interaction effects			
Volume_X_EC			-0.123**
Velocity_X_EC			-0.122*
Variety_X_EC			0.172**
Veracity_X_EC			-0.025
_cons	2.259***	1.734***	0.325
r2	0.082	0.13	0.17

*Note. *$p = .10$; **$p = .05$; ***$p = .001$.*
N = 307

Findings and Discussion

Based on the regression analysis of survey data collected in the end of 2021 on sample of Russian SMEs, we identified the following effects of BD usage on firms' outcomes. The expected result was that SMEs that utilize big data characterized by large volume experience rise in their market performance. With higher level of environmental complexity firms that rely on big data from various sources show higher performance outcomes. Unexpected was that in highly complex environments the positive role of high volumes and high velocity BD in SMEs performance decreases. The utilization of large volumes of data improves firm insight generation by discovering new relations among different elements (Köhler, 1970). Without having sufficient data, firms may not be able to accurately find new patterns in data. Based on the gestalt insight learning theory, processing different types of data could help firms to better discover new relationships and patterns in data. Severin (1967) suggests that the number of cues (e.g., structured and unstructured data) available to decision makers is associated with providing deeper insights about a particular problem. Specifically, collecting various types of data (e.g., numbers, photos, texts, and pictures) enhances the chance of identifying new and non-obvious patterns in data (Dong, Liao, & Zhang, 2018). Based on the gestalt insight learning theory, the problems firms are confronting could be solved by understanding the relations between different elements in a particular context (Köhler, 1970). Therefore, analyzing data in real time helps firms to quickly generate insights about what is happening now, what is likely to happen in the future, and what actions they need to take to get the optimal results. This insight generation helps firms to quickly develop new ideas and business strategies (Erevelles, Fukawa, & Swayne, 2016).

Contribution

With the current study we extend the big data literature by differentiating among the role of big data characteristics in outcomes of small and medium firms. Moreover, we examine moderating role of environmental complexity in the impact of big data characteristics on firm outcomes. While prior studies looked at firm-level characteristics and abilities in increasing big data benefits, we add external environment to the relationship between big data and performance outcomes.

Overall, with this study we contribute to the emerging stream of management literature on the role of new technologies (especially BD) in firm success, particularly focusing on the context of small firms in turbulent and complex environment.

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Smart Sustainable Cities: Challenges and Opportunities

Smart Sustainable Development of Territories: the Case of Leningrad Region

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Abstract:
To ensure smart and sustainable urban environment, it is necessary to continuously assess the actions and needs of all three groups of stakeholders: government, business, and citizens. In order to develop a consistent approach towards such monitoring, it is important not only to consider the three areas of sustainability - economic, environmental, and social - but also to analyze the needs and attitudes of citizens towards smart sustainable development (SSD). In this study we develop a framework of SSD monitoring and test it on three territories of Leningrad oblast. The results show that there are gaps on all these territories and the most probable cause of them is poor communication. By introducing a valid SSD monitoring framework, this study not only contributes to the literature on SSD but also provides implications to the practitioners towards more sustainable policies.

Keywords: *smart city, sustainable development, smart sustainable city, urban development*

1. Introduction

The efficient use of limited resources with respect to the needs of future generations is a major problem for urban areas, where the quality of infrastructural solutions, such as drainage, water, energy, and waste management, directly impact the quality of life, as measured by environmental, economic, and social indicators. This is widely considered in the literature as a difficult social challenge for government agencies (see, for example, Höjer & Wangel, 2015) due to the multidimensional nature of urban infrastructure and the diverse preferences and needs of stakeholders (public authorities, citizens and local businesses). However, sustainable development goals cannot be achieved solely by the government, as private sector companies play a key role as the driver of economic changes, controlling financial flows, and introducing innovative technologies. Moreover, the significance of citizens' engagement is growing since co-production becomes vital in achieving better results in the public sector (e.g., separate waste collection). Thus, to achieve progress in sustainability, aligned efforts are required from local public authorities and local business, as well as local citizens, who should be considered as co-producers, rather than passive consumers.

Smart sustainable development (SSD) implies the implementation of public policies across all key areas of smart sustainable agenda, based on synchronization of stakeholders' needs and interests, and utilizing ICT for the betterment of the city. There is an increasing wave of studies in academic literature about territorial and urban development. However, the majority of these studies rely exclusively on quantitative approach that does not allow to assess the correspondence between the needs of local citizens and the activities of local businesses and the authorities.

Therefore, to address the above-mentioned challenge, the assessment of all stakeholders, their expectations, needs and interests should be included into the process of defining sustainable policies. By taking into account the diverse interests of all stakeholders we propose our Smart Sustainable Development Monitoring (SSDM) that not only considers objective Environmental, Social, and Corporate Governance (ESG) characteristics of the territory but also accounts for qualitative data and allows to identify gaps in how the three major groups of stakeholders — the citizens, business, and the authorities — see the development of the territory. We also expand

ESG by two additional components for territorial analysis: D — digital, and E — economic. We thus consider that our SSDM will help to determine progress, impacts, and identify best practices for benchmarking purposes.

This paper is aimed at developing a SSDM framework and presenting the empirical results of its application. The data were collected in three villages of Leningrad oblast (Russia): Kingisepp, Volkhov, and Shlisselburg. These villages are similar in terms of their size yet differ in terms of proximity to St. Petersburg and economic development.

The results show that Shlisselburg has the lowest DEESG-score, while Kingisepp has the highest one. Gaps between the citizens, the business and the municipal authorities exist on all three territories and the most probable source of them is poor communication.

It is to note that the application of SSDM facilitates not only longitudinal analysis that allows to assess SSD of a territory but also provides room for comparative analysis that can be used for SSD rating development.

Our study contributes both theoretically and practically. First, we resort to the emerging SSD approach to study territories and thus expand its application. Second, we develop a theoretical framework that contributes to the literature on sustainable territorial development. Third, this framework can be also used by practitioners to reduce the gaps between the vision of territorial development of the citizens, businesses, and local authorities.

This paper is organized as follows. We first observe SSD and analyze existing approaches to its monitoring. We then discuss their limitations and develop a new SSDM framework. Next, we describe data collection procedure and our approach to its analysis. In the following section, we provide the results of our empirical analysis. In conclusion, we discuss potential avenues of future research.

2. Smart Sustainable Cities: Definition, Monitoring and Evaluation

A smart sustainable city, as defined by the United Nations Economic Commission for Europe (UNECE) and the International Telecommunication Union (ITU), is an innovative city that utilizes ICT to improve the quality of life, operational efficiency, services, and competitiveness while meeting the needs of present and future generations in terms of economic, social, environmental, and cultural aspects (ITU-T, 2015; ITU, UNECE, 2017). This definition was proposed in 2015 and expanded in 2020 to include "Socially Smart Sustainable Cities" (Golubchikov, 2020), emphasizing the role of citizens, their needs, and public participation in achieving sustainable development. Therefore, it is important to consider not only the environmental aspect, but also the social and economic dynamics and public opinion.

In recent years, there has been an increase in the number of ratings and approaches that assess both smart and sustainable development, with the total number of these ratings matching or even surpassing those evaluating urban development solely based on "smartness". However, many of these methodologies have a significant drawback as they rely exclusively on the assessment of quantitative data. Existing methodologies for evaluating smart and sustainable city development rarely incorporate the opinions of key city stakeholders, namely residents (among few exceptions are (Eurostat, 2021; IMD World Competitiveness Center, 2023)), and secondary data is used to assess the quality of life for citizens on a given territory. Additionally, the term "smart" often solely implies the use of ICT to address urban development issues, while neglecting the social aspect.

In our proposed approach to monitoring SSD, we begin with two fundamental assumptions: (1) There are three main groups of territorial development stakeholders: business, government, and citizens. Each group contributes to sustainability - citizens through public participation, co-production in the public sector, business through ESG agenda (environmental, social, and governance) implementation, and government through the implementation of local public policies. (2) A SSD ensures the implementation of policies across all key dimensions of sustainable development, based on the synchronization of stakeholder needs and the use of smart

technologies. Thus, the concept of "smart" encompasses not only ICT but also improving the quality of interaction between stakeholders of the city.

We expand ESG by adding digital and economic components that encompass the use of ICT in territorial development and account for vital economic indicators. Thus, the DEESG (Digital, economic, ecological, social and governance) development agenda reflects the policies implemented at the city level by government and municipal authorities, as well as companies operating within the territory. It includes environmental management, economic and social development, and the use of more effective managerial tools and stakeholder interactions, supported by the implementation of ICT to these issues.

One of the key objectives of our monitoring approach is to identify gaps between stakeholder expectations, needs, and efforts and to find solutions to bridge these gaps. The monitoring results provide recommendations for city governance authorities and business representatives. Through monitoring the smart sustainable development of a city, progress can be assessed over time, benchmarked against other cities, and through data analysis and exchange, conditions for disseminating best practices and establishing standards for achieving sustainable development goals at the local level can be created.

To that end, the monitoring results aim to answer the following questions:

- How do stakeholders interact in the context of sustainable development, and to what extent are their expectations, needs, and efforts synchronized?
- What are the advancements (results) in key areas of sustainable development, and is there any imbalance in a particular direction? How does this affect citizens' subjective perception of the quality of life in the city?
- How are ICT technologies being utilized to drive progress in EESG directions?
- What conclusions can be drawn to amend corporate non-market strategies and policies of government and municipal authorities?

Fig. 1 illustrates the outcomes of the monitor within the proposed framework.
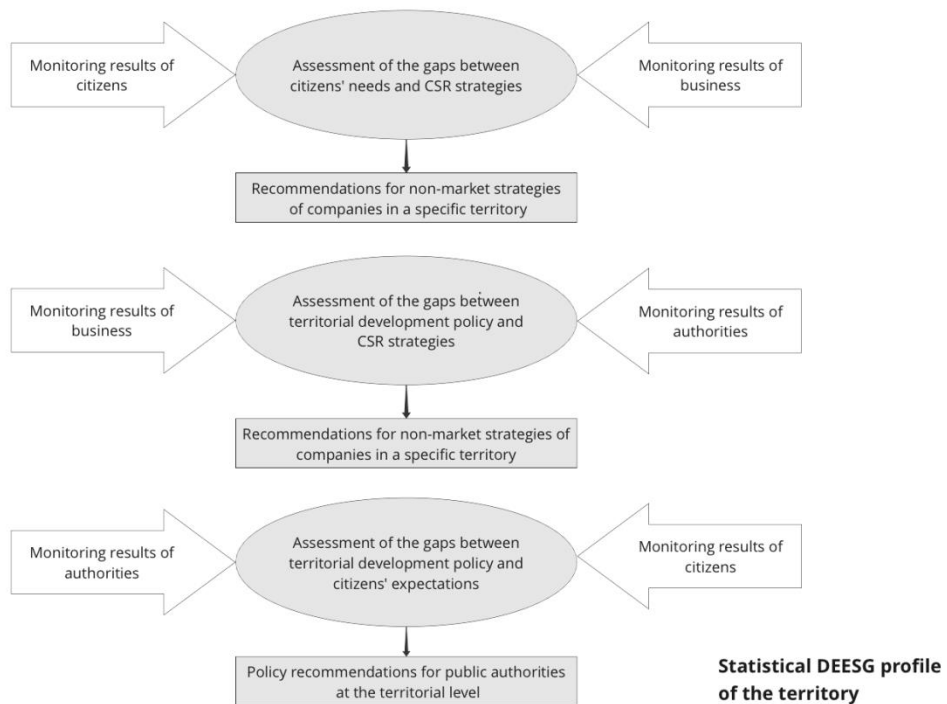
Fig. 1. The anticipated outcomes of Smart Sustainable Development Monitor

3. Data and method

The data for this study were collected in 2023 in three towns of Leningrad oblast (Russia): Kingisepp, Shlisselburg, and Volkhov. Their location and population size are given in **Fig. 2.** The proximity of the studied territories to St. Petersburg significantly affects their socio-economic development.

Volkhov is located on the eponymous river and is 135 km on the East from St. Petersburg. It is a major railroad node and has a direct rail connection with St. Petersburg. As of 2023, the population of Volkhov reaches 37,955 citizens, which has been decreasing in the last fifteen years (Rosstat, 2023). Volkhov's economy is focused on manufacturing.

Kingisepp is located on the Izhora river and is 130 km on the West from St. Petersburg. It is also relatively close (25 km) to the border with Estonia. Among the territories under analysis, Kingisepp is the largest with 49,005 citizens (Rosstat, 2023), which has been relatively stable during the last decades. The economy of Kingisepp is majorly represented by chemical, glass, automobile manufacturing and oil industry. The largest Russian seaport on Baltic Sea is located within Kingisepp municipal district, which has a significant impact on the local socio-economic development.

Being located 50 km on the East from St. Petersburg, *Schlisselburg* is the closest among the studied territories. It is also the smallest in terms of population size, which was estimated 13,918 people in 2023 (Rosstat, 2023). In contrast to other territories, the population of Shlisselburg has been rising in previous decades up to 2020, when it reached its peak value of 14,920 citizens. The local economy is focused on ship, electronics, and wood manufacturing, as well as food production.

Fig 2. Territories of the SSDM analysis if current study (red) and their relative location to St. Petersburg (blue)

In our study, several methods of analysis were used. We relied upon content-analysis to study strategic development plans of the territories as well as the web resources of local administrations and available media materials (local news, CSR/ESG reports) about local businesses. To study opinions and attitudes of the citizens of these three territories, a DEESG-questionnaire was developed and a set of CAWI[1]-surveys were conducted.

The questionnaire contains 72 questions that encompass socio-economic characteristics (age, gender, education and income levels, etc.) and all components of DEESG. Economic,

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[1] CAWI = computer-assisted web interview.

ecological, social, and governance constituted various sections of the questionnaire. Digital component was represented through particular questions within each section and contributed both to assessing other components and assessing digital component separately. The measurement was produced via five-step Likert scales, where the respondents were asked to choose the degree of agreement with given statements. Then, the mean value of the questions representing each component was calculated.

4. Empirical results

In this section we present the empirical results of SSDM application to the three selected territories. We start with presenting the policies of the local authorities, then analyze the CSR/ESG activities of local businesses and finish with interpreting the survey results that elicits the attitudes and needs of the citizens regarding the territorial development.

4.1. Directions of local territorial development

The directions of territorial development are summarized in table 1.

Table 1. Prioritized directions of territorial development according to local strategic plans

Volkhov	Shlisselburg	Kingisepp
Economic: • Ensuring sustainable functioning and development of the communal and engineering infrastructure and improving energy efficiency. • Developing road networks • Developing small and medium-sized businesses and the consumer market **Social:** • Providing citizens with quality housing • Developing culture • Developing sports • Ensuring the safety • Sustainable social development • Creating a comfortable urban environment • Supporting youth	**Economic:** • Development and support of small and medium-sized businesses **Infrastructure:** • Development of housing, communal and road infrastructure **Social:** • Development of physical culture and sports, • Development of culture in the territory, • Ensuring security, • Promoting the development of participation of the population in decision-making by local governments	**Economic:** • Development of the logistics complex and industrial clusters • Development of the agro-industrial complex • Development of commercial services **Comfortable environment:** • Development of comfortable housing • Development of microdistricts • Development of modern public spaces **Modern infrastructure:** • Development of the social sphere • Development of the transport system • Development of the fuel and energy complex and public utilities

Volkhov

The local authorities of Volkhov city have a comprehensive strategy plan and a set of municipal programs (Volkhov municipal district, 2023) to contribute to the development and well-being of the territory. Their efforts include ensuring sustainable infrastructure and energy efficiency, providing quality housing, developing road networks, promoting culture and sports, supporting small and medium-sized businesses, ensuring safety, promoting social development, creating a comfortable urban environment, and supporting youth. However, there are no ecological, digital and governance components of DEESG emphasized. In general, through outlined initiatives, they aim to create sustainable social and economic environments.

Shlisselburg

The local government of the city of Shlisselburg is implementing a number of municipal programs aimed at solving the most pressing infrastructure, social issues, as well as issues of economic development of the territory. The scale of these programs and their content are largely limited by the small public budget of the municipality. As for the DEESG monitoring components, there is no digital component; environmental and sustainable development issues are not reflected in the strategic plans. However, it is worth mentioning a specially created and implemented municipal program for the development of public participation, which can have a positive impact on the Governance component in the future.

Kingisepp

The prioritized directions of Kingisepp municipal district development are outlined in the local Strategy of socio-economic development until 2030. The main directions are in vain with the federal and regional laws and programs and lay on three pillars: economic growth, comfortable environment and modern infrastructure. It should be noted that in terms of DEESG, digital, ecological, and governance components are barely considered while most of measures are devoted to economic, social and governance components (Kingisepp municipal district, 2017).

The territories considered have largely similar priorities in the local policies being implemented. With limited budgets, the major focus is made on the most pressing social and infrastructural issues.

4.2. CSR/ESG activities of local businesses

The CSR activities of local businesses with regard to local development are given in table 2.

Volkhov

Companies in the city actively engage in the environmental and social life of the еуккшещкн, although there is a clear leader among them - the Volkhov branch of AO "Apatit" (a chemical cluster of the "PhosAgro" Group). The company prioritizes environmental sustainability, aiming to reduce emissions, wastewater discharge, and water consumption while increasing waste utilization. It has implemented an ecological management system and participated in environmental monitoring and reforestation programs. Additionally, it contributes to and participates in social initiatives by organizing meetings with the local population and presenting social projects (governance component) (PhosAgro, 2022). Therefore, the company's contributions cover environmental, economic, social and governance aspects of the DEESG concept.

Shlisselburg

Several local companies are famous with their participation in social and ecological activities as well as collaboration with local government as far as economic development of the territory is considered. For instance, LLC Tritment participates in state and regional programs to support small and medium-sized businesses. Companies are involved in ongoing monitoring of hygienic requirements for ensuring the quality of atmospheric air in populated areas, streamlining the activities of all divisions for better management of production and consumption waste. The leading role of environmental requirements is widely recognized, companies are using ecological standards in making strategic decisions related to the reconstruction, technical re-equipment, and modernization of production facilities. The social impact of local business is

reflected in holding sports competitions among employees and closer interaction with the city administration to participate in regional and federal programs to expand production (which in turn has positive effects on creation of new job opportunities).

Kingisepp

In Kingisepp, two large businesses reported contributing to the local development. Eurokhim, a large fertilizer producer has an ammonia production facility located in the Kingisepp district. The company cooperates with the authorities of Kingisepp district, participates in Kingisepp social development program and monetary contributes to the local territorial development (Eurokhim, 2019). Another company that is located in the region, JSC Rosterminalugol, also announced corporate policies towards environmental protection that are aimed at increasing environmental awareness of the citizens, compliance with international standards and saving Baltic seals that are on the verge of extinction (Vremya, 2019). Hence, the activities towards local territorial development from businesses in Kingisepp encompass environmental, economic, and social components of DEESG, while digital and governance components are lacking.

Table 2. CSR activities of local businesses that explicitly contribute to local territorial development

Volkhov	Shlisselburg	Kingisepp
Environmental protection: • Implementing eco-friendly practices and technologies for environmental conservation. **Economic sustainability:** • Generating employment opportunities for the local population. • Investing in infrastructure development. • Collaborating with local suppliers and manufacturers. **Social development:** • Supporting community initiatives and events.	**Environmental protection:** • Use of environmental standards and their monitoring and control. **Economic sustainability:** • Participation in regional and local business support and development programs. • Development of job opportunities. • Creation of new jobs. **Social development:** • Participation in organizing sports events.	**Environmental protection:** • Introduction of new technologies to reduce ecological footprint in terms of water, air, waste. • Campaigns to increase environmental awareness of population. • Compliance with international environmental standards. • Financing of research towards saving Baltic seals. **Economic sustainability:** • Consulting local agricultural producers about effective fertilizer application. **Social development:** • Measures to increase labor safety. • Incentives to promote creative initiatives of workers. • Campaign to increase road safety. • Case championships and monetary support to school students.

Hence, the businesses in all studied territories implemented policies for ecological, economic, and social development. However, these policies barely cover digital and governance components. Businesses from Kingisepp occur to contribute the most to its territorial development which might be stipulated by their large size.

4.3. Attitudes and needs of the citizens

Our SSDM allows to estimate the progress of territorial development as far as different dimensions of SSD are concerned. In **Fig. 3** the average score of satisfaction with DEESG based on the surveys of the citizens is given for the three studied territories. As seen, the results for the territories are different. The citizens of Kingisepp reported the highest satisfaction with all components.
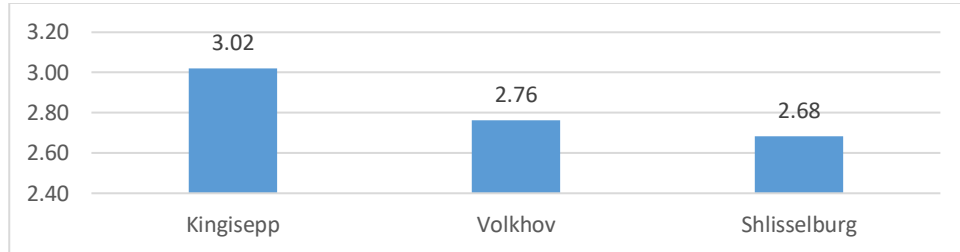
Fig. 3. Overall average DEESG citizen satisfaction score across studied territories

At the same time, comparing Kingisepp and Shlisselburg, one may observe that Shlisselburg has higher scores in economic and ecological components, while Kingisepp has higher social, governance, and digital scores **(Fig. 4)**.
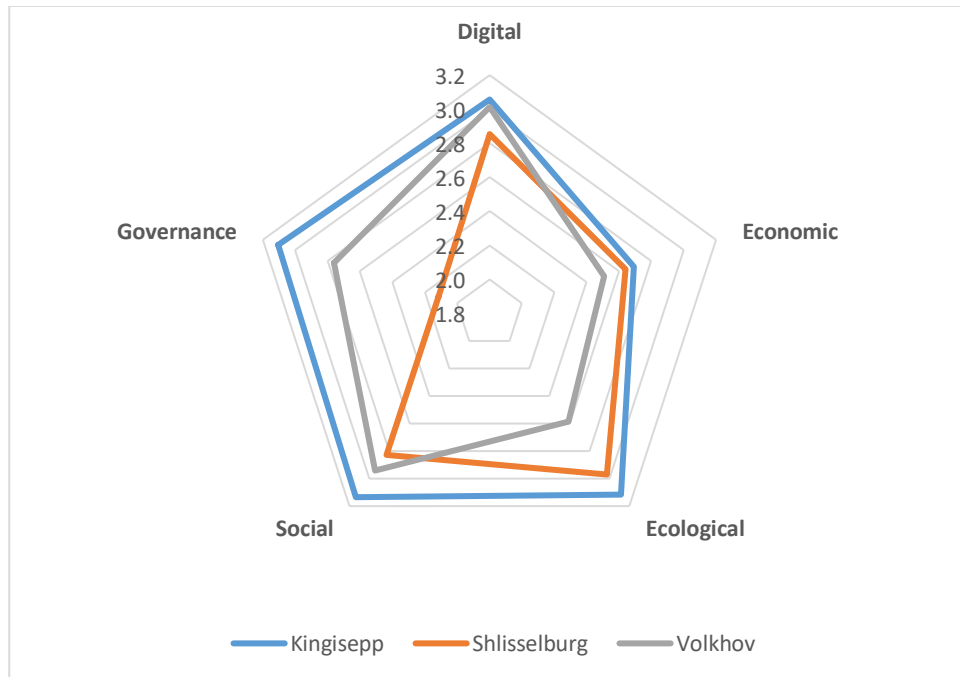
Fig. 4. Average score of citizen satisfaction with each of the DEESG-components across the studied territories

4.4. DEESG Gaps

In this section the needs and activities of the citizens, the businesses and the authorities on the studied territories are compared. To this end, the programs of local authorities, corporate activities of local businesses and the survey of local citizens are analyzed. The latter contain 1 to 5 scales and the average score for given measurements by city are given in brackets. Citizen-related gaps are outlined in the case of satisfaction level below 3.

Volkhov

Volkhov receives the second best DEESG score. The outcomes of SSDM assessment of this territory are given in Table 3. The local businesses and authorities have implemented

comprehensive initiatives for the development of the local territory. However, while the local businesses prioritize environmental protection, the authorities primarily focus on economic development. This discrepancy has led to a situation where citizens are not fully aware of the environmental efforts made by local businesses, and they express dissatisfaction with public services, particularly in areas such as ecology, employment, housing, and healthcare. Residents complain about limited job opportunities and a lack of publicly available vacancies. The healthcare sector meets government regulations, but residents express concerns about staff shortages and outdated equipment in hospitals. The environmental situation in the city is subpar, despite efforts to reduce emissions and preserve biodiversity. It is vital for the authorities to consider these concerns as primary areas of focus.

Table 3. SSDM results: Volkhov

Business - Citizens		
Monitoring results of business	**Revealed gaps**	**Monitoring results of citizens**
Social: • Regular meetings with the population to address their questions and suggestions. • Supplier verification for their compliance with the principles of CSR and purchasing from local producers. • Development and improvement of parks and squares. • Vocational guidance for children. **Ecological:** • Reduction of greenhouse gas emissions. • Implementation of a closed water circulation systems. • Conservation of biodiversity (fish release). • Forest restoration.	• Business contribution to the territory development score: citizens are moderately satisfied with CSR policies of business in the territory of the municipal district (**2.97**) • Weak communication between business and citizens: residents are unaware of the contributions to the environmental conservation of the municipal district (**1.76**) • The citizens are dissatisfied with job access and labor conditions but there no initiatives from local businesses regarding this issue.	Average satisfaction level (from 1 to 5, where 1 refers to completely dissatisfied and 5 to absolutely satisfied) with: • Ecological condition (**1.90**). • Business' contribution to the ecology (**1.92**). • Job access (**2.39**). • Labor conditions (**2.29**).
Business – Municipal public authorities		
Monitoring results of business	**Revealed gaps**	**Monitoring results of municipal authorities**
Social: • Regular meetings with the population to address their questions and suggestions • Supplier verification for their compliance with the principles of CSR and purchasing from local producers • Development and improvement of parks and squares • Vocational guidance for children **Ecological:** • Reduction of greenhouse gas	• Lack of joint efforts of business and local authorities regarding the development of labor market and job opportunities in the territory • Still, the local authorities are not providing adequate support for the numerous incentives aimed at environmental	**Economic:** • Ensuring sustainable functioning and development of the communal and engineering infrastructure and improving energy efficiency. • Developing road networks • Developing small and medium-sized businesses and the consumer market **Social:** • Providing citizens with quality housing

Monitoring results of municipal authorities	Revealed gaps	Monitoring results of citizens
• emissions • Implementation of a closed water circulation systems • Conservation of biodiversity (fish release) • Forest restoration	protection by local businesses	• Developing culture • Developing sports • Ensuring the safety • Sustainable social development • Creating a comfortable urban environment • Supporting youth
Municipal public authorities - Citizens		
Monitoring results of municipal authorities	**Revealed gaps**	**Monitoring results of citizens**
Economic: • Ensuring sustainable functioning and development of the communal and engineering infrastructure and improving energy efficiency. • Developing road networks • Developing small and medium-sized businesses and the consumer market **Social:** • Providing citizens with quality housing • Developing culture • Developing sports • Ensuring the safety • Sustainable social development • Creating a comfortable urban environment • Supporting youth	• Low level of citizens' satisfaction with the work of public authorities (**2.26**) • Low level of citizens' trust to public authorities (**2.15**) • Ineffective policies in housing and public utilities, as well as lack of attention to the healthcare sector from the local authorities	Average satisfaction level (from 1 to 5, where 1 refers to completely dissatisfied and 5 to absolutely satisfied) with: • Public transport service quality (**2.71**). • Housing services quality (**1.73**). • School education quality (**3.23**). • Healthcare services quality (**1.94**). • Local safety (**2.58**).

Shlisselburg

The interaction of stakeholders in the territory is very poorly developed, which is reflected in the results of monitoring and evaluation.

Table 4. SSDM results: Shlisselburg

Business - Citizens		
Monitoring results of business	**Revealed gaps**	**Monitoring results of citizens**
Business participation is limited to compliance with environmental standards and participation in the development of the city's economic sphere; social and infrastructure projects are significantly limited	People are dissatisfied with the contribution of businesses to local territorial development (**1.65**). The citizens are unaware of the contributions to the environmental conservation of the municipal district (**1.63**).	Average satisfaction level (from 1 to 5, where 1 refers to completely dissatisfied and 5 to absolutely satisfied) with: • Ecological condition (**2.88**). • Business' contribution to the ecology (**2.00**). • Job access (**1.96**). • Labor conditions (**2.00**).
Business – Municipal public authorities		
Monitoring results of business	**Revealed gaps**	**Monitoring results of municipal authorities**
Compliance with ecological requirements, assistance in economic development and employment opportunities	Lack of business participation in solving infrastructural problems, increased cooperation is required, based on closer contact between local communities.	Despite the presence of development programs, business participation is limited, the assessment of employment availability is still very low in the territory
Municipal public authorities - Citizens		
Monitoring results of municipal authorities	**Revealed gaps**	**Monitoring results of citizens**
The work of government bodies is limited to solving the most pressing problems of the territory. In general, local policy is focused on solving problems for which the population revealed low ratings	The territory has the lowest score for the Governance component, which means the lack of dialog and collaboration between local government and citizens	Average satisfaction level (from 1 to 5, where 1 refers to completely dissatisfied and 5 to absolutely satisfied) with: • Public transport service quality (**3.65**). • Housing services quality (**2.14**). • School education quality (**2.78**). • Healthcare services quality (**2.22**). • Local safety (**3.08**).

Kingisepp

Kingisepp indicated the highest average of DEESG indicators. The results of SSDM application to this territory are given in table 5. Local businesses and authorities have relatively sophisticated programs of local territorial development. However, they are lacking concordance. Local businesses seem to emphasize environmental protection while local authorities focus on economic development. The citizens are on one hand rather unaware of the environmental initiatives of local businesses and on other hand dissatisfied with public services: above all, public transportation, housing, and healthcare. The authorities might consider these as primary areas of concern.

Table 5. SSDM results: Kingisepp

Business - Citizens		
Monitoring results of business	**Revealed gaps**	**Monitoring results of citizens**
Environmental protection: • Introduction of new technologies to reduce ecological footprint in terms of water, air, waste. • Campaigns to increase environmental awareness of population. • Compliance with international environmental standards. • Financing of research towards saving Baltic seals. **Economic sustainability:** • Consulting local agricultural producers about effective fertilizer application. **Social development:** • Measures to increase labor safety. • Incentives to promote creative initiatives of workers. • Campaign to increase road safety. • Case championships and monetary support to school students.	• People are rather satisfied with the contribution of businesses to local territorial development (**3.14**) — the highest result among three studied territories. • However, there is a problem of rather weak communication between business and citizens: residents are unaware of the contributions to the environmental conservation of the municipal district (**2.35**).	Average satisfaction level (from 1 to 5, where 1 refers to completely dissatisfied and 5 to absolutely satisfied) with: • Ecological condition (**2.85**). • Business' contribution to the ecology (**2.86**). • Job access (**2.98**). • Labor conditions (**2.91**).
Business – Municipal public authorities		
Monitoring results of business	**Revealed gaps**	**Monitoring results of municipal authorities**
Environmental protection: • Introduction of new technologies to reduce ecological footprint in terms of water, air, waste. • Campaigns to increase environmental awareness of population. • Compliance with international environmental standards. • Financing of research towards saving Baltic seals. **Economic sustainability:** • Consulting local agricultural producers about effective fertilizer application. **Social development:** • Measures to increase labor safety. • Incentives to promote creative initiatives of workers. • Campaign to increase road safety. • Case championships and monetary support to school students.	• Numerous incentives of environmental protection from local business lack support from the local authorities. • Local businesses are insufficiently involved into the development of local entrepreneurship and comfortable living environment. • At the same time, the local authorities have potential to follow up local businesses in promotion of creativity.	**Economic growth:** • Development of the logistics complex and industrial clusters. • Development of the agro-industrial complex. • Development of commercial services. **Comfortable environment:** • Development of comfortable housing. • Development of microdistricts. • Development of modern public spaces. **Modern infrastructure:** • Development of the social sphere. • Development of the transport system. • Development of the fuel and energy complex and public utilities.

Municipal public authorities - Citizens		
Monitoring results of municipal authorities	**Revealed gaps**	**Monitoring results of citizens**
Economic growth: • Development of the logistics complex and industrial clusters. • Development of the agro-industrial complex. • Development of commercial services. **Comfortable environment:** • Development of comfortable housing. • Development of microdistricts. • Development of modern public spaces. **Modern infrastructure:** • Development of the social sphere. • Development of the transport system. • Development of the fuel and energy complex and public utilities.	• Mediocre level of citizens' satisfaction with the work of public authorities (**2.87**) • Insufficient level of citizens' trust to public authorities (**2.77**) • Low attention towards public transportation, housing, and healthcare from the local authorities.	Average satisfaction level (from 1 to 5, where 1 refers to completely dissatisfied and 5 to absolutely satisfied) with: • Public transport service quality (**2.40**). • Housing services quality (**2.64**). • School education quality (**3.05**). • Healthcare services quality (**2.44**). • Local safety (**3.14**).

5. Conclusions and recommendations

Application of SSDM allowed us to spot the gaps in territorial development from the stance of three stakeholder groups: the citizens, the businesses, and the authorities. On all the studied territories, the citizens occur to be unaware of the contribution of local businesses to territorial development which indicates the problem of poor corporate governance and lack of transparency. Businesses could undertake more efforts to communicate their policies and involve local citizens in their design and implementation. Another major gap is lack of cooperation between business and authorities. Except for Shlisselburg, the latter barely consider communicating with the former to trace the development of the territory. In addition, there is a lack of authorities' concern and communication about environmental policies of local enterprises. In addition, we were able to identify the areas of concern of public service. Citizens tend to be dissatisfied above all with housing and healthcare, which could become the primary areas of concern for the local authorities. All three territories indicated poor governance from local authorities implying poor communication and citizen involvement.

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The Main Problems of Implementing the Concept of "Smart Cities" in Russia

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Abstract:
This article discusses the concept of a «smart city» and the challenges that arise when introducing such cities in Russia. The authors describe the reasons why Russian cities face difficulties associated with the creation of «smart cities». The article also examines international and domestic experience in introducing «smart cities». According to the authors, technological innovation, the development of management systems, the creation of an ecosystem and the needs of a particular city are important factors in the successful implementation of the concept of «smart cities». In addition, the article suggests ways to solve problems in implementing the concept and provides recommendations for creating «smart cities». The authors believe that it is necessary to conduct training courses on digital literacy for citizens, develop a program for the development of urban infrastructure, allocate more funding for project implementation. In addition, it is necessary to develop a program to improve the skills of specialists involved in the creation of «smart cities», as well as a program of grants for special achievements in this field.

Keywords: *smart city, big data, internet of things, artificial intelligence.*

Introduction
Modern Russian cities are forced to adapt to a new development model based on high technologies, innovations and human capital. Gradually, cities are turning into intelligent systems where population growth is causing various problems in social, economic, environmental and other spheres. Digital transformation affects all areas of the city's functioning, such as healthcare, education, energy, transport and resource management.

Increasing the burden on urban infrastructure and new requirements for its efficiency make intellectualization vital, so the concept of a "smart city" becomes necessary for the survival of cities. Population growth leads to traffic jams, environmental degradation, an increase in the number of crimes and a decrease in the quality of life of residents. Smart city technologies can solve these problems and make life in cities more comfortable and safe.

However, on the way to the creation of "smart cities" there are a number of problems and challenges that complicate the process of implementation and development of this concept.

Many countries are already actively implementing the concept of "smart cities", and this experience can be useful for the development of "smart cities" in Russia.

In this article, the authors consider the main problems that Russian cities face when implementing the concept of "smart cities". The authors also analyzed the experience of various countries and cities that are already successfully implementing the concept of "smart cities". Based on the analysis, the authors propose ways to solve these problems and recommendations for creating "smart cities" in Russia.

Relevance
The implementation of the "smart city" concept in Russia began in 2017, when the federal program "Digital Economy" was adopted. The program aims to develop IT technologies, improve the quality of life for citizens, and increase the efficiency of urban resource management.

The situation with the introduction of "smart cities" in Russia is quite specific. On the one hand, Russia pays great attention to the development of "smart cities" and the introduction of new technologies into urban infrastructure. On the other hand, the introduction of "smart cities" in Russia faces many problems that complicate this process.

Examples are Kazan, Ufa, Moscow. In Kazan, after several years of work on the concept, problems arose due to the lack of innovation and the slow pace of the introduction of new technologies. In Ufa, the project faced funding problems and a shortage of qualified employees. In Moscow, encountered problems in creating an infrastructure to improve urban transport based on the Internet of Things and Big Data technologies. There were also difficulties integrating various information systems and ensuring data transmission security.

Research question and methods
The research is aimed at studying the aspects of the introduction of "smart cities" in Russia and the world, identifying the difficulties that Russia faces in implementing the concept by hypothesizing and inductive reasoning, as well as developing a strategy for the development of the concept using the comparison method.

The analysis was carried out on the basis of international and domestic experience in the introduction of "smart cities". Among foreign countries, the following countries are successfully and effectively implementing the concept: China, Great Britain, Norway, Japan, South Korea and the Netherlands. In Russia, bright examples are Moscow, St. Petersburg, Kazan, Voronezh, Ufa.

One of the main objectives of the study is to answer the question: What are the existing reasons for problems in implementing the concept in Russian cities?

The implementation of "smart city" concepts requires significant investments, which is one of the main problems with implementing this concept. Not all cities can allocate a sufficient amount of money to create infrastructure and introduce new technologies. In addition, many cities lack the funds to maintain and operate the systems that have already been installed.

The development and implementation of new technologies requires the availability of qualified specialists, and a lack of personnel could be one of the major problems that could hinder the implementation of the smart cities concept. A lack of qualified specialists could also lead to delays in the development and implementation of new technologies.

In many Russian cities, it is necessary to update the urban infrastructure in order to introduce new technologies.

The implementation of "smart city" concepts requires the participation and support of the population, and a low level of digital literacy among the population could make it more difficult to implement the smart cities concept. Residents may not understand the benefits of new technologies, be unable to use them, or lack access to them.

The results to be reported

Foreign experience in implementing the "smart cities" concept shows that such cities can bring huge benefits for residents and businesses. "Smart cities" ensure more efficient use of resources, improve the quality of life for residents, ensure safety and convenience in everyday matters.

The key elements of a successful implementation of the "smart cities" concept are technological innovations, the introduction of digital technologies, the development of management systems, and the creation of an ecosystem for communication between urban services and residents.

In addition, foreign experience shows that "smart cities" should be designed taking into account the specific needs of a particular city and its residents. It is necessary to take into account social, economic and environmental factors, as well as to take into account the opinions and needs of residents.

Today, Russia is actively developing smart cities projects and introducing new technologies into urban infrastructure. However, compared to international experience, Russia still has some problems and limitations in this area. Russia is developing pointwise and very slowly in this area, the existing problems do not push to reduce the frequency of their occurrence.

Russia lags behind developed countries in terms of the digital economy index and the overall assessment of digital infrastructure, in terms of knowledge about technologies and qualifications of personnel, in terms of data transmission security and privacy of citizens.

Thus, it is necessary to take measures to reduce the occurrence of problems, as well as to form a plan for the development of Russia in the field of "smart cities".

According to the authors of the article, in order to reduce the frequency of problems with the introduction of "smart cities" in Russia, it is necessary:
conduct mass training courses on digital literacy of the population;
develop a professional development program for personnel involved in this field;
develop a program for the development of urban infrastructure to enable the implementation of smart city technologies ("Internet of Things", "Big Data");
implement a grant program for a special contribution to the development of this field;
allocate more funding for the implementation of projects on the introduction of "smart cities".

Based on the analysis, the authors propose the following recommendations for the creation of "smart cities" in Russia:

Development of a detailed urban development plan: it is necessary to develop a plan for the creation of "smart cities" that will take into account the specifics of Russian conditions and the needs of the population;

Budget planning: it is necessary to plan a budget for the creation of "smart cities" based on a development plan, taking into account risks, deadlines and qualifications of specialists and attract additional investments from various sources;

Creation of innovation clusters: it is necessary to create innovative clusters that will contribute to the development of smart technologies in urban infrastructure;

Attracting international experience: it is necessary to attract international experience and expertise in the field of "smart cities" to adapt the best practices and technologies to Russian conditions;

Creation of partnerships: it is necessary to create partnerships between the state, business and the population for the development of "smart cities". This will allow the most efficient use of resources and optimize processes.

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Towards City Sustainable Road Safety: Road Traffic Accident Severity Classifier Using Machine Learning Methods

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Abstract:
Road traffic accidents are a significant public health issue with substantial economic and social implications. While previous studies in Russia have employed machine learning models to address this challenge, the accuracy of these models has often been unsatisfactory. This study aims to improve model accuracy by addressing imbalances in datasets regarding different injury types. Utilizing KNN, Naive Bayesian, Decision Tree, Random Forest, and Gradient Boosting Classifier methods, along with the Synthetic Minority Over-sampling Technique (SMOTE), we processed a dataset containing information on 68,065 accidents that occurred from January 2015 to February 2023 in Moscow. Notably, our random forest model achieved an accuracy of 86%. The findings from this study are pivotal for promoting sustainable road safety in urban areas, enabling the identification of high-risk zones and the implementation of targeted interventions to minimize accidents.

1. Introduction

Road traffic accidents remain a major global public health concern, leading to substantial loss of life and economic impact. Despite global advancements that have reduced accident rates, certain regions, especially when compared to developed countries, still experience high incident rates. An illustrative example of this situation is Russia. According to Rosstat (2022), there was an estimated injury rate of 115 people per 100 thousand in 2021, translating to roughly ten fatalities daily—a concerning figure that calls for immediate and effective interventions. Since 2013, the Russian Federation has initiated road safety measures ranging from infrastructure enhancements to advocating for safer driving habits. However, the desired results are yet to be realized. In the quest to understand and address this ongoing problem, researchers have explored various methodologies. Machine learning has risen to prominence in this domain due to its ability to process large datasets and identify patterns. While studies like those by Donchenko *et al.* (2020) have employed machine learning, there's potential to further enhance model accuracy. This study aims to address the imbalances in datasets, a recognized contributor to prior model inaccuracies. By utilizing a comprehensive dataset from January 2015 to February 2023 in Moscow and applying the Synthetic Minority Over-sampling Technique (SMOTE), we have refined our approach. The rest of this paper is organized as follows: Section 2 summarizes related works. Section 3 provides details on our methodology and dataset. Our experimental results are discussed in Section 4, and conclusions are drawn in Section 5.

2. Literature Review

The federal target program's objectives have spurred significant scholarly interest in the domain of road traffic accidents. A plethora of studies has endeavored to decipher the underlying causes and mechanisms that govern these unfortunate incidents. Rodionova *et al.* (2022) conducted a meticulous study centered on Saint-Petersburg, deploying ordered probit regression to delineate the influence of diverse factors on the gravity of road accidents. Their findings

pointed to run-off-road accidents as the most potent determinant, attributing to them an 11.2% surge in fatal incidents. Another compelling observation from their study was the tangible correlation between defective road barriers and a 2.8% escalation in fatalities, implicating infrastructural inadequacies. Sysoev *et al.* (2022), shifting the geographical lens to Lipetsk and spanning the period from 2014 to 2019, harnessed machine learning tools to sift through traffic accident data. Their innovative approach clustered the data into seven distinct categories, painting characteristic profiles of habitual traffic rule offenders. Expanding to a broader regional spectrum, Kapitanov *et al.* (2020) obtained regression equations relating the main indicators of the accident rate to the most relevant factors and assessed the role of each factor under consideration by means of confidence estimates and confidence probabilities. Shifting focus to broader data compilations, a comprehensive study by Donchenko *et al.* (2020) encompassed data from March 2015 to 2018 across Russia, aggregating close to 91,000 instances. Their methodology, which leaned heavily on machine learning paradigms, aimed to devise a predictive model for gauging accident severity levels. Ensemble techniques, notably decision trees, random forest, and gradient boosting, emerged as superior contenders, outstripping other algorithms like logistic regression and Naive Bayes. Within this ensemble subset, the random forest and XGBoost variants showcased exemplary accuracy. It's noteworthy to mention that their dataset, while extensive, was a distilled version from an initial corpus of over 560,000 data points. They too acknowledged potential improvements in future iterations, particularly by incorporating oversampling techniques.

In the arena of machine learning, addressing imbalanced datasets remains a pivotal concern. Sáez *et al.* (2016) ventured into this domain, suggesting an intricate method of segmenting individual class subsets and then meticulously applying oversampling to each. Their approach proved particularly effective when compared to standard multi-class preprocessing methods. This emphasis on balance finds a profound echo in road safety analytics. (Schlögl et al., 2019) treated accident data as a binary classification challenge, harnessing both synthetic minority oversampling and maximum dissimilarity undersampling to refine their dataset from Austria's highways. Their findings bolstered the efficacy of tree-based algorithms, registering accuracy rates between 75% and 90%. Beryl Princess *et al.* (2021) further spotlighted the challenges of imbalanced datasets in road safety. Highlighting the disparities between serious and minor injury rates, they advocated for the Synthetic Minority Oversampling Technique (SMOTE) to equilibrate the dataset. Their subsequent evaluations underscored the superior performance of the random forest model, which exhibited impressive metrics across various parameters.

3. Method and data

3.1 Data Source and Collection

Our study leveraged a dataset procured from the official Traffic Police website (https://dtp-stat.ru/), encompassing data on 68,065 traffic accidents recorded in Moscow between January 2015 and February 2023. This comprehensive dataset captures diverse attributes related to traffic accidents, ranging from temporal variables like the day and time to intricate details concerning the individuals involved and the conditions under which the violations occurred. It's important to note that our dataset specifically focuses on the injury severity of drivers involved in traffic rule violations. The motorcyclists, cyclists, and pedestrians have been excluded from this sample.

For clarity, the core variables extracted from the dataset are:
• weekday: Day of the week (represented numerically as 1 to 7)
• hour: Time of the accident, captured hourly (0 to 23)
• gender: Gender of the individual who violated the traffic rules
• driving_experience: Years of driving experience of the rule violator
• region: Specific region in Moscow where the accident transpired
• weather: Prevailing weather conditions during the accident (e.g., cloudy, sunny, rainy, snowy, etc.)

- light: Ambient lighting conditions during the accident (categorized as daylight, twilight, night with/without lighting)
- road_conditions: Status of the road during the accident
- vehicle_color: Color of the vehicle involved
- vehicle_brand: Brand of the vehicle
- vehicle_year: Production year of the vehicle

3.2 Data Preparation and Model Training

From the total dataset, 90% was earmarked for training our model, leaving 10% for testing and validating its performance. A glaring challenge in our data was the evident imbalance in accident severity categorization; the "slight" category eclipsed others with thrice the data points as "severe" injuries and had a whopping sixteen times the data points for 'fatal' accidents.

To rectify this imbalance and avoid skewed predictions, we employed the Synthetic Minority Oversampling Technique (SMOTE). This technique involved bolstering the other classes by oversampling. Our programming language of choice was Python. Drawing upon the results from previous literature, in this paper, we have selected five machine learning methods for modeling: KNN, Naive Bayes, Gradient Boosting, Decision Trees, and Random Forest. Post training, model efficacy was gauged using an array of metrics: a confusion matrix, accuracy, precision, recall, and the F1 score.

4. Results

4.1 Performance Evaluation Post-SMOTE Balancing
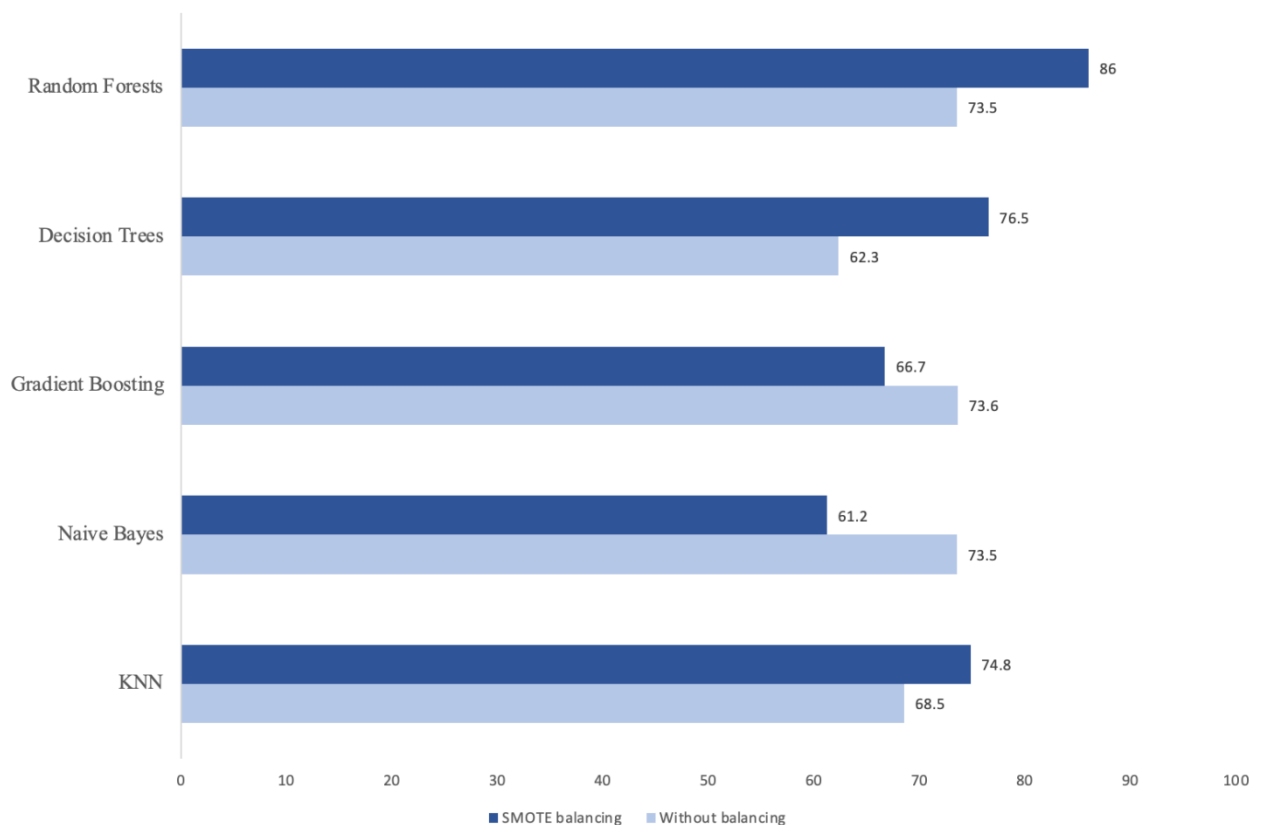
Figure 1. Comparison of Machine Learning Model Accuracy with and without SMOTE Balancing

We conducted preliminary tests using KNN, Naive Bayes, Gradient Boosting, Decision Trees, and Random Forest. Initial results indicated comparable performance for Gradient Boosting, Naive Bayes, and Random Forest, each achieving accuracies in the vicinity of 73.5%. To enhance our results, we employed the SMOTE method to balance the dataset. Upon retesting with this balanced data, the Random Forest model exhibited a marked improvement, achieving an accuracy of 86%.

Table 1. Performance comparison of classifier models from imbalanced dataset

Model	Precision	Recall	F1 Score
KNN	0.39	0.36	0.35
Gradient Boosting	0.58	0.36	0.33
Naive Bayes	0.52	0.38	0.38
Decision Trees	0.39	0.38	0.38
Random Forest	0.56	0.37	0.35

Table 2. Performance comparison of classifier models from SMOET balancing dataset

Model	Precision	Recall	F1 Score
KNN	0.75	0.75	0.73
Gradient Boosting	0.66	0.67	0.63
Naive Bayes	0.62	0.63	0.60
Decision Trees	0.76	0.76	0.76
Random Forest	0.88	0.86	0.86

In our analysis, we designated 10% of the training set for validation purposes. This subset's variable conditions served as input parameters for the machine learning model. The generated predictions were then juxtaposed against actual outcomes to ascertain the model's accuracy. The model's performance was evaluated using a standard suite of metrics: precision, recall, and F1 score. Table 1 illustrates that, that across both imbalanced and SMOTE balanced datasets, the classifiers show varied performance. When examining precision, the Random Forests classifier consistently outperforms the other models with a score of 0.56. Naive Bayes follows closely with a precision of 0.52, while KNN and Decision Trees lag slightly behind. In terms of recall, the differences are relatively minimal among the models, hovering around the 0.36 to 0.38 range. The F1 Score, which provides a balanced measure of a model's precision and recall, shows Naive Bayes, Decision Trees, and Random Forests all performing comparably.

In Table 2, which further delves into the performance metrics of each classifier from the SMOTE balanced dataset, it's evident that Random Forests clearly stands out with the highest precision of 0.88, recall of 0.86, and an F1 Score of 0.86, indicating a superior overall performance. Decision Trees also demonstrate commendable results, especially with a balanced F1 Score of 0.76. KNN, while maintaining consistent precision and recall at 0.75, has a slightly lower F1 Score of 0.73. On the other hand, Naive Bayes presents the lowest scores among the set, with precision, recall, and F1 Score values of 0.62, 0.63, and 0.60 respectively. Gradient Boosting offers mid-range scores, fitting between the performance of KNN and Naive Bayes.

The pronounced dominance of Random Forests in this table, reflected in its high scores across all metrics, emphasizes its efficacy as a classifier model, making it an optimal choice for the given dataset. This superior performance of Random Forests aligns well with prior studies, such as those by Bokaba *et al.* (2022) and Santos *et al.* (2021) , which also highlighted the effectiveness of Random Forests in classification tasks. Such consistency reaffirms the robustness of Random Forests as a reliable classifier in diverse datasets.

4.2 Evaluating the Random Forest Classifier
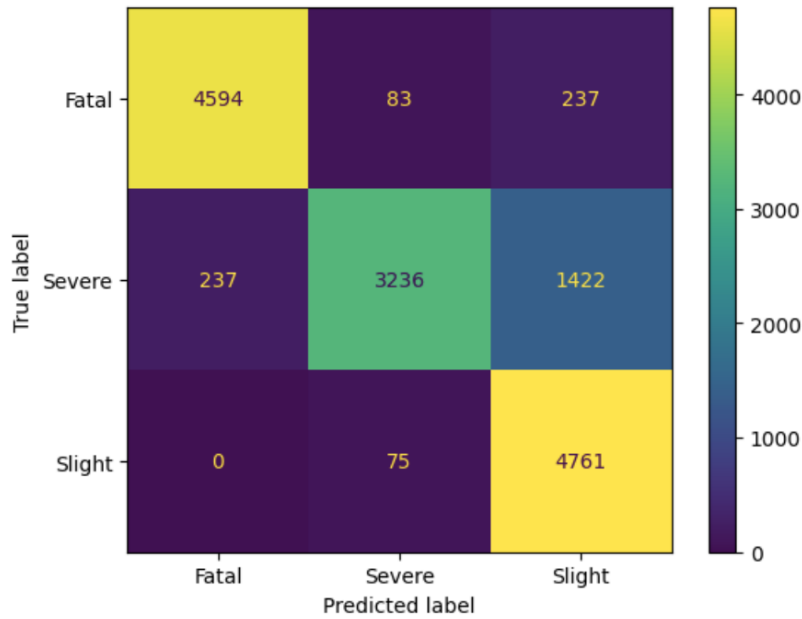
Figure 2. The confusion matrix of Random Forest Classifier

The confusion matrix offers a detailed view of the Random Forest Classifier's performance in predicting varying injury severities resulting from road traffic accidents. This matrix presents counts of true positives, true negatives, false positives, and false negatives for each injury class. The classifier exhibits commendable performance with notable counts of true positives and true negatives across all injury categories. Diagonal entries in the confusion matrix represent the number of correct predictions for each class made by the classifier. For the categories of 'Fatal' and 'Slight' categories, the Random Forest classifier achieved accuracies of 91.8% and 98.5%, respectively. Nonetheless, for the 'Severe' injury category, the classifier's performance was notably lower, registering an accuracy of 66.11%, indicating an area for potential improvement. It effectively predicted the injury types in most instances. In 1422 instances, the classifier misjudged the actual 'Severe' injuries as 'Slight'. While the model performs impressively in many aspects, this discrepancy emphasizes an avenue for further refinement.
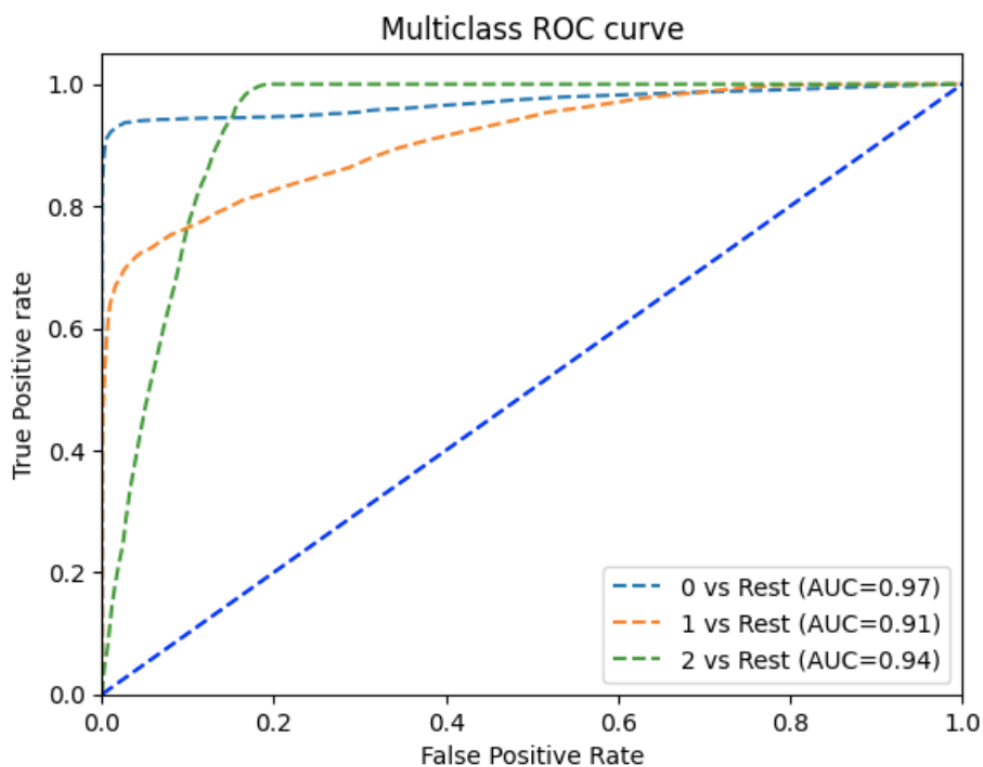
Figure 3. The ROC curve of Random Forest Classifier

Figure 3 shows the ROC (Receiver Operating Characteristic) curve of the Random Forest classifier. The ROC curve is a graphical representation of the performance of a classifier system as its discrimination threshold is varied. It plots the true positive rate (TPR) against the false positive rate (FPR) at various threshold settings. In other words, the ROC curve shows how well a classifier can distinguish between positive and negative classes by plotting the trade-off between sensitivity (true positive rate) and specificity (true negative rate). The area under the ROC curve (AUC) is often used as a measure of how well a classifier performs overall, with an AUC value closer to 1 indicating better performance. Figure 3 displays the ROC curve for the Random Forest Classifier with all its AUC values above 0.9. This indicates that the classifier has excellent performance in distinguishing between different injury types in road traffic accidents.

Lastly, we present the relative feature importance in our model. The figure 4 presents a visualization of the relative importance of various features used in a predictive model. The x-axis denotes the importance scale, ranging from 0.00 to 0.14, with higher values indicating greater relevance to the model's predictions. The most influential feature appears to be 'region', closely followed by 'vehicles year'. Other notable contributors include 'vehicles brand' and 'years'. Towards the lower end of the spectrum, 'light', 'weather', and 'gender' play a comparatively minor roles in the model's decisions. This insight into feature importance can be vital for refining the model and focusing on the most relevant data for future analyses.
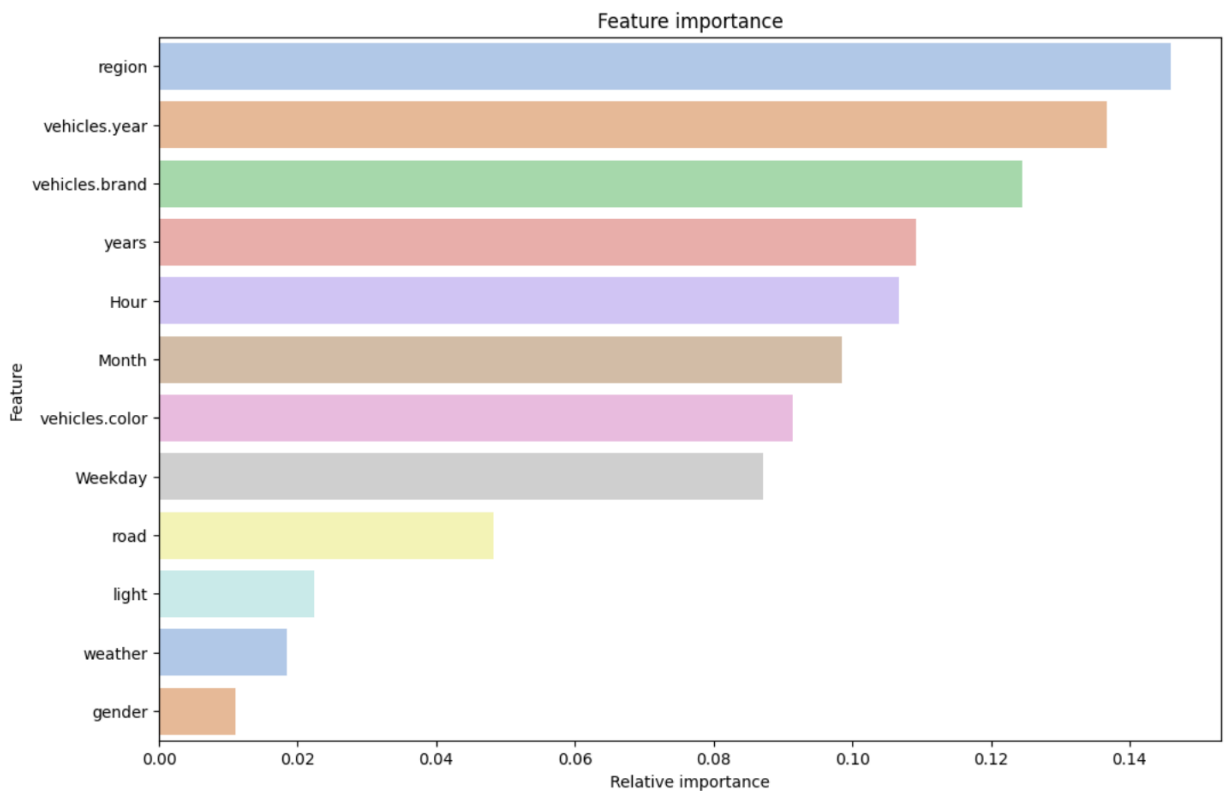
Figure 4. The relative feather importance of Random Forest model

5. Conclusion

Urban regions worldwide face the challenge of ensuring road safety, particularly with the surge in motorized transport. In our endeavor to bolster road safety measures, we meticulously scrutinized a dataset comprising 68,065 traffic accident instances from Moscow spanning January 2015 to February 2023. The analysis employed a battery of classifiers, including KNN, Naive Bayes, Gradient Descent, Decision Tree, and Random Forest.

Our empirical findings underscore the preeminence of the Random Forest (RF) classifier, which, when coupled with the SMOTE technique for imbalanced data handling, achieved a commendable accuracy of 86.0% in predicting accident severity. This result marked a noteworthy improvement, almost 13%, in accuracy compared to the approach delineated by Donchenko et al. (2020). The prowess of our tailored machine learning model holds significant promise, especially for decision-makers, in pinpointing accident-prone zones and enacting informed, strategic interventions. Such data-driven initiatives can indubitably pave the way for safer urban roads. The implications of our investigation are profound for fostering sustainable road safety in metropolitan areas. Harnessing the power of our models can empower urban planners and legislators to discern patterns, preempt accidents during high-risk windows, and devise efficacious countermeasures. This proactive approach not only curtails the adverse consequences of accidents but also begets tangible economic dividends by diminishing associated medical expenses, infrastructural damages, and the economic toll of lost labor hours.

Our dataset's geographical limitation to Moscow underscores the need for boarder data to refine the model's precision further. Cutting-edge techniques like neural networks and advanced machine learning algorithms, as highlighted in studies by Chakraborty (Chakraborty et al., 2021) and (Kumeda et al., 2019), warrant further exploration. Enriching the model with variables like lane dimensions, real-time traffic metrics, and vehicular flux could further elevate its predictive capabilities, making our roads safer for all.

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Smart Cities in China: Comparative Analysis within Cluster Development

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Abstract:
The current rate of urbanization in developed and emerging countries requires reshaping the systems of urban management, resource optimization, sustainable development. The introduction of the concept of smart cities, which involves the use of technologies, the most advanced integrated systems to standardize and optimize decision making, foster economic development, is currently the most cutting-edge strategy. One of the countries most affected by this phenomenon is China. The goal of the study is to examine the development trends of 5 Chinese clusters within the context of the relations between smart city components. Emissions from the data sample were gathered and examined after the PCA analysis. Most often, the first-tier cities in three clusters —Jing-Jin-Ji, Yangze River Delta, Greater Bay Area — are the sources of the observed emissions. The study's findings show that these cities are the cores of the clusters, and their development has been nearly consistent across the studied regions.

Keywords: *Smart city clusters, information technology, principal component analysis, development pattern, China.*

1. Introduction

Currently, the pace of urban population growth is rising year after year. Therefore, 55.3% of the world's population in 2018, as reported by the UN, and 68% of it in 2050, are predicted to reside in cities[1].

This fact prompts cities to be put to the test, necessitating their development and thorough optimization of urban infrastructure.

Our daily lives have long incorporated innovation in all its forms. In recent decades, there has been a clear global trend towards the use of IoT, AI, blockchain, and many other technologies in the field of urban administration with the goal of establishing the unified digital ecosystem (Kim et al. 2017). The COVID-19 pandemic brought this issue to light, and several aspects of the smart city have made it possible to manage and prevent the spread of illness (Allam and Jones 2020). All of this suggests that, given current circumstances, the digitalization of more cities is unavoidable.

There are more and more smart cities popping up around the world, and the ways in which they develop are also continually evolving. Various features and elements of smart cities are discussed in academic papers and government publications.

As a result, most studies on smart cities focus on technological aspects, with an emphasis on electronic and digital technologies (Cocchia 2014; Kitchin 2015), or they use adaptive approaches, which treat cities as complex systems (Lombardi et al. 2012; Lom and Pribyl 2021).

Concerns about the concept of smart cities' uncertain impact on citizens' lives are being stated more frequently since many technologies serve the function of monitoring and controlling society without it always being aware of it, therefore invading into people's private lives (Zhang et al. 2017; Ismagilova et al. 2022).

The People's Republic of China (PRC) has experienced a fast urbanization of its population during the past 40 years. The country's urban population has increased from 19% to

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[1] 2018 Revision of World Urbanization Prospects. Multimedia Library - United Nations Department of Economic and Social Affairs. [online]. Available at: URL: https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html [Accessed 23 March 2022]

61% of the total population since 1980, according to the World Bank[2]. Due to this trend, China faces a big obstacle in promoting sustainable urban development (Li et al. 2020).

Evaluation of the relations between smart city components (SCC) is crucial for the qualitative stimulation of projects in this field. Many estimating techniques, however, lack objectivity and can't offer a thorough quantitative examination. Their implementation has flaws, such as the absence of thorough empirical research on smart city initiatives and similar studies comparing the development of various regions while taking the heterogeneity of regional characteristics, the informatization of infrastructure, and economic factors into account.

The goal of the study is to examine the level of maturity and developmental trends of 31 significant SCCs in China within the context of the cluster development. The authors create a research inquiry: What are the general growth trends and comparative advantages of Chinese SCCs?

2. Relevance of the paper to the track topic

2.1. Concept of smart-city and its components

The concept of a smart city did not appear overnight and spontaneously; rather, it developed over time in line with the paradigms of urban development (Haughton 1997). The idea first surfaced in the 1970s, and it has since progressed through three major stages: the "competitive city", "sustainable city", and "smart city" (Hu 2017) (Table 1).

Table 1. Smart city concept development

Conceptual stage	Years	Driving factors	Priority policies
Competitive City	1970's	Globalization, neoliberalism	Increasing the competitiveness of cities, economic growth
Sustainable city	1990's	Environmental and social issues	Increasing the competitiveness of cities, economic growth Resilience of cities, sustainable development with environmental protection and social justice
Smart city	2010's	Technological breakthrough, knowledge economy	Smart cities, innovation

Source: compiled by the authors

The idea of a smart city aims to guarantee sustainable growth in the quality of life of citizens, to create a favorable business climate, to enable centralized and most importantly transparent city management, as well as to increase the efficiency of public spending. In other words, a smart city is first and foremost a city for people, where everyone takes part in managing it using digital technologies like artificial intelligence, which have a bridging effect across all domains (Miah et al. 2022).

The subject of evaluating the relationship between key SCC and the potential for comparing their qualitative attributes emerges with the establishment of a growing number of smart cities throughout the world (Nam and Pardo 2011).

The approach, which identifies the adoption of intelligent technology as the main force behind the city's sustainable growth, is relevant and usable for comparison studies or for focusing on specific SCC. Although plainly necessary, ICT-based infrastructure is insufficient for the development of smart cities (Bifulco et al. 2016).

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[2] Urban population – China. The World Bank. [online]. Available at: URL:
https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=CN [Accessed 23 March 2022]

But as a city cannot be referred to as "smart" if it overlooks the social aspects of its residents' lives, such framework projects have drawn criticism due to their emphasis on the industrial sector and the national level (Jo et al. 2021). Quality of life, public services that encourage sustainable development, and cutting-edge services that speed up economic development define a socially oriented smart city (McFarlane and Söderström 2017).

Another approach highlights how crucial it is for the four SCC — politics, citizens, science, and private businesses — to cooperate and depend on one another. The issue of current ICT technologies that enable ecosystem users, stakeholders, socioeconomic and political agents to take part in the creation of economic value and the solution of social issues with the aid of local entrepreneurs was also brought up (Sarma and Sunny 2017).

One of the central topics in scientific discourse is evaluation of how well the key components of smart cities interact with one another. Most academics use social, economic, and environmental impact parameters to evaluate and rank cities.

Of course, there are a variety of viewpoints on the fundamentals and elements of smart city assessment, but the focus continues to be more on cutting-edge technological solutions than on indications of sustainable growth. It is challenging for the current assessment methods to appropriately address the current smart city situation in China.

Regression econometric models are typically built in order to evaluate the relationship between variables or to highlight the influence of variables on the outcome factor. However, in this study, to evaluate the relationship between the SCC in China by three factors, namely technological, smart economy, and intellectual infrastructure (Table 2), the principal component analysis method (PCA) was applied to reduce the number of indicators, in contrast to the method of modeling structural equations.

The value added of high-tech industrial products is one of the representative and quantitative indicators in the technology component. Employment in IT and software development, spending on S&T, and spending on R&D explain the input of innovative resources, innovative goods in urban areas. A thorough evaluation of a smart economy must consider both local innovative entrepreneurship and sustainable development indicators, as well as how cities participate in the global economy, particularly in high-tech areas. The progress and caliber of the information and services the state offers its residents are attested to by the intelligent infrastructure system and ICT-based services. The evaluation's goal is to contrast the many traits of each smart city's sustainable and intelligent growth plan.

3. The research question and methods
3.1. Principal component analysis (PCA)

Principal component analysis (PCA), a widely used statistical processing approach, provides a useful way to derive information and depict pattern from linear combinations of initial variables that rely on correlation matrix.

The eigenvalues and related eigenvectors of the covariance matrix are discovered to derive the components. The first principal component, which captures most of the data variability and represents a rotation of the original data along an axis describing the widest spread, is the component with the largest associated eigenvalue. The remaining components and the components with the second-largest variance reveal residual variability that is unrelated to the initial component (Hansmann 2012).

First, various new uncorrelated indicators that can reflect the progress of sustainable smart cities are specified as $Y_1, Y_2, \ldots Y_m$ to avoid unnecessary repeating computation.

Consider the $(n \times p)$ dimensional data matrix X of n cities and p smart city components variables; these new indicators can be embodied via a linear combination called the principal components, as shown in Eq. 1.

$$Y = \begin{cases} y_1 = \alpha_{11}x_1 + \alpha_{12}x_2 + \cdots + \alpha_{1p}x_p \\ y_2 = \alpha_{21}x_1 + \alpha_{22}x_2 + \cdots + \alpha_{2p}x_p \\ y_m = \alpha_{m1}x_1 + \alpha_{m2}x_2 + \cdots + \alpha_{mp}x_p \end{cases} \quad (1)$$

Second, the raw index values could not be employed directly in the computation due to the diverse data sources, data kinds, and dimensions of evaluation indicators (Kolenikov and Angeles 2004). To increase the network's ability to generalize, the index data were normalized and transformed into dimensionless data from 0 to 1 (Eq. 2) Another formula is used to calculate negative indices (Eq. 3) , where $\tilde{x}_j$ is the uniform data of the j th index; x_j is the original value of the j th index; x_{minj} is the minimum value of the original value of the j th index; and x_{maxj} is the maximum value of the j th index.

$$\tilde{x}_j = {x_j - x_{minj}}\big/{x_{maxj} - x_{minj}} \quad (2)$$

$$\tilde{x}_j = {x_{maxj} - x_j}\big/{x_{maxj} - x_{minj}} \quad (3)$$

Calculating the variance covariance matrix $R_{p \times p}$ for data matrix $X_{n \times p}$ is the third step. Calculating the eigenvalues $\lambda_i (i = 1,2 \cdots, p, \ i < p$ from equation $|\lambda I - R| = 0$, the eigenvectors α_p of variance covariance matrix $R_{p \times p}$ are calculated by formula (Eq. 4).

$$(R - \lambda_{pI})\alpha_p = 0 \quad (4)$$

Defining the contribution rate ${\lambda_i}\big/{\sum_{i=1}^{p} \lambda_i}$ and the cumulative contribution rate ${\sum_{i=1}^{m} \lambda_i}\big/{\sum_{i=1}^{p} \lambda_i}$ is the fourth step.

The fifth step is to calculate the scores of the principal components for each city k as shown in Eq.5.

$$F_k = \alpha_{i1}x_1 + \alpha_{i2}x_2 + \cdots + \alpha_{ip}x_p ; (i = 1, 2, \cdots, m; \ k = 1, 2, \cdots, n) \quad (5)$$

The normalization of city development performance, represented as Eq. 6, is the sixth step.

$$PCA(k) = {\sum_{i=1}^{m} \lambda_i}\big/{\sum_{i=1}^{m} \lambda_i} \times F_k \quad (6)$$

3.2. Data

This research was conducted in the context of smart cities in China. The selection of the cities as the study context is justified as follows: (a) cities included in 19 clusters of smart cities (13th Five Year Plan for Economic and Social Development); (b) the cities are preliminarily completed the smart concept and practices.

The research used the following secondary sources to gather and analyze data: (a) online resources were adopted to obtain data from the China Statistical Yearbook[3] and the Yearbook of China Information Industry[4]; (b) the National Economy and Society Developed Statistical Bulletin[5], and the official website of the municipal government. It should be noted that Hong Kong and Taipei were not included in the sample due to methodological features.

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[3] National Bureau of Statistics of China, 2020. China Statistical Yearbook. China Statistical Press, Beijing. [online]. Available at: URL: http://www.stats.gov.cn/tjsj/ndsj/2020/indexeh.htm [Accessed 23 March 2022]

[4] Yearbook Editorial Board, 2016. Yearbook of China Information Industry. Publishing House of Electronics Industry, Beijing.

[5] 2020 Statistical Bulletin on the Economic and Social Development. [online]. Available at: URL: http://www.zj.gov.cn/art/2020/8/12/art_1229216136_54388053.html [Accessed 21January 2022]

The assessment framework's goal is to examine each city's many aspects from the perspective of its development pattern, not to rank the cities. Table 2 displays descriptive data with mean and standard deviation for the fifteen original indicators of the thirty-one smart cities. The subsequent research is built on these original facts.

Table 2. A system of indicators for assessing the relationship of smart city components and their descriptive statistics

Factor level	Explanatory level	Operating indices	Unit	Symbol	Mean	S.D.
Technology	Innovative resources	R&D expenditure	10^4 yuan	T1	4506806.16	5787831.25
		Employment in IT and software development	10^3 person	T2	14.67	19.04
		S&T expenditure	10^4 yuan	T3	192.08	239.74
	Output of innovations	High-tech industries output	10^4 yuan	T4	10200.47	9753.51
Smart economy	Productivity	GDP, per capita	yuan/person	EC1	69235.06	32698.43
		Share of high-tech industries in GDP	%	EC2	53.66	7.53
	Global trade participation	Enterprises with foreign direct investments	number	EC3	3786.87	5990.43
		Software export	10^4 yuan	EC4	119.88	294.93
		Export of enterprises in the high-tech industry development zone	10^3 yuan	EC5	13343827.81	22182784.49
	Entrepreneurship	Enterprises in the high-tech industry development zone	number	EC6	4553.13	5672.36
Intellectual infrastructure	Public facilities	Postal services business volume	10^3 yuan	I1	523.54	938.11
		Telecom services business bolume	10^3 yuan	I2	3439.78	2403.65
		General construction expenditure	10^3 yuan	I3	80142990.55	73187452.03
		Added value through construction	10^3 yuan	I4	2280.19	1731.86
	Internet penetration	Number of domain names	number, 10^3	I5	161.54	168.59
		Number of web pages	number, 10^3	I6	960741.66	2151089.83
		IPv4 addresses	number, 10^3	I7	996.27	1581.14
		Broadband Internet subscribers	number, 10^3	I8	1449.29	1014.24

Source: compiled by the authors

3.3. Principal component analysis

A 31×15 assessment matrix that incorporates the technologically based social, economic, and technologic elements of sustainable smart cities was constructed and converted into a collection of uncorrelated principal components based on statistical data collecting. A correlation matrix of the initial operational indicators was created for each data set.

The proportions of variation explained by the principal components were subsequently determined for each of the three data sets and visualized. Graphs showing the link between the two core components for each vector were constructed, which allowed for a comparison of the

numerous attributes of each smart city (Fig. 2, Fig. 3, Fig. 4). The factors loadings of the first six principal components after maximal variance rotation are shown in Fig 1.

It can be seen in Fig. 1 that PC1 (the first principal component) and PC2 (the second principal component) jointly account for more than 80% of the sample variance for each of the directions, indicating the appropriateness of employing solely PC1 and PC2 in further analysis.

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8
Technology	0.8242	0.1503	0.02056	0.00498				
Smart economy	0.7079	0.1857	0.0519	0.0376	0.0088	0.0081		
Intellectual infrastructure	0.6269	0.2221	0.0707	0.0465	0.0215	0.0061	0.0044	0.0017
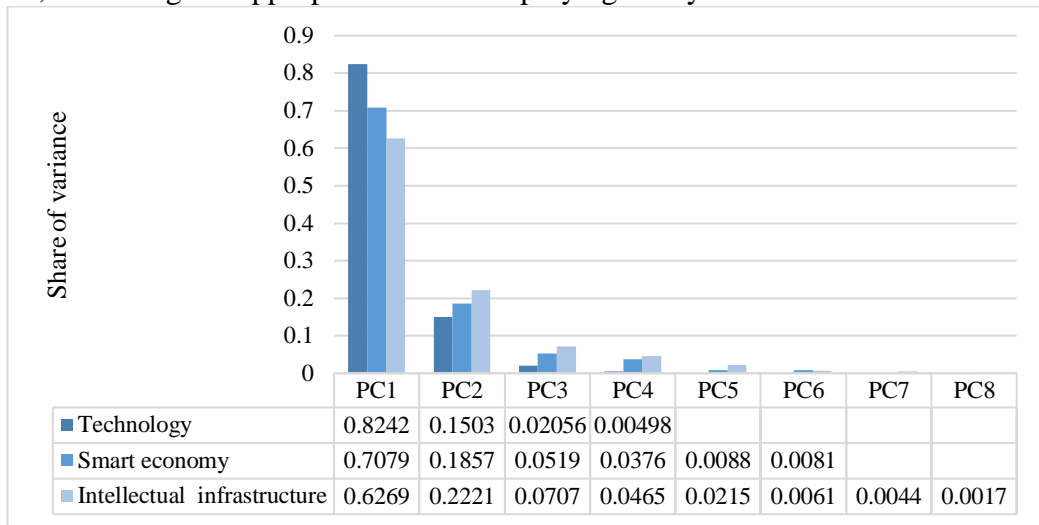
Fig. 1 Factors loadings of the first six principal components

4. The results to be reported
4.1. China smart city clusters

Nineteen clusters of supercities were defined in the 13th Five-Year Economic and Social Plan, which will account for nearly 80% of the whole Chinese GDP. Within the research the authors examined five significant clusters as they contain 97 cities with a combined population of 539 million people, an area of 986,000 km2, and a GDP of 38,277 billion yuan (about 40% of China's overall GDP).

Jing-Jin-Ji City Cluster

Yangze River Delta City Cluster

Greater Bay Area City Cluster

Chengdu-Chongging City Cluster

Middle Reaches of Yangze River City Cluster

1 2 3 4 5   Tiers of smart cities (according to business attractiveness rating developed by the China Development Research Foundation)[6]
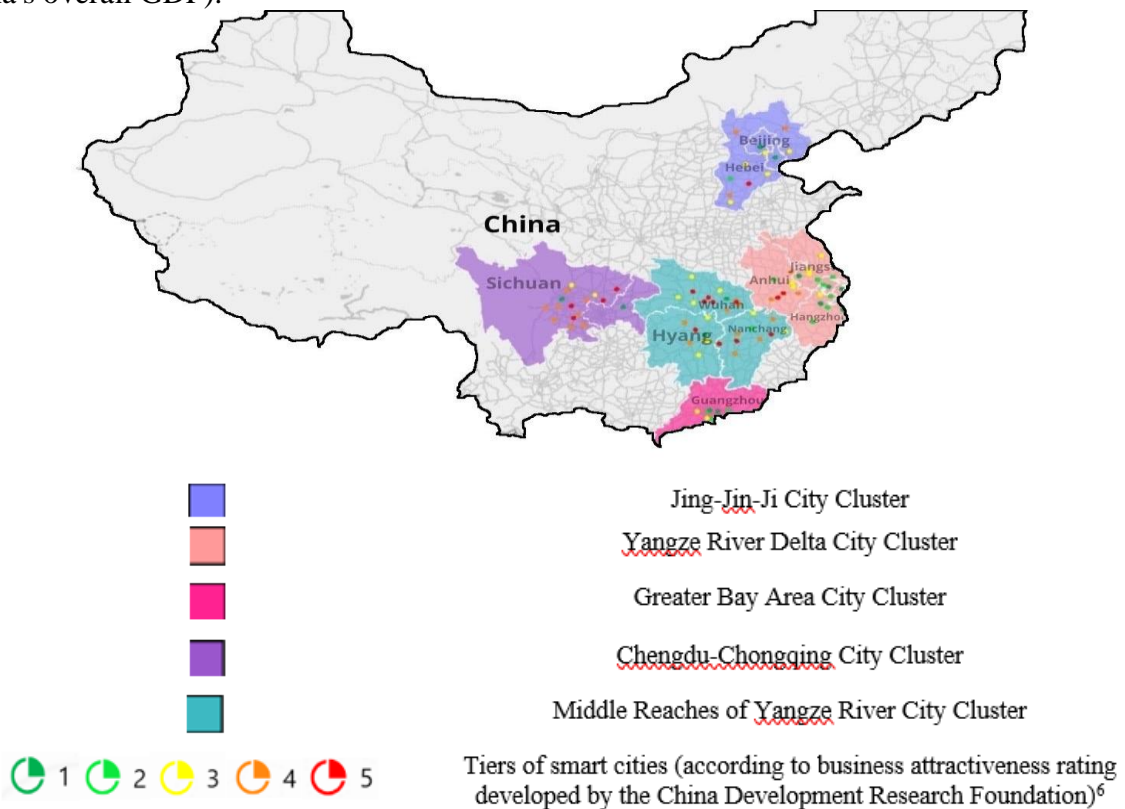
Fig. 2 Smart city clusters in China

The highest concentration of smart cities is observed in the Middle Reaches of Yangze River and Yangze River Delta clusters, but the cities in them have qualitative differences (Fig. 2). Another characteristic is that key clusters are concentrated in Southeast China along the Yangze River. Three key clusters—Jing-Jin-Ji City Cluster, Yangze River Delta City Cluster, and Greater Bay Area City Cluster—are given priority by the government. They are the ones who, in accordance with the government's objective, should excel at innovation and global competition.

4.2 China smart city clusters within PCA

Consider the link between PC1 and PC2 by technology vector graph (Fig. 3), which can be used to determine the relative importance of each operational indicator to the main components as well as how uniformly distributed the sample from smart cities is in this dimension.

All operational indicators therefore contribute nearly the same amount (~ 0.5) to the first principal component, as shown by the lengths of the unit vectors projections of the baseline coordinates, which are shown in Fig. 3 as red arrows. The operational indicator T2, which measures employment in the software and information technology sector for information transfer, has the highest impact on the second component (T2 = 0.81). Additionally, PC1 increases as spending on research and technology increases, whilst the second essentially stays the same.
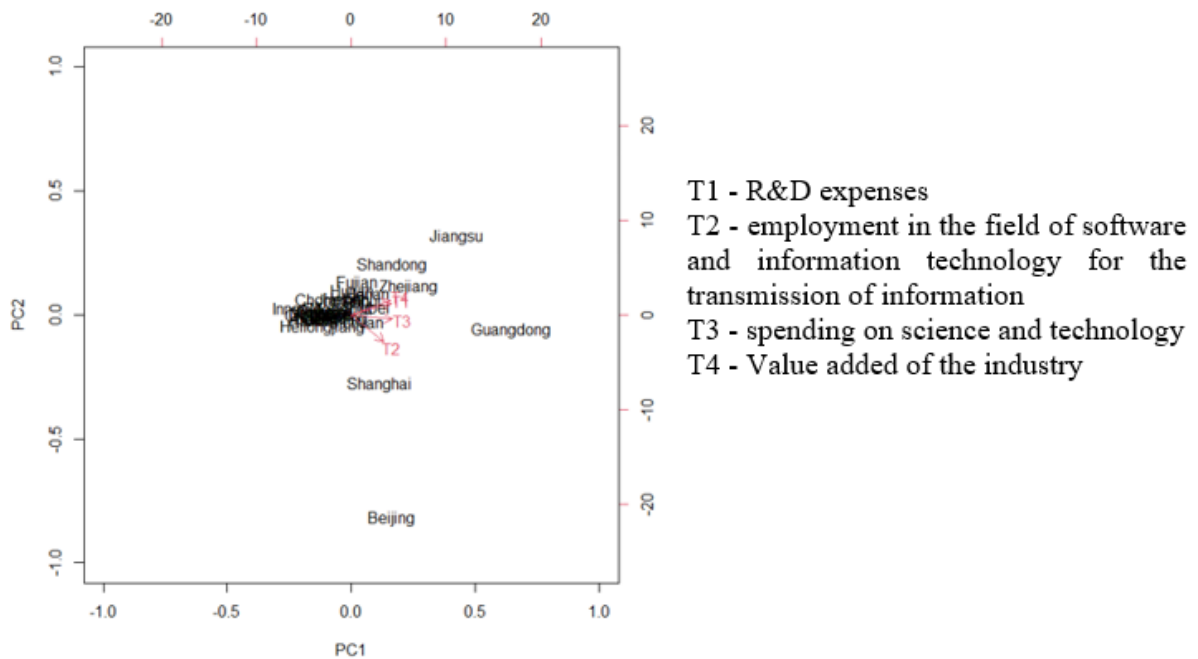
Fig. 3 Relationship between the contributions of each variable by technology area

The analysis highlights those provinces and areas, particularly Beijing, Shanghai, Guangdong, Jiangsu, Zhejiang, and Shandong, deviate from the overall sample. The most technologically advanced in China, when viewed in the context of cities, are Beijing, Shanghai, Guangzhou, Shenzhen, Nanjing, Suzhou, Hangzhou, Ningbo, and Jinan.
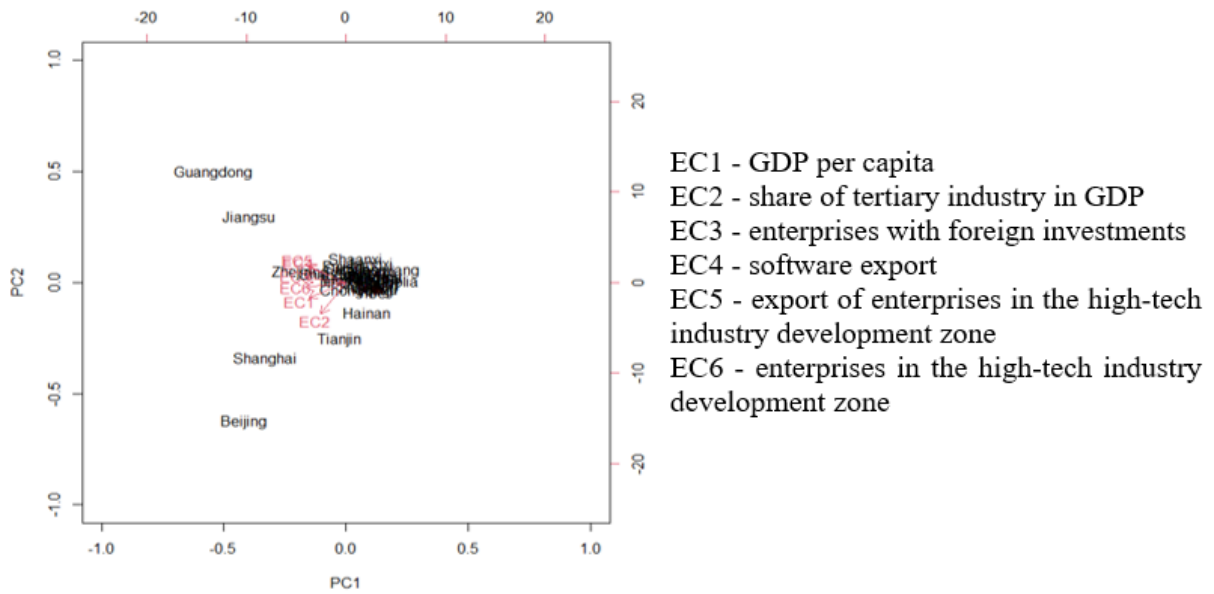
Fig. 4. Relationship between the contributions of each variable by technology area

The smart economy is the next aspect this paper focuses on (Fig. 4). From this current perspective, we can notice that all the initial indications are equally included in PC1, which is located between the beginning data, with nearly equivalent weights (~0.4). The two most prominent variables in PC2 are EC2, which measures the tertiary industry's GDP contribution (EC2=0.73), and EC5, which counts the export of companies in the high-tech industry development zone (EC5=0.41). Value emissions show that Beijing, Shanghai, Guangzhou, Shenzhen, Nanjing, Suzhou, and Tianjin have the most advanced smart economies in China.
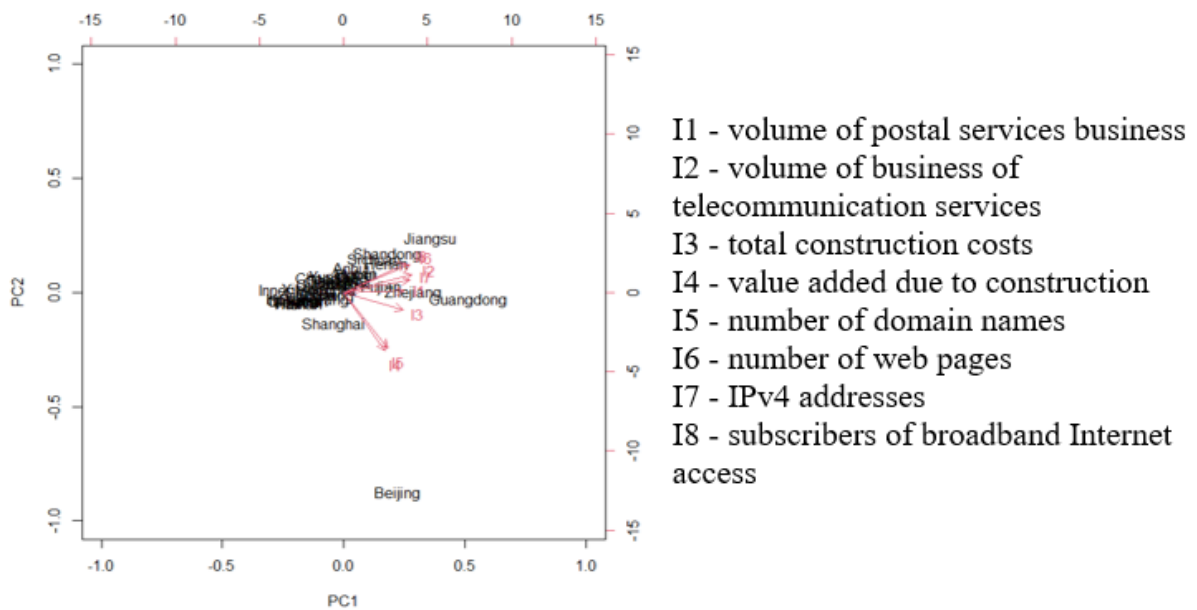
Fig. 5 Relationship between the contributions of each variable by intellectual infrastructure area

PC1 includes all initial indicators with weights that are almost equal (I1= 0.35), while PC2 includes indicators with the highest weights, including I4 (value gained due to construction) (I4=0.61) and I5 (number of domain names) with a weight of 0.61. (I5 = 0.58). Cities like Beijing, Shanghai, Guangzhou, Shenzhen, Hangzhou, Ningbo, Nanjing, and Suzhou exhibit the highest variance from the full sample by intellectual infrastructure area (fig. 5).

4.3. Discussion of the results

The results of a study on a sample of Chinese cities using the PCA were gathered and analyzed by the authors (Table 3).

Table 3. Comparison of selected cities' growth characteristics across Technology, Smart economy, and Intellectual infrastructure areas

Cluster	Province/City	Technology	Smart economy	Intellectual infrastructure
Jing-Jin-Ji	Beijing	+	+	+
	Beijing		+	
Yangze River Delta	Shanghai	+	+	+
	Zhejiang (Hangzhou, Ningbo)	+		+
	Jiangsu (Nanjing, Suzhou)	+	+	+
Greater Bay Area	Guangdong (Guangzhou, Shenchen)	+	+	+

Compiled by the authors

The Greater Bay Area, the Yangze River Delta, and Jing-Jin-Ji are three clusters where the government has prioritized efforts and where PCA emissions are commonly detected (Table 6). Following the study's findings, mentioned cities are the centers of studied clusters, and their growth has been remarkably consistent across the three test regions. In addition, the findings can point to the uneven growth of cities within the context of the China Smart Cities Development Initiative.

Construction of sustainable metropolitan areas and the creation of a heterogeneous network may effectively manage economy, and infrastructure by pooling resources and investing in technological advancements. The relationship between intellectual infrastructure, the technologically advanced environment, and the economic growth cycle must be taken into account.

A strong positive correlation exists between the development of smart infrastructure, technological innovation, and economic base. There are, however, structural issues, such as the absence of a clear top-down development strategy and adapted regional development.

There are also certain limitations on this study. Although the data used in the article, which covered the years 2017 to 2020, can demonstrate the rapid development of SCCs in China, it is still insufficient when compared to the prolonged timeline of sustainable smart development. As a result, rather than emphasizing changing processes, the assessment concentrates on performance and comparative analysis between cities. Future efforts should incorporate data from more years and data sources to reveal the SCC development's progressive changes from a more comprehensive perspective. To compare scenarios in developing countries and gain insight into the issues related to the development of sustainable smart cities, cities in advanced economies should also be included in the study.

The research conducted for this paper allowed the authors to conclude that the concept of smart cities is one that is relevant for all countries throughout the world. This result is facilitated by the specific development characteristics of the Chinese smart city market. The authors focused on the cluster development of the concept in wider context in this article, which allowed them to learn more about the spatial range of China's smart cities, their advantages and disadvantages, and the locations of those on which the government places the most emphasis.

The study of the interconnections between the SCC of Chinese smart cities in key dimensions (technology, smart economy, and intellectual infrastructure) also brought to light and validated the qualitative difference between clusters and leading cities.

The concept has not yet reached its apex and that it has not yet fully presented to the world its potential and power for good. All of this shows that, given the current situation, including more cities in smart cities is simply unavoidable.

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Smart City Controlling

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Abstract:
This research considers the issues of development of information support for controlling in the context of crisis management. The growth of various crisis situations and the scale of their consequences sets the task of activating all existing opportunities for protection against the risks of their occurrence, monitoring and prevention, as well as timely informing the population, enterprises and government agencies about the necessary actions in crisis situations. Using the example of a Smart City, the authors propose the introduction of a unified crisis management system to effectively solve problems in the event of any type of crisis (natural, man-made, political, social, etc.) by ensuring timely response to possible emerging threats, as well as their effective prevention, and in case of their occurrence - the rapid restoration of the normal functioning of the Smart City and the elimination of all the consequences of a crisis situation. The creation of the system will make it possible to introduce, within the framework of the Smart City, a mass information individualized public service in the event of various types of crisis situations at any place and at any time, which should ensure the safety of life and the sustainability of all objects of the Smart City.

Introduction

In the context of digitalization of all spheres of society, we are talking about the need to develop a unified information platform using digital technologies that will allow not only to manage various complex systems in emergency situations (hereinafter referred to as ES), both natural and man-made, but also to disseminate the experience gained within the framework of the Smart City for the full solution of any crisis situations at any level of management.

The potential scale of possible future disasters, along with the spread of available high-tech solutions that prevent damage to the life and health of citizens, the environment, enterprises, regions and the security of the state in the event of a crisis, necessitates the implementation of the concept of controlling at the state level as a tool to ensure sustainability in crisis situations. Such a digital platform should allow to accumulate all incoming information, process it as an expert system and provide users with critically important personalized information services.

The concept of individualized subscriber rescue management

The concept of individualized subscriber rescue management, which was tested at such authoritative platforms as APEC, UN and ESCAP and various international conferences, should become the basis for the implementation of such a system of information support for controlling in crisis management. At the beginning of 2023, this concept was approved as a Recommendation by the International Telecommunication Union Y. smart-evacuation "Framework of Smart Evacuation during emergencies in smart cities and communities" at the meeting of the SG20 study group, which took place on February 9, 2023. The adopted Recommendation describes the concepts and functions of smart evacuation management in the event of natural disasters and/or emergencies, and defines the high-level requirements, ICT infrastructure for smart evacuation and use cases in the event of natural disasters and/or emergencies.

The Recommendations emphasize that the introduction of such a system will make it possible to maintain the level of comfort achieved in the Smart City for the population even in the event of natural or man-made ES, which is essential to justify the huge material costs for the rapid development of Smart cities around the world against the backdrop of more frequent ES natural and man-made character in all corners of the world.

The Smart City development problem

The concept of "Smart City" is a systematic approach to the use of information technologies based on data analysis to provide natural, energy and urban resource management services that contribute to sustainable economic development and high living standards. The implementation of the "Smart City" concept involves the introduction of a whole range of digital solutions in the most important areas of development of the urban environment, such as "smart" urban transport, public security systems, "smart" housing and communal services, communications, tourism, service and etc., however, the current practice of its implementation shows a number of problems.

First, we can highlight the lack of a unified system for the development of the Smart City. Due to the lack of a clear understanding of the implementation algorithm and set of Smart City services, different regions and cities perceive this concept and requirements for the development of digital infrastructure in their own way, which leads to ambiguous implementation processes, evaluation of the final results and quality of execution. The solution to the problem can be the development at the federal level of a unified methodology for the implementation and development of the Smart City project and standardized requirements for digital infrastructure.

Secondly, it is important to form a clear system of public administration, including the federal, regional and municipal levels of Smart City management. It is also necessary to expand the requirements for the mandatory development and inclusion in the concept of such constituent elements as the development of a green economy, the demographic situation, the prevention of crisis situations, and also, taking into account the development of the current geopolitical situation in the world, the inclusion of digital solutions in the field of cybersecurity, anti-terrorist protection, prevention offenses, etc.

Thus, a special place in the implementation of the Smart City concept should belong to the development of a unified crisis management system. To this end, it is important to determine the role and place of a unified crisis management system in the overall Smart City management hierarchy. The traditional hierarchy of Smart City management levels makes it possible to form a unified management process based on the goals and development strategy of the Smart City, which ensures its more efficient functioning and achievement of goals. However, upon the occurrence of any crisis situation, all levels of management of the Smart City switch to the ***anti-crisis level of management*** - functioning in the mode of a unified crisis management system until the end of the crisis situation and elimination of its consequences.

Therefore, the strategy for the optimal functioning of the Smart City should be supplemented by the need to create an integrated decision support and effective management system that would ensure end-to-end coordination of all management systems and departments involved in crisis situations. We are talking about the development of a controlling system as a comprehensive information and analytical support for decision-making processes within the framework of a unified crisis management system.

The controlling concept in the Smart City crisis management system

Figure 1 shows the author's interpretation of the implementation of the controlling concept in the Smart City crisis management system, in which the foundation of digitalization and strategic management should be the implementation of a platform solution that would reflect the information model of a modern city, taking into account all levels of management and services, which will create the most effective a control system that includes all the conditions for a

comfortable and safe urban environment. Such a platform should become an automated system that used to be Internet of Things communication networks, big data processing tools, cloud computing, next generation communication networks in order to automate one or more management functions for all socio-economic activities.
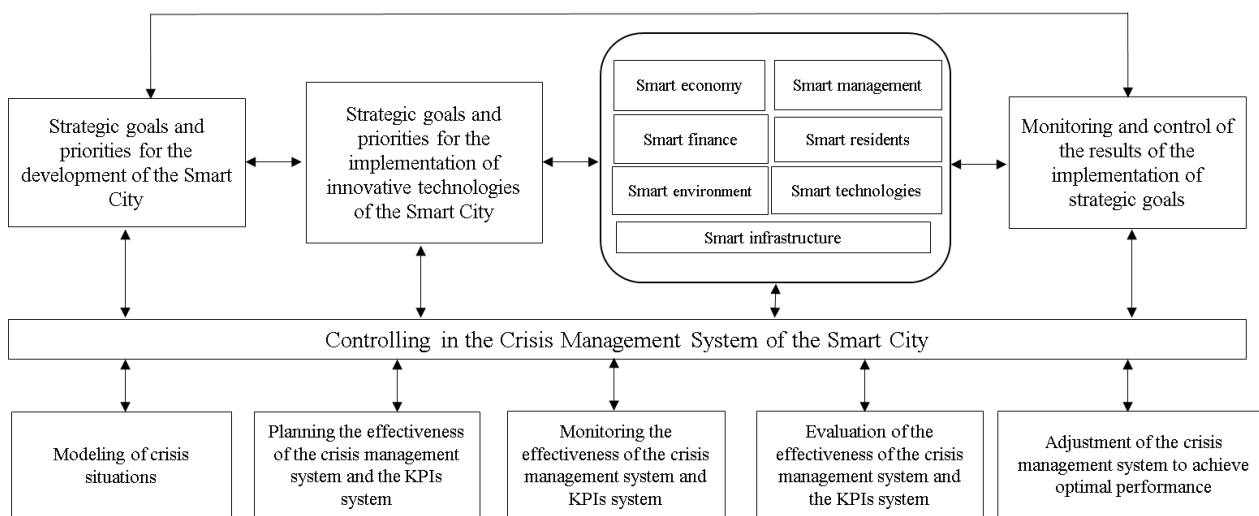
Fig. 1 Controlling in the crisis management system of the Smart City

Controlling in the Smart City crisis management system should be a system of measures aimed at ensuring the effective operation of the crisis prevention and management system. Its main task is to prevent possible crisis situations, as well as manage them if they occur. Information support of controlling should include the processes of analysis, monitoring, modeling and risk assessment of crisis situations, as well as planning and coordination of actions, organization of communications and information support in these situations. In addition, controlling is responsible for planning and evaluating the effectiveness of the crisis management system, as well as adjusting its work to achieve optimal performance.

Thus, it should be noted that in the current conditions of global challenges and upheavals, there is an objective need for the accelerated development and implementation of large-scale digital solutions that will ensure the effective construction and operation of a unified crisis management system, which will effectively solve any problems in the event of any situations in the Smart City.

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Uneven Regional Development in Context of Infrastructure Financialization: Evidence from Russia

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Abstract:

The aggregate variable of public and private investment in infrastructure, as well as its composition, has received limited academic attention, particularly in the context of BRICS countries. This study aims to bridge that research gap by examining infrastructure financialization and its impact on uneven regional development in Russia. Utilizing the Tobit model and panel data from 2005 to 2019, the study measures the characteristics of uneven regional development in Russia using infrastructure financialization as core explanatory variable. The results reveal that infrastructure financialization significantly contributes to this uneven regional development in Russia. The study attributes the negative and statistically significant impact of infrastructure financialization on the comprehensive gap to Russia's fully government-led economy and the extensive involvement of the federal center in regional development. Interestingly, this study differs from previous research conducted in other countries using a similar methodology, highlighting the controversial nature of the topic. Future research can build upon these findings to explore additional factors that contribute to uneven regional development, further enhancing our understanding of regional development dynamics.

Keywords: *regional development, infrastructure financialization, Russia*

Introduction

Infrastructure plays a crucial role in urbanization, economic growth, and public well-being (Pokharel et al., 2021). However, the high costs of infrastructure construction often exceed the financial capabilities of local governments (Wang et al., 2011). The shortage of funds for infrastructure development is a common challenge faced by governments globally (Cheng et al., 2021). To address this, governments have explored financialization, resulting in a dynamic and diverse phenomenon (O'Neill et al., 2019). Infrastructure financialization involves an increasing reliance on financial capital and the expanding influence of financial institutions, instruments, and professionals in infrastructure projects. Nevertheless, financialization has its risks, such as the potential for excessive debt that can lead to crises for local governments (Christophers, 2015; Wu, 2021).

Therefore, it is vital to evaluate infrastructure financialization systematically and establish mechanisms for sustainable infrastructure development. Furthermore, most of the current theoretical frameworks and studies on urban financialization focus on urbanization in Western countries, leaving a lack of research that examines the specific challenges experienced by emerging markets (Li et al., 2023).

The Russian context is becoming more interesting due to the fact that government has recognized the issue of regional disparities and has implemented various measures to address it. These include investment programs, tax incentives, and the creation of special economic zones in less developed regions to attract investment and stimulate economic growth. However, reducing regional disparities remains a complex and ongoing challenge for Russia (Kadochnikov, 2020).

This study explores the quantitative effects of infrastructure financialization on uneven regional development (URD). It starts by providing a concise overview of financialization and its impact on uneven regional development. The research design and data are then presented, followed by a discussion of the empirical findings. The study concludes by summarizing the key points and proposing policy recommendations to enhance infrastructure financialization in Russia and similar emerging markets.

Theoretical background

The rapid growth of the financial market has led to the expansion of financial capital beyond traditional boundaries, aiming to maximize profits. This phenomenon, known as "financialization", refers to the increasing influence of financial motives, markets, actors, and institutions on both domestic and global economies (Ioannou & Wojcik, 2019). Financialization is a complex and constantly changing concept, which not only originates from the economic field but also displays unique characteristics in relation to urbanization and urban development (Li et al. 2023). Moreover, the infrastructure financialization can be observed through the policy instruments area perspective. In his paper Dabrowski (2015) utilizes existing literature on public policy instruments, exploring their characteristics and their impact on achieving policy objectives. According to the author the choice of a specific policy instrument can have significant effects on actors and create opportunities for new interpretations and learning. It can also introduce dynamics of change that challenge path dependency in policies. Hence, the infrastructure financialization and its influence on policy instruments is a crucial aspect in modern literature.

Furthermore, research on infrastructure financialization from an economic geography perspective is limited compared to other disciplines such as economics and management. Existing theoretical frameworks and studies on urban financialization largely stem from a Western urbanization context, with scarce research addressing the unique challenges faced by developing countries (Furlong, 2020). In recent years, scholars have shown an increasing interest in the process of accumulation through financial means rather than traditional trade or commodity production (Li et al., 2023). The effects of financialization on society, the economy, and everyday life are still a topic of debate. Theoretical approaches to understanding this phenomenon typically adopt different perspectives, each emphasizing different aspects and scales (Lin et al., 2019).

Meanwhile, Clark (2017) highlights the paradox of expanding institutional investors like pension funds facing a lack of profitable opportunities, hindering regional growth. To address this, global intermediaries known as market makers connect institutional investors with infrastructure assets for financing. According to Anguelov (2021) Clark overlooks the role of public organizations in intermediation common in emerging economies, which view infrastructure as a public good rather than just a financial asset. Emerging economies lack infrastructure markets, assets, and regulatory frameworks, further distinguishing them from the West. Multilateral development banks aim to establish market-based systems for infrastructure provision in developing countries by attracting international investors seeking higher returns through financial intermediaries and regulatory frameworks.

Moreover, infrastructure financialization is a very common concept in modern literature in the BRICS context. Démurger (2001) empirically studied the relationship between infrastructure investment and economic growth in China using an economic growth model. Fedderke, Perkins, and Luiz (2006) measured South Africa's infrastructure and economic growth to confirm the positive impact of infrastructure construction on economic growth. However, infrastructure also has negative effects. For instance, the significant investment and financing of infrastructure, along with subsidies, can lead to increased debt risk for local governments, known as the "infrastructure trap" (Li et al., 2023). The effects of infrastructure financialization are complex and varied. For instance, Li et al. highlighted that the unstoppable trend of urban financialization in China is a topic of debate. The flawed financial system not only affects urbanization and uneven development but also has significant implications for local government debt. The concentration of financial capital in a few select financial centers is a prominent feature, with a small number of centers housing the majority of the world's financial capital, including funds, institutions, and professionals.

In Russia, the Constitution establishes a federation composed of "subjects of the federation" or regions. The revenue sources of subnational budgets in Russia are determined by

federal laws, which also regulate various aspects of the budgeting process. In the years following the dissolution of the Soviet Union, bilateral contractual relationships between the federal and regional authorities, particularly ethnic republics, were common. These relationships allowed for differential treatment of specific regions and varying levels of fiscal autonomy within the federation. However, by the late 1990s, this approach had been discontinued. The current Russian Budget Code explicitly states that all subjects of the federation have equal rights and obligations, and any agreement conflicting with the Budget Code is considered invalid (Kadochnikov, 2020). The variety of avenues used to raise taxes and spend public funds is a significant aspect of public finance in Russia. The central component of every nation's fiscal system is its public budget, which in Russia are the central and local budgets. However, there are additional fiscal/quasi-fiscal institutions such as The Federal Compulsory Medical Insurance Fund, the Social Insurance Fund, and the Pension Fund. They are just a few of the public funds in Russia that are officially referred to as "state extrabudgetary funds." (Liu, 2019).

Unequal regional development is a common issue in urbanization and economic growth (Lin, 2017). Almost all countries, including Russia, experience regional development disparities, except for those with small areas and no regional differences. According to some economists, the main cause of unequal regional development is the income gap between regions (Czudec et al., 2019). Capital endowment disparity is considered the most influential factor in this regard. The theory of new institutional economics emphasizes the importance of institutions in economic growth and confirms their significant role in Russia's economic growth. With economic opening, globalization, and trade liberalization, Russia has witnessed a notable increase in its inter-regional income gap (Li et al., 2023).

The impact of infrastructure financialization on regional development inequality is multifaceted. It can attract funds from developed regions to accelerate development and reduce disparities in underdeveloped regions lacking infrastructure funds. However, the pursuit of profits and concentration of financial capital may lead to increased investments in infrastructure projects in developed regions, widening regional development gaps. Additionally, infrastructure investments have a spatially correlated spread or backwash effect, particularly affecting neighboring regions (Peon et al., 2019). These effects coexist and require empirical analysis and case studies for evaluation. By assessing the impact of infrastructure financialization on urban and regional development through indicators and quantitative measurements, potential issues arising from financialization can be monitored and a deeper theoretical understanding of financialization can be achieved (Li et al., 2023).

Methodology

This study is aimed to examine the impact of infrastructure financialization on uneven regional development. The study constructed the indicator systems for uneven regional development and infrastructure financialization respectively based on the regional panel data in Russia, and quantitatively assesses the impact of infrastructure financialization on uneven regional development by the Tobit model. The methodology is based on the Li et al. (2023) paper, where the authors suggested the methods and findings would be of interest also for other nations. In their paper authors define uneven regional development indicators, which comprise absolute gap[1], relative gap[2], and comprehensive gap[3]. Further, the infrastructure financialization rate[4] (IFR) was calculated as well.

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[1] The absolute gap represents the absolute difference between the overall unit variable value and the standard deviation, which includes measurements such as range, mean deviation, and standard deviation. In this study, the range is used as the measure. The range is calculated as the difference between the maximum and minimum values of the overall unit variable value, and the formula is as follows: $Absolute\ gap = X_{max} - X_{min}$; where $Xmax$ represents the maximum value of per-capita GDP and $Xmin$ represents the minimum value of per-capita GDP.

[2] The relative gap is the comparison between the overall unit variable value and the contrast value, expressed as a ratio. It includes measurements such as relative difference, relative range, and unbalance difference. In this study, the relative range is chosen as the measure. The relative range calculates the ratio of the maximum value to the

This study uses Tobit model, which is also known as a censored regression model or limited dependent variable is used in the research. With infrastructure financialization levels as explanatory variables, and government intervention degree, urbanization rate, and highway mileage as control variables, the IFR's impact on URD is estimated as follows:

$$URD = \alpha \sum \beta_i + control + \varepsilon$$

where *URD* represents the comprehensive difference index of URD among the 81 regions, α is the intercept item, βi is the parameter to be estimated, *Xi* represents the influencing factor of the comprehensive difference, *control* represents the control variable, and ε represents the residual item.

To ensure the authenticity and reliability of the indicator values, the selected indicators for examining the impact on regional development are chosen based on official data. This ensures that the indicators used in the analysis are robust and reflective of the actual conditions.

The details of the variables are as follows:

The comprehensive gap (weighted coefficient of variation) of per-capita GDP is selected as the explained variable to characterize URD. In this study, the infrastructure financialization level is chosen as the main explanatory variable to conduct a comprehensive analysis of its impact on URD. Contributing factors to URD include urbanization level, government intervention degree, and public service level. The urbanization level signifies the coordinated development of a country or region in terms of productivity, technology, and industrial structure. This is typically measured by the urbanization rate, which reflects the proportion of the total urban population to the total population. Government intervention plays a role in economic growth and regional development through various growth drivers. Public service, considered a controllable variable, is also a factor. In this study, the measurement of public service is represented by highway mileage in the transportation domain, as indicated by previous literature.

Data Source and Processing

The data used in this article are panel data from 2005 to 2019. Different official sources for gathering data were used (Federal State Statistics Service, Economic Freedom of the World, World bank). According to the variables' descriptive statistics, there are no outliers in the current

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minimum value among similar indicators, and the formula is as follows: $Relative\ gap = \frac{X_{max}}{X_{min}} * 100\%$; where Xmax represents the maximum value of per-capita GDP and Xmin represents the minimum value of per-capita GDP.

[3] The comprehensive gap refers to the overall ratio of differences among the overall unit variable values, providing an assessment of the overall trend of disparities. In the field of regional economics, commonly used measures include the Gini coefficient, Theil index, and weighted coefficient of variation. Among these, the weighted coefficient of variation is considered a reasonable and effective calculation method as it addresses the limitations of the other two measures. Hence, this study utilizes the weighted coefficient of variation for analysis. The formula for calculating the weighted coefficient of variation is as follows: $Comprehensive\ gap = \frac{1}{\bar{x}}\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \times \frac{p_i}{p}} - 1$;

where *Vw* is the weighted coefficient of variation, *X* is the mean value of per-capita GDP, and $\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \times \frac{p_i}{p}}$ is the standard deviation of per-capita GDP.

[4] The financial correlation rate is a measure of economic financialization and is calculated as the ratio of total financial assets to gross national product. Utilizing this financial correlation rate, Li et al. (2023) developed the infrastructure financialization rate (IFR) indicator. The IFR measures the proportion of total financial funds to the total investment in infrastructure projects. The calculation formula for the IFR is as follows: $R = \frac{F_r}{W_r}$; where *Fr* refers to the total amount of financial capital in infrastructure investment in a certain period and *Wr* refers to the total investment in infrastructure in a certain period.

data. The data values all fluctuate within the normal standard deviation range of the mean value. The index kurtosis of the comprehensive gap is 2.573 and the skewness is 0.184. The indicator kurtosis of the IFR is 3.221 and the skewness is -0.446. A basic understanding of the data is obtained through the descriptive analysis of the characteristics of concentration and volatility, which lays the foundation for subsequent in-depth analysis (Table 1).

Table 1. Descriptive Statistics of variables

Variables	Mean	Std. Dev.	Min	Max	p1	p99	Skew.	Kurt.
Comprehensive gap	.49	.1	.31	.679	.31	.679	.184	2.573
Infrastructure financialization level	.549	.045	.449	.633	.449	.633	-.446	3.221
Urbanization level	.757	.013	.737	.776	.737	.776	-.11	1.765
Government intervention	6.473	.273	6.02	6.85	6.02	6.85	-.233	1.961
Highway mileage	1134	373.023	581	1542	581	1542	-.166	1.248

URD characteristics in Russia

In modern Russia, unequal regional development has been a persistent challenge since the collapse of the Soviet Union in 1991. The shift from a centrally planned economy to a market-based system resulted in significant disparities across different regions. Granberg (2004) noted that one of the main transformational trends was the continued strengthening of inter-regional socio-economic differentiation. This process took place against the backdrop of a general economic downturn and was associated with the inclusion of market competition mechanisms, different opportunities for regions to adapt to market conditions, a weakening of the regulatory role of the state, and unequal relations between the federal center and various subjects of the Russian Federation. The author noted that in the 1990s the number of relatively more developed regions (where the level of GRP per capita is higher than the national average) was 3–4 times less than the number of relatively less developed ones. On one flank are Moscow and oil and gas producing regions, which are increasing their lead, on the other is an increasing number of especially lagging regions (in which GRP per capita does not reach 50% of the average Russian level). In 1994, there were seven such regions out of 79 (only the republics of the North Caucasus), then their number continuously increased and reached 19 in 2000 (a number of republics were added, regions of Central Russia, Altai Territory, Jewish Autonomous Region). Once in this risk group, the regions, with rare exceptions, cannot get out of it. Thus, the strengthening of inter-regional differentiation is accompanied by the expansion of areas of particular depressiveness, backwardness, and poverty.

Granberg (2004) identified old industrial regions as a separate category of lagging regions. The old industrial regions have their own unique features, such as a developed industrial base, the presence of large enterprises and a high level of technical equipment. However, the author pointed out that in a changing economic environment, the old industrial regions may face problems associated with outdated technology, lack of innovation and low competitiveness. Granberg emphasized the importance of adapting and modernizing these regions to ensure their sustainable development.

Moreover, Granberg (2004) considered patchy-scattered settlement (the presence of small settlements over a large area) in Russia as one of the main causes of inequality between regions. The author noted that such a settlement model leads to an uneven distribution of resources and economic opportunities. In regions with low population density and remote from the central territories, access to social and economic services, infrastructure, education and healthcare is

limited. In addition, Granberg pointed out that focal-scattered settlement leads to disproportionate development of individual regions, which increases inequality in the development of the economy and society as a whole.

The Russian government has begun to pay attention to the issue of URD and attempted to solve the problem of URD in the process of urbanization by implementing industrial policies, regional development policies, and rural revitalization strategies, as well as using state finances and taxation to directly support backward regions.

According to the available data, this paper selects the per-capita GRP (gross regional product) of 81 regions in Russia from 2005 to 2019 as indicators to measure URD. This paper describes the URD from the perspectives of range (absolute gap), relative range (relative gap), and the weighted coefficient of variation (comprehensive gap), as shown in Table 2.

Table 2. Uneven regional development measured by Russia's per capita GRP.

	Absolute gap (rub.)	Relative gap	Comprehensive gap
2005	996 062.7	81.549	0.452
2006	958 199.0	70.706	0.356
2007	1 194 964.1	85.832	0.408
2008	1 667 000.2	82.151	0.485
2009	1 448 280.2	63.045	0.310
2010	1 921 708.0	73.187	0.569
2011	2 069 094.8	73.489	0.556
2012	2 212 620.4	70.127	0.515
2013	2 040 331.7	49.291	0.446
2014	1 927 029.9	42.239	0.450
2015	1 764 032.6	40.159	0.440
2016	2 001 399.4	45.481	0.481
2017	2 318 007.5	59.118	0.556
2018	2 474 963.7	59.979	0.646
2019	2 610 641.7	66.736	0.679

As shown in Table 2, the range of Russia's 81 regions increased from 2005 to 2012 and from 2015 to 2019. The relative gap and weighted coefficient of variation fluctuated from 2005 to 2019. The following figures are more intuitive for observation and analysis (see Figures 1–3).

Analyzing the graphs below, the existing trend of increasing disproportion between regions can be noticed. Moreover, periods of decreasing inequality are associated with periods of crisis: the global financial crisis of 2008 and the crisis of 2014, when there was a sharp devaluation of the Russian ruble due to lower oil prices and sanctions. Meanwhile, the increase in inequality during the period of economic growth of the country can be noticed as well. These trends are explained by the fact that economic growth was due to the most developed regions, while it was they who suffered the most during crises, as a result, they broke away from the lagging regions at a slower rate.
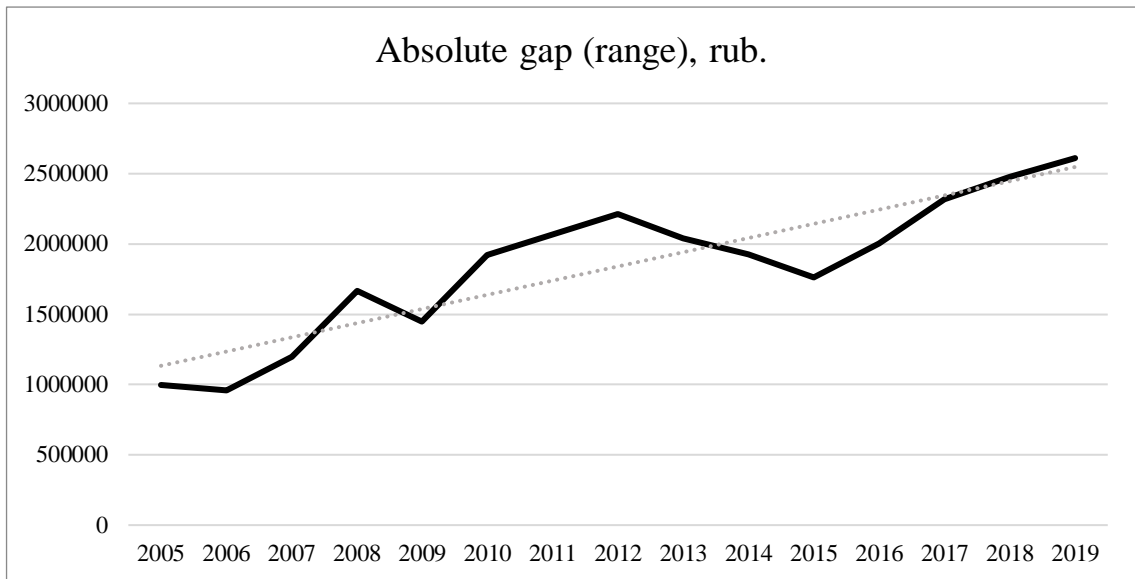
Figure 1. The absolute gap (range) of Russia's per-capita GRP from 2005 to 2019.
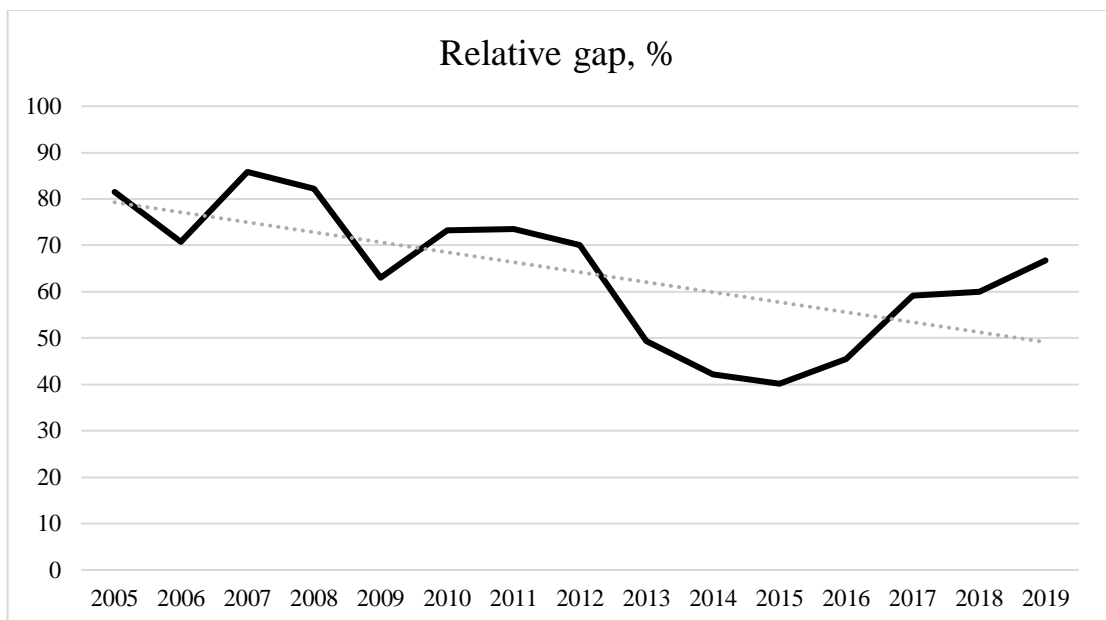
Figure 2. The relative gap of Russia's per-capita GDP from 2005 to 2019.
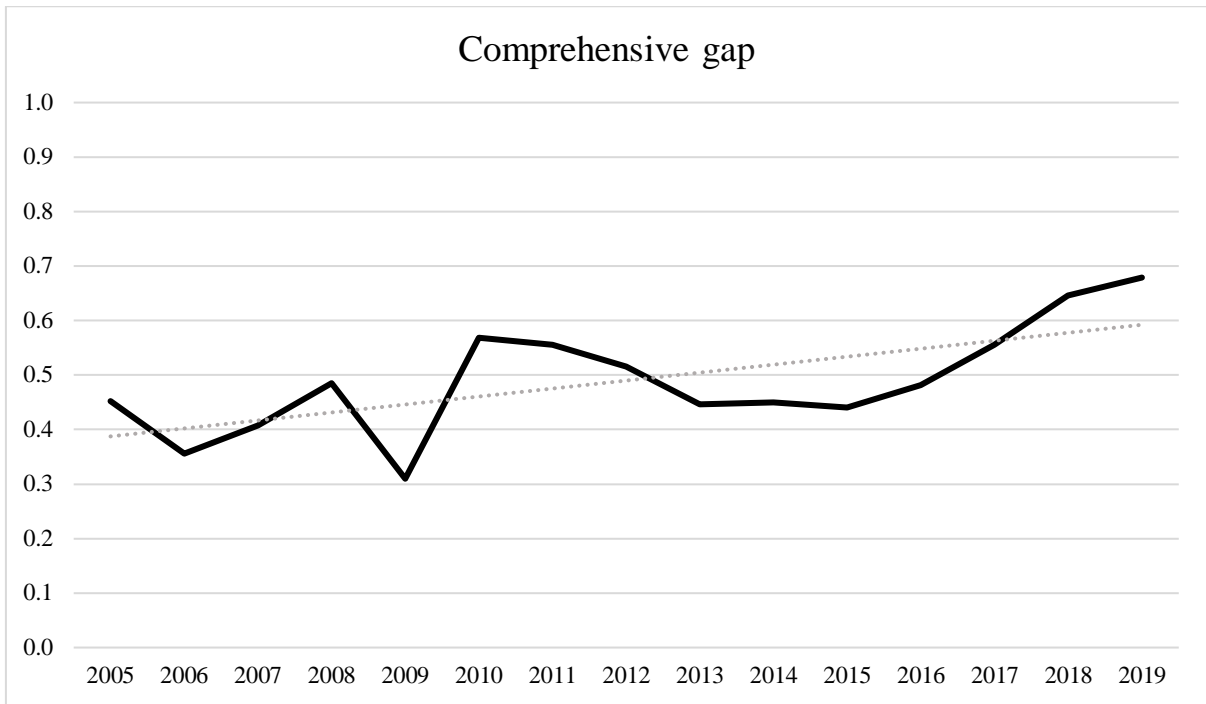
Figure 3. The comprehensive gap of Russia's per-capita GDP from 2005 to 2019.

Initially, the model undergoes a validity analysis, as shown in Table 3. The hypothesis being tested is whether the model quality is consistent, regardless of the inclusion of the explanatory variable IFR. The resulting p-value, below 0.05, indicates the rejection of the original hypothesis. Thus, the inclusion of the IFR variable is deemed valid, meaning the model construction is meaningful. Additionally, when comparing multiple models using AIC or BIC values, lower values correspond to better model construction.

Table 3. Tobit regression model validity analysis.

Model	Chi square value	p	AIC value	BIC value
Restricted (without IFR)	4.62	0.0315	-37.679	-34.139
Unrestricted			-40.303	-36.054

From Table 4, the explanatory variables of the Tobit regression analysis include IFR, highway mileage, government intervention and urbanization rate, and the explained variables include the comprehensive gap. The model formula is as follows: comprehensive gap = -12.146 - 1.236×IFR - 0.001×highway mileage + 0.505×government intervention + 14.148×urbanization level. Through specific analysis, the final results are as follows.

Table 4. Summary of Tobit regression analysis results (n=15).

Tobit regression

Comprehensive gap	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
IFR	-1.236	.531	-2.33	.04	-2.404	-.067	**
Highway mileage	-.001	0	-4.34	.001	-.001	0	***
Gov. intervention	.505	.205	2.46	.032	.054	.956	**
Urbanization rate	14.148	7.233	1.96	.076	-1.772	30.067	*
Constant	-12.146	4.203	-2.89	.015	-21.397	-2.896	**
var(e.CG)	.002	.001	.b	.b	.001	.004	
Mean dependent var		0.490	SD dependent var			0.100	
Pseudo r-squared		-0.902	Number of obs			15	
Chi-square		24.809	Prob > chi2			0.000	
Akaike crit. (AIC)		-40.303	Bayesian crit. (BIC)			-36.055	

*** p<.01, ** p<.05, * p<.1*

The regression coefficient value of IFR is -1.236 and shows a significant level of 0.05 (p = 0.04 < 0.05), which means the IFR had a significant negative effect on the comprehensive gap.

The regression coefficient value of highway mileage is -0.001 and shows a significance level of 0.01 (p = 0.001 < 0.01), which means highway mileage has a negative impact on the comprehensive gap.

The regression coefficient value of government intervention is 0.505 and shows a significance level of 0.05 (p = 0.032 < 0.05), which means government intervention has a significant positive impact on the comprehensive gap.

The regression coefficient value of the urbanization rate is 14.148, however does not show a significance level of 0.05 (p = 0.076 > 0.05, but is significant at level 0.1), which means the urbanization rate has not a significant impact on the comprehensive gap.

The IFR has a significant positive impact on the comprehensive gap of URD. Moreover, it has the largest impact on comprehensive gap compared to other statistically significant variables.

Conclusion and discussion

Before proceeding to the key conclusions, it is necessary to understand the overall picture of the development of the regions. Table 5 shows the top ten regions in terms of gross regional product in 2005. It should be noted that among the leaders there are production centers of the country, which, despite the relatively low population, have an extremely high level of gross regional product. For example, the Tyumen region, the Khanty-Mansi Autonomous Okrug and the Yamalo-Nennets Autonomous Okrug are the largest oil and gas resource centers, moreover they have a developed oil and gas industry. The leading positions of other regions can be explained by the high level of population.

Table 5. Ranking of top-10 regions by Gross Regional Product, 2005.

Region	Gross regional product, M rub	Population, thousand people	GRP per capita, rub.
Moscow	2 759 101	10 425	264 659
Tymen region	1 898 156	3 323	571 166
Khanty-Mansi AR	1 276 184	1 478	863 337
Moscow region	548 642	6 628	82 775
St. Petersburg	518 885	4 580	113 279
Yamalo-Nennets AR	420 933	530	793 166
Tatarstan Republic	410 906	3 761	109 240
Krasnoyarsk krai	380 404	2 906	130 894
Sverdlovsk region	366 610	4 409	83 137
Samara region	349 048	3 189	109 454

If we analyze the top ten in 2019 after 15 years, we can see that the list of leaders has not changed much, except for the Tyumen region. This region has a more diverse economic structure, has smaller oil and gas reserves, as a result, resource exports have not had the same strong beneficial effect on the region. Otherwise, the regions almost exactly retained their positions.

Table 6. Ranking of top-10 regions by Gross Regional Product, 2019.

Region	Adjusted GRP, M rub.	Population, thousand people	Adjusted GRP per capita, rub.	Change in ranking (2005-2019)
Moscow	6 026 222	12 678	475 325	-
Khanty Mansi AR	1 671 224	1 674	997 924	▲1
Moscow region	1 409 258	7 690	183 237	▲1
St. Petersburg	1 383 920	5 398	256 372	▲1
Yamalo-Nennets AR	1 314 528	544	2 414 636	▲1
Tatarstan Republic	960 533	3 902	246 108	▲1
Krasnoyarsk krai	885 677	2 866	309 008	▲1
Krasnodar krai	798 915	5 675	140 766	▲4
Sverdlovsk region	749 815	4 310	173 943	-
Bashkortostan Republic	605 978	4 038	150 065	▲1

Moreover, it is necessary to analyze ten lagging regions to understand whether any of the lagging ones managed to climb higher in the list. Table 7 shows the 10 most lagging regions in terms of GRP in 2005. Among the leaders of the lagging regions, it can be noticed that several from the Far Eastern Federal District (Chukotka AR, Magadan region), the least populated due to its geographical location. The remaining regions are predominantly from the Southern Federal District. The backwardness of these regions can be influenced by geographical and natural conditions, for example, location in mountainous and remote areas. Also affected by many small national minorities, which can create difficulties in the integration of these groups and the implementation of various development programs. Many of the regions represented depend on one or more sectors of the economy, such as agriculture. Dependence on a limited number of industries can create vulnerabilities and limit opportunities for development in other sectors of the economy.

Table 7. Ranking of the 10 most lagging regions, 2005.

Region	Gross regional product, M rub	Population, thousand people	GRP per capita, rub.
Ingush Republic	6 022	487	12 366
Altai Republic	9 122	204	44 606
Tyva Republic	9 767	308	31 660
Kalmik Republic	11 347	288	39 305
Jewish AR	11 485	186	61 550
Adigeya Republic	13 299	442	30 042
Karachay-Cherkess Republic	14 467	431	33 529
Chukotka AR	15 124	50	299 495
Magadan region	23 670	171	137 940
Osetia Republic	25 324	702	36 059

Similar to the top 10, the list of the top 10 laggards remained largely unchanged. No one managed to escape from the 10 most lagging behind. Such a result leads to the hypothesis that investments are mainly received by the most developed regions, as a result, it is necessary to evaluate the correlation between the level of development of regions and investments in these regions.

Table 8. Ranking of the 10 most lagging regions, 2019.

Region	Adjusted GRP, M rub.	Population, thousand people	Adjusted GRP per capita, rub.	Change in ranking (2005-2019), %
Jewish AR	17 936	158	113 302	▼4
Altai Republic	18 787	220	85 316	-
Ingush Republic	20 139	507	39 714	▲2
Kalmik Republic	23 181	271	85 506	-
Karachay-Cherkess Republic	24 754	465	53 178	▼2
Tyva Republic	25 347	327	77 420	▲3
Chukotka AR	31 100	50	618 285	▼1
Adigeya Republic	37 759	463	81 534	▲2
Osetia Republic	45 380	696	65 117	▼1
Kabardino-Balkaria Republic	46 676	868	53 749	▼1

Correlation analysis shows that there is a statistically significant positive linear relationship between the presence of fixed assets and capital investment as private (bank loans) as well as public. Hence, the tendency to invest in already more favorable and economically developed regions can be noticed.

Table 9. Correlation analysis, 2019.				
Variables	(1)	(2)	(3)	(4)
(1) GRP	1.000			
(2) FA	0.988	1.000		
	(0.000)			
(3) CapInv	0.977	0.973	1.000	
	(0.000)	(0.000)		
(4) Loans	0.850	0.864	0.897	1.000
	(0.000)	(0.000)	(0.000)	
GRP – gross regional product, FA – fixed assets (main funds) in the economy, CapInv – investments in fixed capital, Loans – attracted bank loans; all in M rub.; (0.xxx) – p-value				

Thus, there is a problem of lending to poor regions. The main private investors are institutional development banks such as Vnesheconombank (VEB), the Russian Agrarian Bank (RAB), Gazprombank and the Russian Development Bank (RBR). At the same time, these banks have close ties either with the state or with state corporations.

One of the main problems of lending to the poor regions of Russia is the lack of a sufficient financial base for the development of local business and infrastructure. Poor regions often lack large businesses and other sources of income, making it difficult to provide credit. Another problem is the lack of a reliable collateral base. Poor regions often lack valuable assets that can be used as collateral for a loan. Banks are reluctant to risk lending without secure collateral, making it even more difficult for poorer regions to access credit.

In addition to financial and economic reasons not to invest in the regions, there are also legislative ones. The majority of private loans are subject to a general restriction on not exceeding the budget deficit of the constituent entities of the Russian Federation over the total budget revenues of the constituent entity of the Russian Federation by 15% in case of obtaining a loan. Also, obtaining a private loan is complicated by the rule of the general deadline for their provision of 5 years. Additionally, there is a limiting principle of general (cumulative) coverage of expenses, as well as the amount of public debt and the debt stability of the region, as well as the release of previously attracted loans as a result of restructuring (Budget Code of the Russian Federation, art. 18, 19, 26, 29, 30, 31, 40, 48, 49, 52, 93).

It was revealed that the regulated rules for the implementation of the analyzed tools poorly consider the real needs of the regions for funds for infrastructure development. In addition, the postponed nature of the start of repayment of the main part of budget loans (after three years) and the restrictions laid down in the regulatory framework for the regions on the conduct of debt policy create long-term risks of budgetary sustainability for most constituent entities of the Russian Federation due to a sharp increase in debt servicing costs and a likely shortfall in income from ongoing projects (Abdulaev et al., 2023).

Hence, regions with more prosperous economic conditions are a higher priority target for banks and it is easier for them to obtain permission for lending. In support of this, it can be noticed that the regions in the top 10 in terms of GRP receive the largest private loans, as presented in Table 10.

Table 10. Regions by attracted private loans, 2019.

Region	Attracted private loans, M rub., 2019	Place in the ranking of regions by GRP
Moscow	268 552	1
Yamalo-Nenetsk AR	188 544	5
Moscow region	110 756	3
Chelyabinsk region	69 978	12
Hanty-Mansi AR	61 025	2
Amur region	60 508	57
Tatarstan Republic	55 450	6
St. Petersburg	47 660	4
Krasnodar krai	46 601	7

Since private lending goes to more favorable regions, it contributes to regional inequalities, which shifts the burden of leveling the economic situation on the state. However, the government does not always prioritize reducing regional inequality and may decide in favor of investment efficiency. For instance, in 2021 a third of the budget of state infrastructure loans was distributed among five regions (Moscow, Moscow region, St.Petersburg, Krasnodar krai and Rostov region) that are among the ten most developed (Ministry of finance report).

Hence, a paradox arises that if economic efficiency is prioritized as the main goal, inequality among regions tend to increase. Meanwhile, when the goal of reducing uneven regional development is prioritized, there is a high risk of reducing the effectiveness of investments. Ultimately, it makes extremely difficult for the state to solve the problem of equalizing the socio-economic development of the regions.

The results obtained for the regions of Russia differ significantly from the results in a similar study (Li et al., 2023) for the provinces of China.

Table 11. Summary of Tobit regression analysis results (n=15).

Comprehensive gap	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Constant	-12.146	4.203	-2.89	.015	-21.397	-2.896	**
IFR	-1.236	.531	-2.33	.04	-2.404	-.067	**
Highway mileage	-.001	0	-4.34	.001	-.001	0	***
Urbanization rate	14.148	7.233	1.96	.076	-1.772	30.067	*
Gov. intervention	.505	.205	2.46	.032	.054	.956	**
var(e.CG)	.002	.001	.b	.b	.001	.004	

Table 12. Summary of regression analysis (Li et al., 2023; n=14).

Item	Regression Coefficient	Standard Error	z Value	p Value	95% Confidence Interval (CI)
Intercept	0.967	0.103	9.422	0.000	0.766~1.168
Infrastructure financialization rate	0.481	0.186	2.592	0.010	0.117~0.845
Highway mileage	−0.005	0.002	−2.110	0.035	−0.009~−0.000
Urbanization level	3.325	1.647	2.019	0.043	0.098~ 6.552
Government intervention	−1.998	0.661	−3.022	0.003	−3.293~−0.702
Log (Sigma)	−4.006	0.189	−21.196	0.000	−4.376~−3.635

The main reasons for the difference can be revealed through the system of fiscal federalism. A paradox can be observed, despite the fact that China is a unitary system, it presents

a lower level of centralization than Russia. Kadochnikov (2020) notes that the distribution of power and authority between the central government and the provinces in China is more balanced than between the central government and the regions in Russia. The provinces of China have greater financial independence than the subjects of the Russian Federation. The reason is a presence of broader powers to collect and use tax revenues at the regional level. Moreover, the Chinese provinces have the right to modify the tax structure, which gives them greater flexibility in shaping their income and expenses.

Russia's efforts to implement fiscal federalism have not been successful in terms of regional budget revenues and expenditures. In contrast, China demonstrates higher levels of fiscal decentralization (Kadochnikov, 2020). However, a paradox arises when comparing the two countries' budget legislations. Although Russia has the required provisions for fiscal federalism in its Budget Code, centralization of economic and fiscal power prevails. On the other hand, China's Budget Law lacks these provisions, yet decentralization of public finances is not hindered due to its constitutional principle of centralism.

China appears to have a higher level of fiscal decentralization compared to Russia when examining consolidated public revenues and expenditures (Jiang & Zhao, 2012). However, direct comparisons of their public sector budgets are not justified due to differences in the treatment of government-managed funds, state extrabudgetary funds, accounting practices, and the presence of government-owned shares in private corporations in Russia. Similarly, China still includes revenues and expenditures of state enterprises as state capital operations rather than traditional fiscal statistics. These variations contribute to different fiscal roles played by subnational governments in the two countries. These divergent approaches are shaped by political ideologies, socioeconomic factors, demographic factors, and administrative considerations (Wong, 2013; Kadochnikov, 2020). Further the potential justifications for these distinct approaches to subnational public finances in China and Russia is considered.

In China, the central government maintains significant control over local authorities, making it politically viable to delegate power and funding to them. This is not the case in Russia, where central authorities and regional ones vie for resources due to a strict division of ownership and jurisdiction based on federative principles. Consequently, the central government in Russia has a relatively limited role in the budget system, partly because of the stronger political and administrative bargaining abilities of local authorities.

Further, each of the variables listed in tables 11 and 12 will be discussed in more detail. The negative statistically significant impact of IFR on the comprehensive gap can be explained by the fully government-led economy of Russia, as well as the high level of participation of the federal center in the development of regions. Moreover, it should be noted that private investors are primarily motivated by financial returns, which may lead to the concentration of investment in economically prosperous regions or projects with higher profit potential. Further, it is worth considering the institutional influence, within which the use of private capital in Russia may be less efficient. Private ownership and management of infrastructure may lead to increased costs for consumers, reduced access for marginalized communities, and limited public accountability. This confirms the fact that in Russia private funds are invested in regions where the institutional environment is more developed.

In China, since the beginning of economic reforms in the late 1970s, the country has been implementing a policy of decentralization in the economic sphere. Local governments have gained more freedom in attracting and distributing investments. Major cities and provinces in China such as Guangzhou, Shenzhen and Shanghai have actively attracted both domestic and foreign investment to develop the local economy. They were provided with tax preferences and other incentives to provide favorable conditions for entrepreneurship and attract investors. Moreover, this has led to a significant increase in private investment in these regions and strong economic development. Hence, it can be a reason of positive influence of IFR on comprehensive gap. On the other hand, in Russia, fiscal decentralization has not been as successful in

stimulating private investment in the regions. During the process of transition from a centralized economy to a market economy in the 1990s, local governments gained more financial independence and responsibility. However, due to the weak development of the institutional environment, they could not effectively use budgetary resources to attract investment (Granberg, 2004). The lack of a unified and clear investment attraction policy, as well as legislative and administrative obstacles, have limited the growth of private investment in Russian regions.

Both studies show very similar results on the impact of infrastructure development (proxy variable of highway mileage) on the comprehensive gap. Even though highway mileage is a statistically significant variable, it has little or no effect on regional inequality reduction. (β for Russia is -0,001; β for China is -0.005). While infrastructure is developed it can improve connectivity between regions, however infrastructure cannot be developed equally in all areas. Hence, infrastructure development can lead to unequal access to opportunities for different regions.

The urbanization rate variable also showed similar results in both studies. The process of urbanization naturally and expectedly increases the inequality gap among regions. People tend to move to large cities, which are usually centers of economic growth and investment. As a result, more developed urban areas receive more investment, provide more jobs, and have better economic prospects. This focus on the development of urban infrastructure and the economy can lead to increased inequalities between urban and rural regions.

Interesting differences are observed in the impact of government intervention on regional inequality. While in Russia government intervention increases the inequality of regions, in China the opposite situation is observed. It can be explained through economic systems and policy approaches. Russia transitioned from a centrally planned economy to a market-based system in the 1990s, while China adopted a mixed socialist market economy. These differences shape the nature and impact of government intervention on inequality. Indirectly, this is evidence that China puts the first priority on reducing the inequality of regions, and then on investment efficiency, while for Russia there is no such clear rule.

The study analyzes the differences in government intervention and its impact on inequality in Russia and China. It highlights the role of fiscal decentralization and the level of centralization in the two countries. In China, there is a higher level of fiscal decentralization, allowing local authorities more freedom in attracting and distributing investments, which has led to strong economic development and private investment in certain regions. Meanwhile, Russia's fiscal decentralization has not been as successful in stimulating private investment due to weak institutional development in several regions and lack of clear investment attraction policies. Furthermore, infrastructure development and urbanization are shown to have mixed effects on inequality. While infrastructure development can improve connectivity, it may lead to unequal access to opportunities. Urbanization tends to increase inequality as people migrate to regions, which are centers of economic growth. Notably, government intervention has different effects on inequality in the two countries, increasing it in Russia and decreasing it in China, reflecting the differences in their economic systems and policy approaches.

As previously mentioned, the influence of infrastructure financialization on urban and regional development is diverse and intricate, encompassing aspects such as regional development, urban sprawl, local government debt risk, and social benefits. This study primarily focuses on the impact of infrastructure financialization on URD. However, due to limitations in time and space, this research does not thoroughly analyze or discuss the impacts on other sectors and countries, as well as the impact of various lending tools, methods and policies on reducing inequality among regions.

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Human Well-being in Urban Environment: International Review of Objective Rations

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Abstract:
Academic research interest in human well-being in the urban environment has grown dramatically over the past decade. This emphasis is primarily associated with the global transition to the principles of sustainable development and continuously increasing migration of rural populations to urban centers. The Covid-19 pandemic and its consequences provided additional stimuli that increased interest in this topic among business and academic communities. As the current statistics demonstrate, issues of human well-being are developing most actively in the interdisciplinary field, while the available research methodology explores both subjective and objective well-being of a person. In this study, eight international city rankings were analyzed according to the criterion of the well-being of citizens and included both objective and subjective indicators of a person's well-being in the city. In our opinion, the most promising and correct is the methodology for assessing well-being that includes both objective and subjective assessment indicators. Based on this approach, our analysis includes three rankings (37.5%). Among the objective indicators of the well-being of urban residents, t environmental and work aspects are in the lead and included in all the rankings. The results obtained during the study can be used to improve the current international rankings of cities in assessing the level of well-being of citizens. The rankings of cities according to the level of well-being can be effectively used for case study analysis identifying the best and most effective policies for the development of the level of well-being of citizens.

Keywords*: well-being, city ranking, urban environment, objective rations, sustainability.*

Introduction

The history of mankind is the search and formation of adequate socio–economic systems that provide the necessary level of human well–being as the highest social value. People carry out their activities in ever changing natural and man–made space–time coordinates, as well as in the virtual–temporal and value-oriented sphere of dynamically formed social and personal ideas, which are expressed in the relevant regulations of living conditions.

According to the international scientific citation database Scopus, more than 10,414 academic papers were published on the topic of human well-being in 2021 across the world. It should be noted that in 2013, this figure stood at 2,744 articles only. Thus, there was a 3.8 times increase in research on human well-being during the eight-year span, i.e., demonstrating a +50% annual increase. The share of publications in the field of business and economics on the topic of human well-being constitutes almost 40% with 3,472 published articles addressing the issues of assessing human well-being. As a result, not only the topic of human well-being has become more popular in global academia, but it has also acquired a range of interdisciplinary characteristics.

At the same time, it is important to point at the influence of megatrends on human well-being issues. One of the pronounced global trends of our time is the increasing continuous migration of the world's population to cities, which increases urbanization and overcrowding. In this context, the well-being of urban residents acquires additional urgency for modern

academic research and practical application [1, 2, 3, 4]. The study of the well-being of urban residents has also facilitated the emergence of such a phenomenon as well-being rankings for cities and countries [5,6,7]. In our opinion, several factors contribute to this.

Firstly, today the world is involved in the global "war for talents". In the modern globalized economy, human capital contributes to national economic development. Higher concentration of knowledge, experience, creativity, and innovation in a particular region allows it to develop faster than others, become richer, and invest more resources in the development of environmental comfort programs. . Next, a "positive feedback loop" phenomenon attracts more talents to this region who prefer to go to a place where they find a community of people close in spirit and where they will be able not just to live, but also communicate and generate new ideas.

Talents are one of the most mobile categories in the modern world, and countries and businesses "hunt", i.e., pursue them. As a result, talents have an option to choose where to work and live. One of the important factors affecting their choice is the living conditions in a particular city. The comfort and development of the urban environment, the peculiarities of the city structure, the presence of not only high-quality infrastructure, but also intangible factors, such as communities and additional spaces supporting high-quality social and business contacts are all taken into account by professionals around the world. For each person, an integral indicator of the quality of life is the level of perceived well-being that affects personal happiness. This is an integral indicator that covers a variety of aspects of life. There are different models that comprehensively describe and show the key aspects important for human happiness. Among them are professional, social, public, financial, as well as physical and mental health aspects, and the quality of the urban environment. The study of these factors is actively conducted by researchers around the world and these factors are included in the continuously evolving data basis of cities' rankings. Today, a modern city is supposed to develop according to a scenario that contributes to the well-being of its residents and positively affects their quality of life. In the long term, this approach works to attract and retain key talents in the region that are important for its development.

Secondly, one of the global trends today is human centricity. This is an approach that implies the design and development of any systems with a focus on humans. This approach encourages cities and businesses to create comfortable conditions for any person inside such a system regardless of their socio-economic background. Moreover, it establishes conditions for the disclosure of a person' potential, realization of opportunities, and deeper involvement in the life of an organization or city, making a significant public contribution. In this regard, cities today compete in terms of creating conditions for the well-being of their residents, and such an approach is increasingly becoming a guideline when setting goals for the development of any region.

Thirdly, the pandemic and the subsequent focus on remote or hybrid work unexpectedly opened opportunities for professionals to choose a city where they can live for any period. A separate phenomenon has appeared called digital nomads. These are people who choose regions that meet their requirements for living. Often, the key factor is personal happiness and the ability to provide for their own needs in a variety of aspects. It is in this regard that the development of the region through the prism of assessing the well-being of its residents as a comprehensive system allows for creating conditions that attract modern active professionals. They, in turn, spend financial resources earned in different countries in a particular destination. As a result, they create new consumption models and become a driver of local business development.

Fourth, while planning business development scenarios, companies evaluate the possibilities of opening production facilities or offices in different countries and cities. One of the key evaluation factors in this case is the possibility of attracting talents needed for business in a particular region. The relocation capabilities of the region are also considered, i.e. how easy or difficult it will be to attract the needed specialists and provide them with a decent quality of

life. Such costs, entailing attracting local professionals and specialists from other regions ultimately affect the creation of jobs in a particular city. This drive is aimed at generating additional taxes, as well as attracting people who are willing to spend their money in this destination.

Methodology

This article is focused mainly on the analysis of objective indicators of well-being while analyzing modern city rankings. This approach is currently popular among many researchers [8, 9, 10]. The research approach is based on the Van Praag concept [11], according to which the objective well-being of a person is considered in six areas, namely work, and finance, well-being of living conditions, well-being of the environment, health, and leisure. In this article, the analysis of modern ratings of cities for assessing the level of well-being of citizens was carried out by methods of comparative and qualitative analysis based on the concept of objective human well-being developed by Van Praag [11].

Analysis

Table 1 presents various rankings of cities based on the level of human well-being, which consider different aspects of urban life: work, finances, living conditions, environment, health, and leisure. The indicators used in the rankings that we have observed are divided into the following categories: work, finance, living conditions, environment, health, and leisure. Some of the rankings include indicators that cannot be assigned to any aspect. Thus, an additional column 'Other' is included. In total, eight rankings are analyzed.
The Knight Frank rating [12] uses eight indicators, such as:
- Hours worked per vacation day.
- Level and diversity of private investment
- Green space %
- Sunshine hours
- Traffic free of congestion (traffic without traffic jams)
- Safety
- Healthcare
- Happiness

As a result of the distribution of indicators by the categories under study, the living conditions and leisure categories in the Knight Frank rating are not considered, and the environment is assessed by four indicators. The categories of work, finance, and health are measured by one indicator.

The Techtalk rating [13] includes fifteen indicators, seven of which assess the state of the environment. The category of finance is evaluated by two indicators: monthly salary and youth unemployment. Human health in this ranking is also assessed by two indicators: the quality of health care and mental health. The financial sector is assessed by living expenses and expenses for children. Living conditions and leisure, as in the Knight Frank rating, are not evaluated by any indicators.

The Mercer quality of living rating [14] does not have an open access to its methodology, but it is stated that they assess thirty-nine factors among following categories: Political and social environment, Economic environment, Socio-cultural environment, Medical and health considerations, Schools and education, public services and transport, leisure, Consumer goods, Housing, and Natural environment. All these categories were sorted into seven spheres that we had initially. Environment is assessed by three indicators, while leisure and living conditions are assessed by two. At the same time, work and health are rarely measured with only one indicator in each category. Finally, the finance sphere is measured by the economic environment indicator.

The Vaay rating [15] includes sixteen indicators.   Ten indicators assess the state of the environment. The remaining six indicators are distributed as follows: two evaluate work, one evaluates finance, and three evaluate the health sector. The spheres of living conditions and leisure remain unmeasured.

The Urban environment quality index [16] observes the quality of urban spaces in two dimensions of evaluation, i.e. urban spaces and assessment criterions. Urban spaces comprise housing and adjacent spaces, public and business infrastructure and adjacent spaces, street network, green spaces, social infrastructure and leisure, and the entire metropolitan area. Assessment criterions include the level of safety, level of comfort, level of ecologically friendliness, up-to-dateness   and relevance, identity and diversity, and effectiveness of management.   The urban spaces and assessment dimensions create 36 precise indicators generalized for a better comprehension. The indicators of city assessment fall into four categories. The first one is the structure of the urban economy accounting for the work category, followed by the housing conditions and utilities quality, which correspond to living conditions. Urban form diversity, public services, urban governance, car accidents, traffic congestions, walkability, urban spaces accessibility, green spaces, and transport indicators assess the quality of urban environment, focusing on either the social aspect of urban life or the built environment.

Table 1. Examined ratings with the used indicators.

№	Ratings of cities by well-being level	Objective indicators of human well-being[1]						Subjective indicators of human well-being
		Work	Finance	Living condi-tions	Environment	Health	Lei-sure	
1	The Knight Frank: City Well-being Index[12]	Hours worked per vacation day	Level and diversity of private investment		Green space %, sunshine hours, traffic free of congestion, safety	Healthc are		Happiness
2	The Techtalk: Best Cities Well-being Index[13]	Monthly salary, youth unemplo yment, city innovati on	Living costs, childcare costs		gender equality, safety, LGBTQ acceptance, vegan friendly, green spaces, CO_2 emissions, traffic	Health care quality, mental health		Happiness

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[1] Van Praag, B. M., Frijters, P., & Ferrer-i-Carbonell, A. (2003). The anatomy of subjective well-being. Journal of Economic Behavior & Organization, 51(1), 29-49.

#	Name							
3	Mercerqualityofliving [14]	School and education	Economic environment	Consumer goods, housing	Political and social environment, public services and transport, natural environment	Medical and health considerations	Socio-cultural environment, leisure	
4	The Vaay: Stressful Cities Index[15]	Unemployment rate, social security	Financial stress		Safety & security, gender equality, minority equality, density, traffic congestion, weather, air pollution, noise pollution, light pollution, socio-political stability	Mental health, access to healthcare, covid response stress impact		
5	Urban Environment Quality Index [16]	Urban economy structure		Housing conditions, utilities	Urban form diversity, public services, urban governance, car accidents, traffic congestions, walkability, urban spaces accessibility, green spaces, transport		Diversity of leisure activities, sports infrastructure	

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6	City prosperity initiative - Perception Index [17]	Local economic development, employment	Municipal finance	Adequate housing, energy and ICT	Environmental sustainability, safety and security, gender and youth inclusion, economic inclusion, social development, urban mobility, urban governance, urban form, urban land, public space			
7	Quality of life in Russian cities Index [18]	Income, job, employment, education, work-life balance		Housing conditions, location of residence, consumption of goods and services, waste management	Transport, road quality, public spaces, safety, urban ecology, human rights, level of trust in society	Health, medical access	Leisure, socialization	Satisfaction of life, future life evaluation
8	Global Liveability Index 2022 [19]	Education		Housing, consumer goods, sewage, telecommunication, electricity	Crime and safety, weather, quality of air, water and parklands, social and religious rights, services, corruption, roads, transport	Health care accessibility	Cultural diversity	

The last two indicators evaluate the leisure sphere of urban life by the diversity of leisure activities and the quality of sport infrastructure. The next index is the 'Perception index' developed by the city prosperity initiative [17], which is a part of the UN Habitat. This index

assesses four spheres: work, finance, living conditions, and environment. Many indicators were assigned to the Environment category. Local economic development, adequate housing, energy, ICT, and municipal finances fall into the following categories: work, living conditions, and finance, respectively. Health and leisure are not evaluated. The indicators in the environment category can be divided into the physical environment, which consists of urban form, urban land, public spaces assessment, and the social environment. The latter is represented by gender and youth inclusion, safety and security, and urban mobility among other factors.

The Quality of life in Russian cities index [18] is created to measure the well-being of the Russian citizens. Contrary to other examined indices, this one has fewer indicators in the environment category compared to other categories within this rating. Income, job, employment, education, and work-life balance refer to the work sphere covering its various aspects. Housing conditions, location of residence, consumption of goods and services, waste management account for living conditions, while transport, road quality, public spaces, safety, urban ecology, human rights, and level of trust in society fall into the environment category covering not only physical environment quality, but social environment as well. Health is measured by total health and access to medicine. Leisure possibilities and possibilities of communication with friends and family are two major measurements of leisure. Besides objective indicators, this index includes two subjective indicators, which fall into the 'Other' category, namely satisfaction with life and future life evaluation. Thus, it is a multidimensional index which considers both objective and subjective evaluation of the urban environment.

The Global Liveability Index [19] is the last assessment tool in this study. This index assesses the cities' appeal and attractiveness for living in them. It has seventeen indicators that fall into five spheres: work, living conditions, environment, health, and leisure. Three of these categories are assessed by one indicator only: education, healthcare accessibility, and cultural diversity refer to work, health, and leisure spheres, respectively. Moreover, healthcare accessibility is a common indicator in the examined ratings and has an immediate relation to health. However, education and cultural diversity are indirectly connected to their spheres. Thus, work and leisure are not well represented in the index. Living conditions are assessed through housing conditions, consumer goods access, and various utilities (telecommunication, sewage, electricity). Crime and safety, weather, quality of air, water and parklands, social and religious rights, services, corruption, roads, and transport are the indicators that evaluate the quality of the environment. Some indicators consider the social environment and others consider the physical environment. It is generally assumed that weather influences a human's well-being living in a city.

Results

According to conducted analysis, we see that the environment and work spheres are included in all ratings. Only four ratings measure leisure. Living conditions and finance are included in five ratings. Six ratings assess the health sphere. To conduct the further analysis, we created a matrix of indices and ratings included in the research and all indicators used (Annex 1). This matrix illustrates which indicators are most common in the studied indices. For instance, healthcare and safety levels are the most examined indicators among given selection and included into seven and six indices, respectively. The next most used parameters are socio-political stability, green spaces, and housing conditions. Most indicators are unique and quite specific, requiring generalization. Further research may imply the synthesis of given indicators into broader thematic groups, which are shown in Graph 1.

Graph 1 shows how the indicators in ratings are divided into thematic groups within the observed spheres, according to Van Praag's [11] conceptualization. Environment sphere is the most measured: it is included in all ratings and the number of indicators, and their usage is the highest. There are twenty-one indices with fifty-five mentions that assess the environment in eight ratings. Moreover, these indicators can be divided into two types: urban environment and

social environment. Each of them still has the biggest number of mentions, i.e., thirty and twenty-five, respectively.

We also discovered that there are eight indicators in ratings measuring Work and nine that assess Housing. Nine mentions go for work characteristics and eight for work environment. Housing sphere indicators are divided into three types: built environment, utilities, and living environment with six, five, and five mentions, respectively.

Health sphere is assessed by five indices distributed into three categories: mental health with three mentions, healthcare system with nine, and an impact of the environment on health with one mention.

The next lower number of mentioned indices is the leisure sector, which includes four indices. They can be divided into two types: infrastructure for leisure and social opportunities, each of which has four mentions. At the same time, the finance sphere has the same number of indices, but has two times fewer mentions compared with the leisure sector. These four indicators show human finances and city finances. Finally, there are two subjective parameters with four mentions.
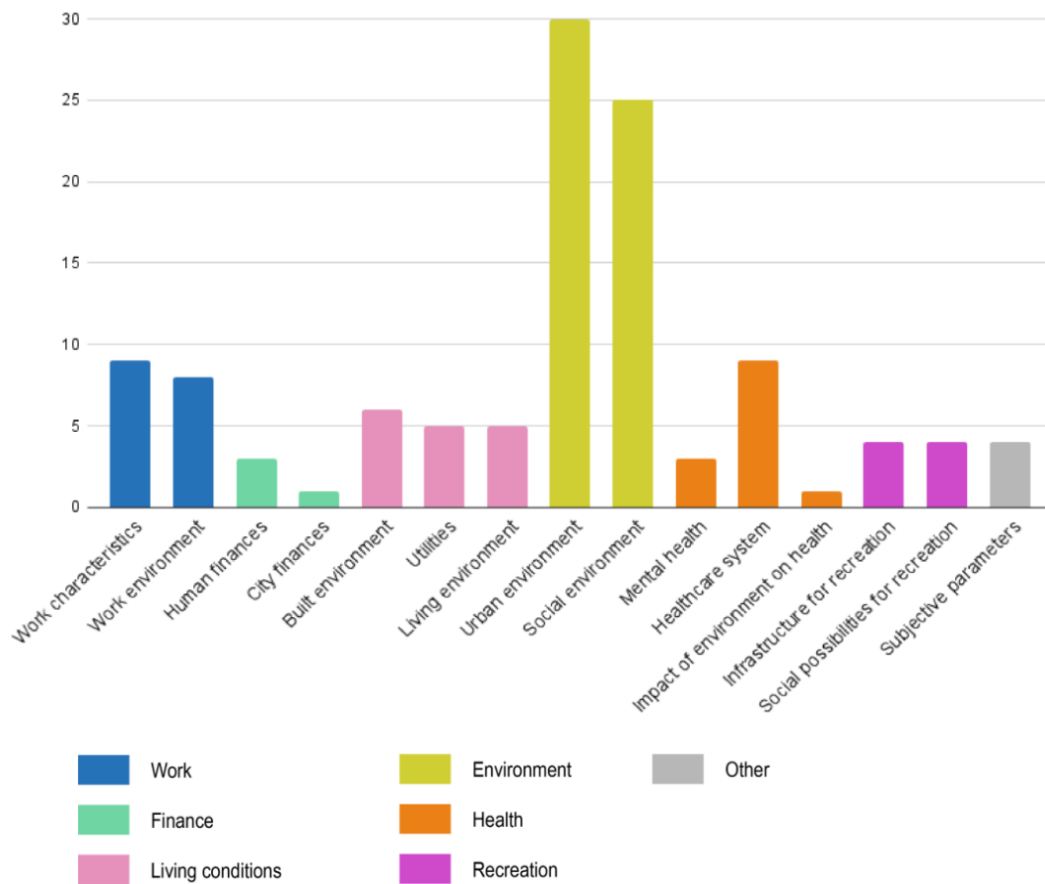
Figure 1. Number of mentioned indices by spheres in international well-being ranking of cities
Source: authors

Overall, these categories represent indicators most used in the ratings. Given that we studied the ratings of human well-being in cities, it is natural to find the environment in the leading position. While the urban environment is the most used category of evaluation when studying the well-being in a city, it is the social environment which comes after it. Society is a major part of urban life as its different aspects directly affect human well-being. In the examined ratings and indices, we found the indicators which may fall into a general framework

of understanding what may influence the citizens' well-being. However, there are also those which seem to fall out of it. For instance, climate indices, weather, and sunshine hours may measure the level of well-being. Furthermore, human finances tend to be underrepresented in the indices, as well as living conditions and health. In this way, city rankings evaluate the urban environment more than the other aspects of citizens' lives.

Discussions

The impact of the urban environment on human well-being has been addressed in many publications [20, 21]. As contemporary studies show, this issue can be considered from the standpoint of a person's active influence on the state, and formation and development of each of the main indicators of objective well-being (Figure 2). Reversely, this issue can be considered from the standpoint of the influence of the main urban elements of well-being on the level of well-being of a particular individual (Figure 2).
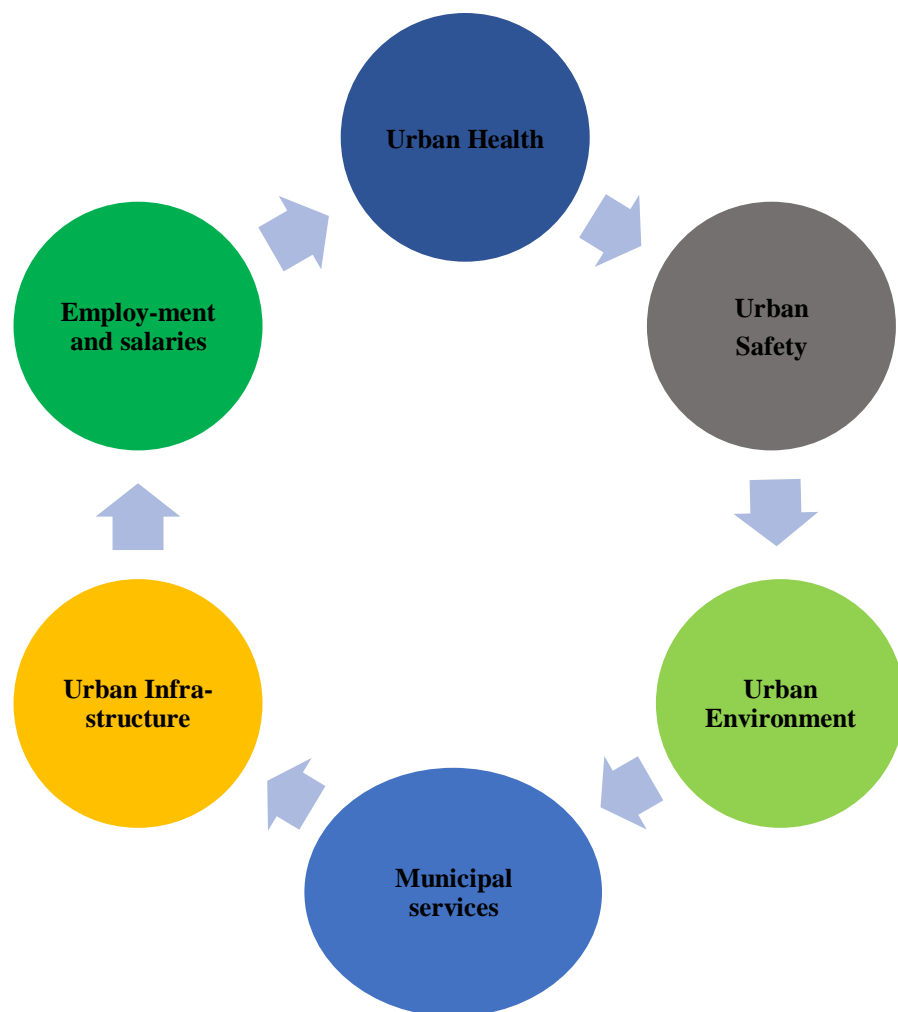
Figure 2. The impact of the city on the resident's well-being
Source: authors

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What factors are primary in this case and what factors occupy the secondary position has not yet been clearly defined because there are successful practical cases implementing either approach. These issues require additional research and will be tackled in future studies.

Recommended methodology for evaluation of cities by well-being.
Table 2 presents the author's methodology for evaluating the city's well-being. It includes two groups of well-being categories, namely subjective and objective ones. Subjective evaluation is made by interviewing citizens. Objective rations are calculated by individual methodology for urban well-being in subgroups. Finally, all rations are calculated into integrative ration in accordance with the Balanced Scorecard method [21]. The importance and value of each ration in integrative ration by percentage is determined according to the experts' opinions. The level of integrative ration could be informative and could show high, middle, or low levels of the urban wellbeing level in the city. This methodology could be useful for city ranking by well-being criteria. Objective group of rations could be calculated in dynamics due to statistical data. Subjective ratings are calculated on the basis of the citizens' interview results.

Multidisciplinary approach presents the opportunity to combine the effectiveness of both subjective and subjective methodology in urban well-being evaluation.

Table 2. Recommended indicators.

Group	Subgroup	Rations
Objective rations	Work	(Un)employment Rate
		Monthly salary (income)
		Social security and employee rights protection
		Innovation, urban economy
		Education
		Work-life balance
	Housing	Housing conditions
		Consumer goods
		Sewage & garbage collection
		Electricity & other commodities
		Telecommunication
		Green spaces
	Environment	Safety
		Crime rate
		Traffic congestions
		Weather
		Transport
		Roads
		Public spaces
		Public services
		Minority equality and human rights
		Urban form (design)

		Urban governance
		Urban mobility
		Socio-political stability
		Environmental sustainability
		Air pollution
	Health	Mental health
		Medical access
		Healthcare
	Leisure	Socio-cultural environment
		Leisure
		Leisure infrastructure
Subjective rations	Happiness/ Current life valuation	

For structuring objective rations, we used the concept of objective well-being developed by Van Praag, where he presented 6 main elements of objective human well-being, namely work, finance, housing, environment, health, and leisure [11].

Also, we are convinced that Maslow Pyramid [22] affects the share and value of rations in well-being evaluation. The basic elements from Maslow Pyramid [22] should have more value in integrative rations in the Balanced Scorecard, but exact data .

Conclusion

According to the research results, objective indicators prevail in the international metrics of urban human well-being. Subjective indicators are rarely used. Out of eight ratings analyzed, only three included subjective indicators of well-being, which is less than 37.5%. Among the objective indicators of the well-being of urban residents, the sphere of the environment and work are in the lead and are included in all the rankings. Also, it can be concluded that in accordance with the concept of subjective human well-being by Van Praag [11], the indicators of objective well-being are fully presented and affect all areas of objective well-being in modern city ranking.

Historically, there has been a focus on the environment and employment as the basic elements of human well-being in accordance with Maslow's hierarchy of needs [23]. It is noteworthy that leisure indicators are quite common and have the potential to become widely used in city rankings for well-being. This is the result of a global commitment to sustainable development and the development of sustainable cities (SDG 11). Hence, the global transition to the principles of sustainable development creates favorable conditions for the development and use of subjective indicators in city rankings.

Concerning the current research, it is important to note that in our opinion, the methodology for assessing well-being including both objective and subjective assessment indicators is the most promising and correct. Three rankings (37.5%) in our analyses are based on this approach.

The results obtained during the study can be used to improve the current international rankings of cities assessing the level of well-being of citizens and to create new ones. Direct rankings of cities by the level of well-being can be effectively used for case analysis and identifying the best and most effective policies for the development of the level of well-being of citizens. Limitations include…

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Annex 1. All indicators presented in the ratings

	Rating	The Knight Frank: City Well-being Index	The Techtalk: Best Cities Well-being Index	Mercerquality of living	The Vaay: Stressful Cities Index	Urban Environment Quality Index	City prosperity initiative: Perception Index	Quality of life in Russian cities Index	Global Liveability Index: Best and Worst Performing Cities
Work	Youth unemployment		✓						
	(Un)employment Rate				✓		✓	✓	
	Monthly salary		✓					✓	
	Social security				✓				
	Job position							✓	
	Innovation, urbane economy			✓	✓	✓	✓		
	Education			✓				✓	✓
	Work-life balance	✓						✓	

Category	Item								
Finance	Living costs		✓						
	Childcare costs		✓						
	Municipal finance						✓		
	Financial stress				✓				
Housing	Housing conditions			✓		✓	✓	✓	✓
	Consumer goods			✓				✓	✓
	Light pollution				✓				
	Sewage					✓			✓
	Electricity								✓
	Telecommunication								✓
	Waste management							✓	
	Location and neighborhood							✓	
	Urban noise				✓				
Environment	Green spaces	✓	✓	✓		✓			✓
	Safety	✓	✓		✓		✓	✓	✓
	Crime rate	✓							✓
	Car accidents					✓			
	Traffic congestions	✓	✓		✓	✓			
	Weather				✓				✓
	Transport			✓		✓		✓	✓
	Roads							✓	✓
	Walkability					✓			
	Public spaces						✓	✓	
	Public services			✓		✓			✓
	Density				✓				
	Vegan friendly		✓						

	Minority equality and human rights		✓		✓		✓		✓
	Urban form					✓	✓		
	Urban governance					✓	✓		
	Urban mobility					✓	✓		
	Socio-political stability			✓	✓		✓	✓	✓
	Environmental sustainability						✓	✓	
	Air pollution		✓		✓				✓
	Sunshine hours	✓							
Health	Mental health		✓		✓				
	Medical access			✓				✓	
	Environmentally friendliness					✓			
	Healthcare	✓	✓	✓	✓	✓		✓	✓
	Covid response stress impact				✓				
Leisure	Socio-cultural environment			✓			✓		✓
	Leisure			✓		✓			
	Leisure infrastructure					✓		✓	
	Socialization							✓	
Other	Happiness/ Current life valuation	✓	✓					✓	
	Future life expectations							✓	

Strategic Finance

Equity Crowdfunding: Choice of Companies for Investments on Crowdfunding Platforms

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Abstract:
This paper aims to shed more light on the relation between characteristics of issuing companies on crowdfunding platforms and their attractiveness to investors. We examine these links for 416 companies that conducted 656 funding rounds on the Seedrs crowdfunding platform (UK) from 2013 to November 2022. New evidence on the relationship between equity share offered, company's innovativeness and business model with attractiveness of issuing companies at crowdfunding platforms is provided. To investigate those relationships the regression analysis was used. A positive relationship between the attractiveness of the company for investors and the share of equity offered on the crowdfunding platform was found. The study demonstrated a direct relationship between the issuer's attractiveness and the number of patents a company has at the time of placement on a crowdfunding platform. The results of the study show that companies whose business model can be characterized as a mixed B2B/B2C are more attractive to investors than companies whose business model is different. Based on the results of the study, investors should be recommended to rely on certain quantitative and qualitative characteristics of issuing companies. Issuers need to consider what factors are the most significant for investors on crowdfunding platforms.

Keywords: *Equity share, business model, innovativeness, equity crowdfunding, crowdfunding platforms.*

Introduction

When attracting external financing, companies, especially small and medium-sized enterprises, face various difficulties. Many potentially successful companies are unable to enter the public stock markets due to high financial costs and the strict regulation of the initial public offering. Without access to the public market, startups and fast growing SMEs cannot raise funding through traditional financial mechanisms. A growing number of new business ventures are in need of large capital investments to develop their projects.

The development of information technology has led to the emergence of investment platforms on which companies have the opportunity to attract funding from a large number of investors. Equity crowdfunding (crowdinvesting) is an innovative way for companies to attract capital from a large number of investors in exchange for the share of companies' equity.

Despite all the potential opportunities of equity crowdfunding, not all companies manage to raise the necessary funding: they do not always manage to attract the target amount during the round. Obviously, the success of attracting financing through crowdinvesting is affected by a combination of factors that attract investors (Shafi, 2019). Companies have a goal aimed at successfully holding a round of equity crowdfunding, so it is important for them to realize what factors determine the choice of investors to adequately assess their chances of success when choosing this financing tool.

There are many academic papers and case studies on success factors of companies raising funds on crowdfunding platforms, investigating relationship between the companies' characteristics and their attractiveness to investors. Signori and Vismara (2016) were among the

first to highlight this problem and look at the link between the features of companies in which investors put their money on crowdfunding platforms and their financial performance.

Among multiple characteristics of issuing companies that tend to be related to the success of crowdfunding campaigns are issuers' innovative activities (Chang et al., 2012; De Vries et al., 2017; Hornuf, Schwienbacher, 2017), owners and managers characteristics, types of shares issued (Cumming et al., 2019, 2020), the size, age of the company and its industry, diversification of activities etc. (Nguyen et al., 2019; Walthoff-Borm et al., 2018).

Research hypotheses

The purpose of this study is to investigate the relationship between the attractiveness of a company for investors in the process of a crowdfunding campaign.

An analysis of the literature demonstrated that one of the determinants of a company's attractiveness to crowdinvestors is the share of equity that companies offer in exchange for funding on crowdfunding platforms. A number of researchers (Ralcheva, Roosenboom, 2016, 2019; Wachira, Wachira, 2022) prove that the larger the share, the more attractive the company for investors, justifying this by the fact that a larger share of equity allows investors to have more opportunities to get higher cash flows in future. However, in other studies (Ahlers et al., 2015; Vismara, 2015, 2018), the authors conclude that a large share of capital may indicate to investors about the low trust of the founders in the future of their company.

Hypothesis 1: There is a direct relationship between the attractiveness of a company to investors and the share of equity offered on a crowdfunding platform.

Another characteristic that attracts investors and determines the potential growth of a company's value and future cash flows is its intellectual capital. In many studies (Chang et al., 2012; Cumming et al., 2019; Hornuf, Schmitt, 2017; Ralcheva, Roosenboom, 2016; Signori, Vismara, 2016) as an indicator of intellectual capital companies use patents and trademarks. They demonstrate the innovativeness of the company and the presence of intellectual property, that could affect the attractiveness of the company for investors.

Hypothesis 2: The more patents a company has at the time of offering on a crowdfunding platform, the more attractive it is for investors.

Hypothesis 3: Companies that have trademarks at the time of offering on a crowdfunding platform are more attractive to investors than companies that do not have trademarks.

The authors (Angerer et al., 2017; Khansa, Arie, 2022; Lukkarinen et al., 2016; Mamonov, Malaga, 2018) when discussing the determinants of investment attractiveness for crowdinvestors, agree that companies with B2C business model are more attractive to investors. This is explained by the fact that this type of model is clearer to investors than B2B. At the same time, statistics show that B2B companies are much more likely to go public. There are no studies that examine the mixed B2B / B2C business model in the context of the success of crowdfunding campaign, which has the advantages of both models, and from our point of view, companies with such a business model will be more attractive to many investors.

Hypothesis 4: Companies whose business model is characterized as a mixed B2B/B2C model will be more attractive to investors than companies with different business models.

Methodology

To investigate the relationship between companies' characteristics and their attractiveness to investors on crowdfunding platforms, the following regression model was used:

$$InvAttract_i = \beta_0 + \beta_1 Equity_i + \beta_2 Firmsize_i + +\beta_3 Patent_i + \qquad (1)$$

$$+\beta_4 TMbinar_i + +\beta_5 BussMod_i + \varepsilon_i$$

In equation (1) the dependent variable $InvAttract_i$ — the ratio of raised funds to the initially stated amount of funds, characterizing the attractiveness of companies to investors on crowdfunding platforms, ε_i — random values; β_k, $k = 0, 1, ..., 7$ — unknown parameters; i — the number of the funding round on the crowdfunding platform.

Table 1 presents a summary of variables.

Table 1. Variables used in the regression analysis.

Variable	Description
Dependent Variable	
$InvAttract_i$	Company's attractiveness to investors on the crowdfunding platform. Measured as the natural logarithm of the number of investors who invested in the company during the crowdfunding round.
Independent variables	
Equity	Equity share offered by a company on a crowdfunding platform.
Patent	The number of patents registered by the company at the time of the offering on the crowdfunding platform.
TMbinar	A binary variable that reflects the presence of trademarks of the company. The variable is equal to 1 if the company owned at least one trademark at the time of the offering on the crowdfunding platform, and equal to 0 otherwise.
BussMod	A binary variable that is equal to 1 if the company's business model can be characterized as a mixed B2B/B2C model and equals to 0 if the company's business model is different.
Control variable	
firmsize	Company's size measured as a natural logarithm of the company's assets at the time of raising capital on a crowdfunding platform.

To test the hypotheses, a sample of 416 companies was formed that conducted 656 funding rounds on the Seedrs crowdfunding platform (UK) from 2013 to November 2022.

Results and conclusions

The results obtained in the research show that there is a direct relationship between the attractiveness of the company for investors and the share of equity offered by the company on the crowdfunding platform. This characteristic of the issue on the platform, positively perceived by investors, demonstrates how much of the company's capital potential investors will be able to own, what are the opportunities for them to impact company's governance, decision-making, and how much cash flow they can claim.

The study showed that there is a direct relationship between the attractiveness of a company for investors and the number of patents a company has at the time of placement on a crowdfunding platform. This is because patents not only allow a company to protect its intellectual property, but also give potential investors a high-quality signal about a company's R&D and innovativeness. The results of the study show that companies whose business model can be characterized as a mixed B2B/B2C model are more attractive to investors than companies whose business model cannot be characterized as a mixed B2B/B2C model. This can be explained by the fact that the mixed B2B/B2C model has the advantages of both B2B and B2C models.

In general, the most of research hypotheses could be accepted. Based on the results of the study, investors should be recommended to rely on certain quantitative and qualitative characteristics of issuing companies. Issuers need to consider what factors of attractiveness are most significant for investors on crowdfunding platforms.

Companies on crowdfunding platforms offering higher proportion of equity for investors, are more successful. It could be evidence of investors' confidence in companies, that aim to attract more money for large-scale investments that could ensure a future growth. Companies that use a mixed B2B / B2C business model, as well as more innovative companies having more patents are attracting larger number of investors.

Exploring of a wider range of success factors on platforms in different countries, including crowdfunding in emerging markets in the analysis, can shed new light on the study of this issue and expand the horizons of understanding crowdfunding as an important phenomenon in the world of business and finance.

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Is the Crowd Efficient? Opportunities for Crowdinvestors to Evaluate Investment Projects of Borrowing Companies on Investment Platforms

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Abstract:
Crowdfunding is becoming an increasingly popular tool for raising funds in the early stages of a company's life cycle. But the choice by borrowing companies of crowdfunding instead of financing from business angels and venture capital funds can distort the real assessment of the potential of the project for both borrowers and investors. Business angels and venture funds can provide borrowing companies not only with capital, but also with expert assessment, a professional team that can help in the implementation of the project, as well as social connections in the professional and business environment. This will provide a synergistic effect in the implementation of the project. At the same time, large professional investors at the project evaluation stage will determine the likelihood of future success.
This study, conducted as a case study, demonstrates that crowd investors on investment platforms cannot always determine the company's potential and, under the influence of the crowd effect and diffusion of responsibility, invest in a project that initially had low chances of success. This indicates the need for additional regulation of the crowdfunding market and the development of mechanisms to increase transparency and improve the tools and methods for assessing borrowers on investment platforms.
The results obtained are important in the discussion about the need to regulate the crowdfunding market and protect the interests of all participants.

Keywords: *crowdfunding, investment platforms, venture investments*

1. Main body of the paper

The size of the global crowdfunding market reaches $17.95 billion and is projected to grow by 29.1% per year (P2P Lending Market Size, 2023). Russia is no exception. In 2022, the volume of the Russian crowdfunding market, according to the Bank of Russia, amounted to 20.4 billion rubles, which is 48% more than in 2021, 13.8 billion rubles. (Overview of platform services in Russia, 2023) Along with other countries for which crowdfunding is a new phenomenon, market participants expect the rapid growth that began in 2019 since its legislative regulation to continue.

Entrepreneurs are turning to crowdfunding as a source of funding for a variety of reasons. This largely depends on the stage of the life cycle of the borrowing company (Paschen, 2017), so crowdfunding can be of different types in response to market demands: crowdlending, crowdinvesting, reward-based financing.

If we consider the early stage of the life cycle - the period of formation - then it is at this moment that the organization needs financing, which does not imply a return of funds in the form of regular payments of part of the debt and interest on the use of capital (as, for example, in the case of a loan). At this stage, the company may not be able to return the borrowed funds at all, because the return on them will be delayed in time.

Early funding is a common practice. Even though companies do not have access to traditional financial instruments (credits, loans), they can always turn to business angels and venture capital funds that specialize in this type of financing (Mason & Stark, 2004).

Thanks to the development of crowdfunding and, as a result, an increase in the availability of financing, borrowing companies have been able to raise capital at early stages not only from business angels and venture capital funds, but also from a wide range of investors on special investment platforms.

Raising capital through investment platforms can allow borrowers to avoid the disadvantages (limited funding, reorganization, or co-investor requirements) imposed by venture capital funds or, in the case of business angels, dependence on a single large investor who can get overly involved in the project and try to influence the company's business processes or its goals (Agrawal, Catalini & Goldfarb, 2014).

The difference between crowdfunding is that instead of one large investor, many small ones invest in the company. It can be both individuals and legal entities. But often the size of the share of an individual investor is insignificant and does not give him the opportunity to influence the company. That is, the borrowing company can count on raising capital from investors, whose rights will be limited by the contract proposed by the borrowing company itself (possibly including the conditions recommended by the investment platform).

This allows the borrowing company to minimize the possible risks associated with the impact on it in case of attracting financing from business angels and venture funds. But it is important to note the fact that for a young or just emerging company, such large investors carry not only risks, but also great opportunities.

Business angels are private investors who find search capital. Such investors are not always motivated only by making a profit from investments. What makes them different is that they consider considerations at the level of ideas. If private investment does not match the probability of the borrowing company, recommendations or contacts with other occurrences that are interested in this project can be identified.

The business angel relationship and earnings are not limited to fundraising. Attracting growth, coupled with the expertise and experience of an angel investor, may also require connections in the business environment to give a young company that synergistic need for rapid growth (Block, Fisch, Vismara & Andres, 2019).

Attracting financing from a venture fund also has positive aspects. The funds are designed for high-level specialists in various fields: industry specialists, financiers, strategic marketing specialists, etc. e. Their activity is aimed at investing in the company, maximizing their profit by increasing the value of the borrowing company (Davila, Foster & Gupta, 2003). Accordingly, it has proven beneficial in making the borrowing company professional and expensive. High level of expertise based on experience gained through many projects.

It is these qualities that can become a charitable initiative to seek funding. Venture investors, analyzing the project through the prism of their own experience and expertise, may refuse to finance the case, in their opinion, the prospect of the project. And if earlier the adoption would have been forced to decide about the judicial decision of its project: an attempt to implement the project on its own or aspiration from it - then now it needs a new accessible tool - crowdfunding.

Crowdfunding is not a panacea. Access to investment platforms - raising funds is not guaranteed. But this is a serious alternative to the first option of an attractive project discussed above.

The motives for the income of those who turn to crowdfunding in search of funding may be different. Among them, there may be refusals from large venture observations. And in this case, it is especially important to understand: do crowd investments have a sufficient level of expertise to evaluate unpromising projects, including fraud?

2.Method

To study whether crowd investments have a sufficient level of expertise for successful investment without involving large industry investors, the case study method was chosen.

In October 2022, on one of the Russian investment platforms (included in the list of investment platform operators of the Bank of Russia operating under Federal Law No. 259 of August 2, 2019 "On Attracting Investments Using Investment Platforms and Federation"), specializing in crowdinvesting (equity crowdfunding), borrower company Y (the name of the

company is hidden in the published part of the study) was selected among those who successfully completed the investment round.

The selection criteria were the completeness of the information provided, the availability of a business plan, the openness of the company and owners, its presence in social networks, the existence of a development plan, and the general attractiveness of the project for consumers.

Company Y met all the requirements. In addition, information was posted in the public domain that the company initially planned to raise funds from business angels and venture funds but abandoned this decision in favor of crowdfunding. As part of the investment round, company Y raised 30 million rubles. from 65 retail investors. The average investment amounted to 460 thousand rubles.

The selection of the research object was carried out among the companies that completed the investment round, since this was a confirmation that investors, having familiarized themselves with the information provided on the platform and in open sources, came to a positive conclusion about the prospects of the project and the reliability of the borrower.

The second stage of the study was to analyze the investment attractiveness of the company "Y" by a project team of HSE researchers. The team included researchers and practitioners in the field of finance, risk management, corporate governance, and management.

The analysis of company Y was also carried out based on open sources and information provided on the investment platform. Thus, researchers and investors had equal opportunities in terms of the availability of information for investment analysis.

After analyzing the investment proposal and the possibilities of company Y to implement it and achieve the stated goals, an unequivocal conclusion was given that the presented project is unrealizable, the company's statements are not supported by real data, the company's business plan cannot be implemented in the presented form, the stated goals are unattainable. In addition, during the analysis it turned out that the market has already had an unsuccessful attempt to implement such a project by a major industry player. Based on the results of which, he decided that such a project has no prospects in the market.

Thus, the results of the analysis were opposite to those obtained by private investors since they invested in company Y with similar access to information.

Having come to opposite conclusions about the investment attractiveness of company Y, the question of the expert capabilities of crowd investments became especially acute. Therefore, it was decided that, as part of the third stage of the study, it is necessary to re-analyze after a certain period during which company Y would have had time to dispose of investments, which would be reflected in both operating results and financial statements.

May 2023 was chosen as the moment for the analysis, after the publication of the company's annual financial statements. A gap of 6 months would allow company Y to dispose of the attracted investments, and the fact that the funds were raised more than two months before the end of the year would make it possible to track the movement of attracted funds through annual financial statements.

In April 2023, a month before the planned third phase of the study, Company Y's website announced that the company was suspending operations. In social networks, the owners of the company gave a more detailed comment, saying that "the idea did not take off" and the project was "paused".

Even though company Y attracted the required amount of investment, it was not able to implement the project, and the investors did not receive the expected income.

3. Empirical results and conclusions
Analysis of the results of the study leads to the following conclusions.

As a result of studying the issue from the point of view of the agency theory of whether crowd investments have a sufficient level of expertise for successful investment without attracting large industry investors, the results were obtained that attracting investments by a

borrowing company through an investment platform is not an obstacle for investors in obtaining and analysis of information about the object of investment.

Investors, acting as a principal, entrust their funds to an investment platform, an agent, while relying on its expertise and the scoring model for assessing the borrowing company. At the same time, the platform, as an agent, is interested in maximizing the number of loans issued and, accordingly, the commissions received from these loans. The agent is interested in maintaining an acceptable level of borrower defaults to maintain the interest of the principal in the investment platform.

The results obtained in the framework of the study using the case study method indicate that the agent does not have a monopoly on information about the investment object. The principal seeks only to reduce his transaction costs and share the risks with the agent, the investment platform, relying on its expertise. This logic is erroneous, because the platform is not responsible for the obligations of borrowing companies, receiving a commission at the time of issuing a loan, respectively, without taking on direct risks from non-repayment of the loan.

The presentation of the project on the investment platform in the eyes of the investor is a certain guarantee of the reliability of the project, because of which the investor will perceive the information presented on the platform less critically.

The decision to invest in a project can also be subject to the diffusion of responsibility. The investor, not possessing a sufficient level of competence for an independent analysis of the project, as an indirect assessment of the potential of the project, is guided by the actions of other investors. If an investor has already invested in a project, this may be a false signal to them that the project will be successful (Adhami, Gianfrate & Johan, 2023). While among investors there may not be those whose decision is based on expert assessment or the analysis itself is incorrect. This is confirmed by the study.

Diffusion of responsibility in crowd investing can have a significant effect, as private investors will rely on the actions of other private investors. This could negatively impact the crowdfunding industry as it creates a risk of opportunistic behavior among borrowing companies. Borrowers may deliberately distort expected results in order to attract more investment, knowing that investors, firstly, are less careful in selecting companies, even if expert investors do not invest in a project, there are a large number of investors who under the influence of the diffusion of responsibility effect will make a positive investment decision; secondly, the likelihood that a large number of private investors with relatively small amounts of investment will decide to recover funds from the borrowing company in court is much lower and is also subject to the phenomenon of diffusion of responsibility, and the investment platform, having received a reward at the time of issuance of the investment, will be more formal relates to the recovery process.

The conclusions drawn from the results of the study suggest that crowd investments in the conditions of limited rationality of investors need additional regulation and supervision. This concerns both the protection of the interests of all parties, and the development of measures aimed at increasing the transparency of the actions of investment platforms, and the creation of tools to increase the level of expertise of projects and evaluate borrowing companies.

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Assessment of the Impact of the Effectiveness of ESG Practices on the Size of Premiums in M&A Deals

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Abstract:
The study investigates the impact of environmental, social, and governance (ESG) performance on mergers and acquisitions (M&A) premiums in deals across industries. It elucidates the importance of ESG performance in M&A transactions and underscores the necessity for companies to prioritize ESG practices to maximize premiums in deals. The sample included 1362 deals from 10 countries between 2003 and 2023 supplied from Zephyr database. Linear regression model with time and region fixed effects was applied. The results revealed positive relationships between ESG ratings and the magnitude of M&A premium. However, among individual scores only environmental score was significant at 5% level. Thus, the effectiveness of ecological and climate management practices is positively priced in M&A deals. Finally, we found that ESG practices in retail, oil and gas and chemical industries are valued the most in determining the size of M&A premiums.

Keywords: *Sustainable development; ESG; M&A premiums*

Introduction

The problem addressed by this research is the lack of a comprehensive understanding of the impact of ESG practices on M&A premiums across industries. Whether or not companies are incorporating sustainable practices into corporate strategy should the management be acknowledged how these practices affect the offer price in M&A transaction. We bridge this gap by examining the effect of ESG practices on M&A premiums in various industries.

The research is intended to explore the relationship between ESG performance and M&A premiums, as well as determine which ESG components in particular are associated with higher acquisition premiums. The subject of the study is M&A transactions, while the object of the study is the influence of ESG practices on M&A deals.

The main tasks in the study are (1) to collect the dataset of M&A deals of public companies with disclosed information about the deal value and available ESG scores; (2) to calculate premiums by applying a well-known methodology developed by Chan and Walter (2014); (3) to build regressions to estimate the impact of ESG individual scores, as well as compound ESG scores on premiums in M&A transactions; (4) to consider industry-specific influence in the regression analysis.

The paper may have the potential to create great value for the contemporary business world. With growing concerns referring to the environmental and social impact of business practices, companies are increasingly adopting ESG practices to reduce risks and create long-term value. The findings of this study can provide valuable insights to executive management, shareholders, investors, policymakers, and other stakeholders, particularly those engaged in M&A transactions. It can help them to understand the impact of ESG practices on M&A premiums in different industries, which can inform their investment decisions and risk management strategies.

1. ESG performance and M&A premiums. Literature review

1.1 M&A rationales and the acquisition premium

The general term 'M&A' is used to describe corporate transaction events between two or more companies, entities, and businesses conducted in order to consolidate companies or assets. M&A results in inorganic growth as opposed to comparatively slower internal growth. Inorganic growth through M&A transactions allows firms to access new markets, expand their market share, diversify risks through portfolio divergence, lower labor costs, and benefit from economies of scale and scope.

At times mergers and acquisitions are used interchangeably, although they involve different types of transactions, and as a corollary, various objectives, characteristics, and risks. Mergers represent a combination of two or more companies into a single entity, where the assets and liabilities of the merging firms are combined to form a new company. According to the study, mergers are more likely to produce more equal-sized matches between the parties, and the distribution of power is more likely to change over time Cartwright, S., & Cooper, C. L. (1990). In contrast, acquisitions involve one company acquiring another company, where the acquirer company takes control of the target company's assets and operations. Another crucial difference between mergers and acquisitions lies in the nature of the transactions. According to a study by Weston and Weaver (2001), mergers are typically friendly transactions where the management teams of both companies work together to complete the merger. Acquisitions are often hostile, where the acquiring company may take over the target company against its will. A hostile acquisition may be more costly due to a number of defensive strategies that a target company can activate to prevent the acquisition. In terms of outcomes, mergers, and acquisitions can have different effects on the companies involved. According to a study by Cartwright and Cooper (1996), mergers tend to result in more significant changes in organizational culture and structure, while acquisitions may result in more incremental changes.

In recent years the global market of M&A deals has shown an upward trend in terms of deal volume and the number of deals completed, although year-to-year growth in global volume has fluctuated significantly since 2012. It is known that M&A activity declines during periods of uncertainty or high market volatility. For instance, according to Reuters (Dogra, 2021), the overall value of M&A stood at $5.8 trillion in 2021, exceeding the corresponding figure in 2020 by 64%, then the indicator steeply declined to $3,63 trillion in 2022 due to macroeconomic reasons.

Although M&A activity is volatile, the leading sectors in M&A remained stable over the past few years. They are as follows: industrials, healthcare, financials, and IT. (Global M&A by the Numbers: 2022 in Review, 2022).

1.2 ESG and financial performance.

ESG is a framework used by various stakeholders to evaluate companies' behavior towards sustainable practices. Although the ESG abbreviation stands for environmental, social, and governance the concept has extended beyond these three pillars. ESG framework allows stakeholders to observe how organizations manage risks and opportunities related to ESG factors.

A research report published by OECD (2021) classifies climate change, carbon emissions, pollution, and resource efficiency as environmental issues. Social issues include labor standards, diversity, and human capital development. And corruption, transparency, and stakeholder fairness are corporate governance issues.

ESG factors have become increasingly important in assessing corporate performance. Companies that prioritize ESG factors tend to perform better in terms of financial performance, risk management, and long-term sustainability. Every company is a collection of various relationships between a company and its stakeholders. As all stakeholders are interdependent the value created for each stakeholder results in multiplicative effect on other stakeholders. For example, if company invests in the social pillar via creating better working conditions it will get more motivated and loyal employees, will

improve its reputation on the market as an employer, and will be able to gather more talented workers while reducing costs of hiring. According to Caiazza et al. (2021) well built social capital through ESG principles integration makes the organization more resilient to external shocks.

A study by Clark et al. (2015) found that companies with strong ESG performance had higher profitability and valuation multiples than their peers. In addition to financial performance, companies that prioritize ESG factors also tend to have better risk management. A study by Zhou and Zhou (2021) found that companies that prioritize ESG factors have lower volatility in their stock prices and are less likely to experience negative events such as corruption scandals. Furthermore, companies that prioritize ESG factors contribute to long-term sustainability. This can lead to increased customer loyalty, employee engagement, and investor support.

In conclusion, ESG factors are becoming increasingly important in assessing corporate performance. Investors and stakeholders are increasingly looking to ESG factors as a key indicator of corporate performance.

2. The data and the methodology

2.1 The hypotheses and the data

The following hypotheses were tested:

H1. Target ESG compound score has a significant positive influence on the acquisition premium;

H2a. The ecological score of the target company affects the acquisition premium and the corresponding regression coefficient is significant;

H2b. Social score of the target company affects the acquisition premium and the corresponding regression coefficient is significant.

H2c. Governance score of the target company does not affect the acquisition premium. H3. These is a difference in ESG-impact on M&A premium across industries

2.2 Methodology

This study exploits a quantitative approach to firm-level financial, deal-related and target ESG data which was analyzed numerically using R, while data processing was performed in Python and MS Excel. Multiple regression analysis is used to test the relationship between ESG performance and M&A premiums, controlling for other factors that may affect the premium paid in an M&A transaction. These factors include the size of the deal, the target company's financial performance, that of the acquirer, and whether a deal is cross-border or domestic. Moreover, time-fixed effects will be applied to adjust for the differences associated with the market situation.

The regression to test hypothesis 1 is:

$$Premium_{it} = \beta_1 ESG_{it} + \beta_2 FM_{it} + \beta_3 PA_{it} + \beta_4 CB_{it} + \beta_5 CI_{it} + \sum_{t=1}^{T} \varphi_t TE_t + \sum_{j=1}^{J} \gamma_j CE_J \quad (1)$$

ESG_{it} – ESG score;
FM_{it} – financial metrics (see Table 1); PA_{it}
- % of target company acquired; CB_{it} –
dummy of cross-board deal;
CI_{it} – dummy of cross-industry deal; TE_t –
time effect dummy;
CE_j – geographical group effect dummy (Asia, Oceania, Europe, North America and South America);
i – number of the deal;
t- number of time period; j –
number of the country.

Consequently, we will run another regression where the explanatory variable of ESG total score will be substituted with separate environmental, social, and governance scores to test hypotheses 2a, 2b, and 2c

$$Premium_{it} = \beta_1 E_{it} + \beta_2 S_{it} + \beta_3 G_{it} + \beta_4 FM_{it} + \beta_5 PA_{it} + \beta_6 CB_{it} + \beta_7 CI_{it} + \sum_{t=1}^{T} \varphi_t TE_t$$

$$+ \sum_{j=1}^{J} \gamma_j CE_J \quad (2)$$

Financial Variables	Description	Exp. Sign
Forward ROA	Higher ratio indicates better asset management	+
Inventory rate	The indicator measures how effectively the company manages its inventories	+/-
MTB	High ratio of market to book value may indicate that the company is overvalued that results in lower premium	-
Mkt. Cap. 3Y growth	Growth over the last 3 years	+/-
Working capital turnover	The ratio indicates how effectively the business generate profit for every dollar of working capital put in use.	+
Ln (total assets)	Is used as a proxy to the target's size. Assets of the target company represent economic value to the acquirer.	+
ADTFA	Accumulated depreciation ratio indicates the overall remaining usefulness of assets.	-

Control Variables	Description	Exp. Sign
% acquired	The percentage of stocks acquired may increase or decrease the acquisition premium due to the type of interest.	+/-
Cross-border	Cross-border deals involve higher information assymetry, however are associated with increased shareholder gains	+/-
Cross-industry	Cross-sector deals involve higher information asymmetry, however as they often occur in vertical transactions, and the acquirers will pay higher premium for new capabilities.	+

E_{it} –environmental (E) scores; S_{it} –
social (S) scores;
G_{it} corporate governance (G) scores.

Lastly, to test hypothesis 3, we ran individual regressions for each j-th industry in the sample.

$$Premium_{it}^j = \beta_1 ESG_{it} + \beta_2 FM_{it} + \beta_3 PA_{it} + \beta_4 CB_{it} + \beta_5 CI_{it} + \sum_{j=1}^{J} \gamma_j CE_J \quad (3)$$

2.3 The Data

The sample consists of M&A deals between 2003 and 2022 retrieved from the Zephyr database (Bureau Van Dijk) and completed with the Refinitiv database (ex. Thomson Reuters).

Table 1. Data Variables

ESG performance	Description	Exp. Sign
Environmental Score		+
Social Score		+
Governance Score	Variable with a granular scoring scale from zero to 100 where 100 represents full allignment with the best sustainable practices.	+/-
Community Score		?
Total ESG Score		+

Most deals in the sample were from India (14%), China (12%), Cayman Islands (11%), Bermuda (10%), Germany (4%) and USA (4%), the rest of the countries represented less than 3% of the sample. Consequently, out of 1362 deals in the sample, the distribution of industry affiliation was: construction and real estate (15%), machinery and equipment (14%), chemicals (12%), financial institutions (12%), metals (6%), mining (6%), information, media and telecom (6%), oil and gas (6%), IT services (5%), transport (5%) and retail (4%). The rest of the industries represented 3% of the sample or less.

3. Results and discussion

The results of model estimation and the hypothesis testing are presented in Tables 2 and 3.

Table 2. Regression output – Hypothesis 1

Robust

Variables	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Total ESG score	0.0082	0.0005	15.5	0.000***	0.0072	0.0093
% acquired	-0.0023	0.0005	-4.52	0.000***	-0.0033	-0.0013
Ln (total assets)	0.0123	0.0043	2.9	0.004**	0.0040	0.0207
Forward ROA	0.0001	0.0006	2.02	0.043*	0.0000	0.0003
M/B ratio	-0.0001	0.0000	-1.73	0.083 .	-0.0001	0.0000
Mkt. Cap. 3Y growth	-0.0004	0.0002	-2.06	0.04*	-0.0008	0.0000
Working capital turnover	-0.0001	0.0000	-1.37	0.172	-0.0002	0.0000
ATDFA	0.5682	0.2762	2.06	0.04*	0.0264	1.1100
Cross-border flag	-0.0178	0.0216	-0.83	0.408	-0.0601	0.0245
Cross-industry flag	0.0494	0.0196	2.52	0.012*	0.0110	0.0879
Time effects	*yes*	*Yes*	*yes*	*Yes*	*yes*	*yes*
Region effects	*yes*	*Yes*	*yes*	*Yes*	*yes*	*yes*

				Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '

N = 1,362   *Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '*

The results of testing hypothesis 1 are reported in Table 2. It is shown that the coefficient associated with the ESG total score is statistically significant at the 1% confidence level and positively impacts the output variable. Consequently, the null hypothesis is rejected, and the corresponding coefficient is significantly different from zero which confirms the fact that the acquirers do value ESG performance of the target company.

The results are in line with prior research (Gomes & Marsat, 2018; Tampakoudis & Anagnostopoulou, 2020) where the researchers discovered that there is a positive relationship between target ESG performance and the acquisition premium.

Table 3. Regression output – Hypothesis 2a, 2b, 2c

Variables	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
Environmental score	0.0066	0.0005	12.28	0.000***	0.0056	0.0077
Social score	0.0004	0.0006	0.63	0.532	-0.0008	0.0015
Governance score	0.0009	0.0005	1.89	0.058 .	0.0000	0.0017
% acquired	-0.0022	0.0005	-4.55	0.000***	-0.0032	-0.0013
Ln (total assets)	0.0028	0.0043	0.65	0.516	-0.0057	0.0113
Forward ROA	0.0002	0.0001	2.54	0.011*	0.0000	0.0003
M/B ratio	-0.0001	0.0000	-2.59	0.010*	-0.0002	0.0000
Mkt. Cap. 3Y growth	-0.0004	0.0002	-2.05	0.041 .	-0.0008	0.0000
Working capital turnover	-0.0001	0.0000	-1.15	0.251	-0.0001	0.0000
ATDFA	0.3702	0.2806	1.32	0.187	-0.1802	0.9207
Cross-border flag	-0.0140	0.0209	-0.67	0.503	-0.0549	0.0269
Cross-industry flag	0.0544	0.0194	2.81	0.005**	0.0164	0.0924
Time effects	*Yes*	*Yes*	*yes*	*yes*	*yes*	*yes*
Region effects	*Yes*	*Yes*	*yes*	*yes*	*yes*	*yes*

N = 1,362   *Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '*

The output of the model constructed to test the second hypothesis of the individual influence of the ESG components on the acquisition premium corresponded the results that contradict the hypotheses 2b, 2c, while support the hypothesis 2a. The null hypothesis (6.3) is rejected due to the significance of the environmental coefficient at a 1% confidence level. This is in line with prior research by Huang et al (2023). The ecological component is the only significant component. This may be because the environmental performance is becoming a more pivotal factor in determining the premium paid in M&A transactions than it used to be. Environmental risks, such as climate change, can have a significant impact on the value of properties and the long-term financial performance of companies. Moreover, environmental risks are easier to quantify than social or governance risks because of their nature. And although the ESG methodology is constantly

improving many acquirers still prefer to rely on the factors that are easy to measure. The governance and social scores are not significant in the model that is why the hypotheses are rejected. There is a high correlation between the social and environmental variables that may be the reason why the social component is not significant. The governance component is significant at 10% confidence level.

The results of testing of hypothesis 3 is presented in Table 4. All models for individual industries were significant by F-test except for other financial institutions.

Table 4. The coefficient of ESG variable for individual industries

Industry	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Construction & Real Estate	*0,0084*	*0,0012*	*6,88*	*0,000****	*0,006*	*0,0108*
Machinery&Equipment	*0,0075*	*0,0012*	*6,40*	*0,000****	*0,0052*	*0,0098*
Chemicals	**0,0093**	**0,0016**	**5,86**	**0,000*****	**0,0062**	**0,0124**
Information Media&Telecom	0,0031	0,0022	1,42	0,16	-0,0013	0,0075
Banks	*0,0080*	*0,0021*	*3,79*	*0,000****	*0,0038*	*0,0122*
Other Financials	0,0038	0,0022	1,71	0,091	-0,0006	0,0082
Oil and Gas	**0,0106**	**0,0018**	**5,99**	**0,000*****	**0,0071**	**0,0141**
Metals	*0,0083*	*0,0023*	*3,65*	*0,001***	*0,0038*	*0,0129*
Mining	*0,0085*	*0,0027*	*3,20*	*0,002***	*0,0032*	*0,0138*
IT Services	0,0058	0,0024	2,41	0,019*	0,001	0,0106
Transport	0,0050	0,0040	1,26	0,214	-0,003	0,013
Retail	**0,0177**	**0,0026**	**6,84**	**0,000*****	**0,0125**	**0,0229**
Food&Beverages	0,0074	0,0032	2,29	0,029*	0,0008	0,014

The table shows that the industries where the total ESG coefficient is the highest among all other industries are retail, chemicals and oil and gas. By targeting sustainable development practices the companies in these industries can lower their ESG-related risks and thus boost M&A premiums.

Conclusion

The paper aims to investigate the relationship between specific ESG characteristics and M&A premiums in selected industries. The research combines two critical trends – M&A transactions that have become a major growth strategy for companies and the growing reliance on ESG performance in investment strategies.
These findings have profound implications for companies seeking to maximize their value in M&A transactions. Therefore, companies that prioritize ESG practices may have a competitive advantage in M&A transactions, and their sustainability practices may ultimately contribute to their long- term success.

Acknowledgement

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Analysis of Influence of Human Capital of Top Management on the Effectiveness of Russian IT Companies Adaptation to the Structural Crisis of 2022

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Abstract:
Starting from March 2022 Russian companies are facing a structural crisis while IT industry was the most affected. The paper investigates the impact of qualities of top management's human capital (HC) in the domestic IT companies on the effectiveness of their adaptation to this crisis. The novelty of the paper is underpinned by (1) the rare investigation of the topic at times of crises; and (2) coverage of the entire top management team. The results showed that HC of top managers moderately and positively impacted the effectiveness of firms to adapt to the crisis. No difference in strength of impact of CEO HC and HC of the rest of the team was discovered. Such qualities of HC as (1) young age; (2) taking office before the crisis; (3) experience in international companies; (4) experience in IT industry; and (5) openness to stakeholders the most supported the adaptation to crisis.

Introduction
The influence of human capital of top management on the performance of companies is widely studied in the academic literature but is rarely considered in the context of crises. However, theory of higher echelons argues that during crises the personal characteristics of top managers are even more significant than in an economically prosperous period (Hambrick, Mason, 1984). In the conditions of the structural crisis and cancel culture pressure against Russian economy, it is important to analyze the influence of personal qualities of top management on the abilities of the companies to maintain financial health and growth in crises.

The objective of the paper is to assess the impact of the human capital of top management on the effectiveness of adaptation of Russian IT companies to the crisis. Domestic IT industry was harshly affected by the crisis given its dependence on technologies from G-7 countries, global nature of IT industry in general, imposed sanctions and significant number of international IT companies which left the Russian market.

To conduct the study, we developed the index of efficiency of adaptation of IT companies to the cancel culture, and the index of personal qualities of human capital of top management in IT companies. We also studied the correlation between indices to assess the strength and direction of the influence of personal qualities of top management on the effectiveness of adaptation to the crisis. Additionally, we investigated the impact of homogeneity of management team on effectiveness of adaptation. The novelty is driven by the rare investigation of this topic for periods of structural crises, the uniqueness of current crisis which requires separate studies and the expansion of the analysis for the entire top management firm as literature focused mainly on CEO.

1. Human capital and company performances in crises. Literature review
1.1 Human capital and the performance of companies
According to the OECD, human capital ("HC") is "a set of skills, knowledge, competencies and qualities of individuals that allows achieving personal, social and economic well–being" (OECD,

2001). In the knowledge-based sectors of the economy (such as information technologies (IT) industry), HC forms the competitive advantage of IT companies (Mugaeva, 2021). The theory of the upper echelons stated that HC of each manager influences the decisions he makes, and thus indirectly affects the results of the company's activities. Such dependence is most manifested in unstable economic conditions (Hambrick, Mason, 1984). The theory of higher echelons was further enhanced. The concept of effective directorship is being formed (Leblanc and Gillies, 2005). In turn, resource theory states that HC can reduce impact of external shocks (Pfeffer and Salancik, 1978; Hillman and Dalziel, 2003).

Academic papers explored various personal qualities ("qualities of HC") of top management. They included CEO and the members of management board (top management). The qualities included education and tenure (Ahn, 2019), professional and industrial experience, creativity (Omerzel and Jurdana Dora, 2015), or a variety of career trajectories (Yang et al, 2015; Crossland et al, 2014). Other factors include the propensity to implement new ideas or the social ties (Faleye, 2004). Papers also argued that the average age of a company's top management has a negative relationship with the innovative and investment activity of companies (Ahn, 2019). Conversely, the career diversity of top management is positively associated with the innovative activity of the company. The technical education of top managers contributes to an increase of innovation activity of the firm (Ahn et al, 2005). Bertrand and Schoar, 2003 demonstrated that the characteristics of top management explained differences in investment policies, financing policies and business practices in companies. Studies of the relationship between the characteristics of top management and strategic financial decisions on going public (IPO) and on secondary issues of shares have revealed the existence of such a relationship (Chemmanur et al., 2009).

The analysis of the literature allows us to identify several gaps. This is the lack of research on this topic in the conditions of permanent structural crises; a small number of studies in Russia; ambiguity of conclusions; focus only on CEO's HC and lack of consideration of homogeneity of top managers.

1.2 Structural crises, cancel culture and companies' adaptation to this environment.

The phenomenon of "cancel culture" is not new and occurs in different historical periods, however, the term itself began to be actively used in the late 2010s – early 2020s, which is associated with the development of social networks. Cancel culture is a public way of holding an individual and/or brand accountable for unethical acts by boycotting a person and/or brand products. The structural crisis that developed in Russia after 2022 is often called the cancel culture crisis. The imposition of sanctions against Russian companies and banks, the disconnection of Russia from the SWIFT payment system, the attempts to "isolate Russia from global markets and culture" have caused many foreign companies to leave the country and break cooperation agreements with domestic firms. Based on the literature, the combination of strategy of maintaining resilience and investment strategy helps to adapt to structural crises (Stepanyan, 2018). The main disadvantage of the literature devoted to the cancel culture structural crises is the lack of methodology for assessing the effectiveness of companies' adaptation to it.

2. The data and the methodology

2.1 The hypotheses and the data

The following hypotheses were tested:

H1. Companies with the higher quality of human capital demonstrate better efficiency of adaptation to the cancel culture.

H2. The quality level of CEO's human capital has a positive impact on the effectiveness of companies' adaptation to the cancel culture.

H3. The quality level of human capital of top management team ex CEOs has a positive impact on the effectiveness of companies' adaptation to the cancel culture.

H4. The quality of CEO's human capital has a stronger impact on the effectiveness of companies' adaptation to the cancel culture than the quality of human capital of the rest of the top management team.

H5. Companies with a more heterogeneous human capital management team demonstrate better efficiency of adaptation to the cancel culture.

We chose IT industry for the analysis as it was harshly affected by the crisis. The sample of Russian IT companies for this study was based on the Moscow Exchange Information Technology Index (MOEX IT), which includes seven companies: Yandex N. V. (Yandex LLC), Ozon Holdings Plc. (Ozon Holding LLC), VK Company Ltd., HeadHunter Group Plc. (LLC Headhunter"), Cian Plc. (LLC "Cian"), Positive Technologies Pjsc. (PJSC "Group Positive"), Softline Holding Plc. (JSC "Softline Trade") and Selectel Ltd. (LLC "Selectel"). We studied companies adaptation in the first nine months of 2022 as it was the most "acute" period of crisis.

2.2 Index of the effectiveness of adaptation to the cancel culture

To study the adaptation of IT companies to the crisis, we developed a special index that consider dual strategy and included the following factors (Table 1).

Table 1. Key factor components of index of effectiveness of adaptation to the cancel culture

Factors	Assessment methodology
Strategy of maintaining resilience	
Revenue growth	0 – revenue of the company contracted 1 – revenue increased with the pace lower than that of industry average 2 – revenue increased with the pace higher than that of industry
Changes in EBITDA margin	0 – EBITDA margin is negative and declined over 9M 2022 1 – EBITDA margin is positive but decreased over 9M 2022 or negative but increased over 9M 2022 2 – EBITDA margin is positive and increased over 9M 2022
Staff retention rate	0 – downsizing 1 - no news about staff reduction and expansion 2 - staff expansion
Changes in absolute liquidity ratio	0 - the coefficient is above average, the coefficient has increased 1 - the coefficient is below average, the coefficient has increased 2 - the coefficient is below average, the coefficient has been declining
5. Changes in account receivables turnover and account payable turnover	0 – turnover of account receivables has increased while turnover of account payables has reduced 1 – turnover of account receivables and turnover of accounts payable has changed in the same direction (increased or decreased) 2 – turnover of account receivable has reduced while turnover of account payables remained unchanged or increased
Investment strategy	
Changes in capital expenditures program	0 - the company has frozen capital investments in 2022-2025 1 - the company made capital investments in 2022 or the company did NOT make investments in 2022 but announced a plan for 2023–2025. 2 - the company made capital investments in 2022 and announced a plan for 2023-2025.
Changes in investment coverage ratio	**If industry average ratio is declining:** 0 - the coefficient decreased more than the industry average 1 - the coefficient decreased less than the industry average 2 - coefficient increased **If the industry value increases:** 0 - coefficient decreased 1 - the coefficient increased less than the industry indicator 2 - the coefficient increased more than the industry indicator
Release of new products	0 - the company has not launched new products in 2022 1 - The company announced new products in 2022 but hasn't launched them yet 2 – the company launched new products in 2022

Changes in the structure of the company	0 - the structure of the company has not changed 1 - the company announced a change in structure, but the changes themselves have not yet occurred 2 - the structure of the company has changed
Change in the price of the company's shares	0 - the company's share price fell more than the industry indicator 1 - the company's share price fell less than the industry indicator 2 - the prices of the company's shares increased in 2022 relative to 2021.
Maximum score of investment sub-index	10
Maximum score of the combined index	20

The combined index of adaptation was calculated by using the following formula:

$$Index\ of\ adapation = \sum_{i=1}^{L} RS_i + \sum_{j=1}^{K} IS_j \quad (1)$$

Where:

RS_i – score of i_{th} resilience factor

IS_j – score of i_{th} investment strategy factors

L – number of resilience factors

I – number of factors reflecting investment strategy

2.3 Index of quality of human capital

The composition of top managers studied included general director (CEO), commercial director, financial director (CFO), technical director, human resource director, legal counsel and marketing director. To assess the quality of human capital of top management, we have also developed a separate index (Table 2). We chose these qualities based on papers of Aboramadan, 2020; You, 2020; Mio, 2016, Ovanesova, 2021; Aboramadan, 2020; Gupta, 2018 and others.

Table 2. Qualities constituting index of quality of HC of top management in IT firm

Критерий	Шкала оценки
Age	0 - old age (60+ years) 1 - middle age (45-59 years) 2 - young age (18–44) The scale is comprised in accordance to WHO recommendations
Tenure	0 - has been in office for less than three months 1 - holds a position from 3 to 9 months 2 - has been in the position for more than 9 months (was hired before the start of structural crisis)
Possession of STEM education	0 - no STEM education 1 - have a basic STEM education 2 - there is an additional STEM education to the main non-STEM
Possession of financial education/training	0 - no financial education 1 – possesses financial education as a major 2 – has dual education, second of which is financial
Highest level of education	0 - bachelor's degree 1 – master's degree 2 – doctoral degree (PhD) or postgraduate studies
Working experience in international companies	0 – absence of work experience in international companies 1 – has work experience in international company branches in Russia 2 – has work experience in international company globally
Experience in managing a company during a crisis	0 - did not hold managerial positions in past crises 1 - held managerial positions in past crises in other companies 2 - held managerial positions in past crises in this company

Experience in IT industry	0 - no experience in the IT industry before the current position 1 - has work experience in IT industry but on other than current job positions 2. held similar as current job positions in other companies in IT industry
Openness	0 – has not appeared in the press after start of structural crisis 1 – has a role of secondary speaker (with no direct speech) in the press after start of structural crisis 2 – primary speaker in the press (with large share of direct speech) after start of structural crisis
Political linkages	0 – absence of political connections 1 –linkages with at least one major politicians 2 – linkages with two or more major politicians

The data on personal qualities was collected for each top manager of companies in their sample using open sources, with information current as of September 30, 2022. If changes in management were made in 2022, the quality of human capital of both managers was considered, weighted by the number of days spent in office. The index was calculated using the following formula:

$$Index\ of\ HC = \sum_{i=1}^{N} K_i \qquad (2)$$

Where:
Index of HC – index of quality of human capital
N – number of traits in the index (Table 2)
K_i – score of i_{th} trait of human capital
The heterogeneity of the qualities of human capital of the top management team was calculated using the Blau index

$$B_i = 1 - \sum_{i=1}^{N} P_i^2 \qquad (3)$$

Bi - Blau index, reflecting the degree of team diversity
N - number of categories to which managers belong
Pi - share of managers in category i.
The presence / absence of a relationship between the indices was determined using Spearman's rank correlation.

Results

The results are presented in Table 3 and Table 4.

Table 3. Assess the Effectiveness of Adapting IT Companies to a Cancellation Culture

#	Domestic IT company	Resilience strategy score	Investment strategy score	Index of the effectiveness of adaptation to the cancel culture
1	Positive Technologies Group	8	7	15
2	Selectel	7	8	15
3	Ozon Holding PLC	7	7	14
4	VK Group	6	8	14
5	Yandex PLC	7	6	13
6	Softline	4	7	11
7	Headhunter PLC	6	3	9
8	Cian PLC	4	3	7

Table 4. Correlation between index of quality of human capital and index of effectiveness of adaptation to the cancel culture

№	Qualities/Factors	Spearman correlation coefficient		
		CEO	The rest of management team	Entire management team
1	Age	0,67	0,10	0,61
2	Tenure	0,37	0,12	0,47
3	Possession of STEM education	-0,37	0,25	0,15
4	Possession of financial education/training	-0,33	-0,31	-0,57
5	Highest level of education	-0,54	-0,63	-0,78
6	Working experience in international companies	0,21	0,49	0,41
7	Experience in managing a company during a crisis	-0,25	-0,82	-0,76
8	Experience in IT industry	-0,28	0,30	0,30
9	Openness	0,46	0,42	0,41
10	Political linkages	0,29	-0,17	0,10

The greatest positive impact on the effectiveness of adaptation is exerted by the age tenue, past experience in international companies, previous experience in IT sphere (except for CEO) and openness to stakeholders. Conversely, financial skills had negative impact on effectiveness on adaptation. The current crisis in unique and "traditional" financial "recipes" did not help to adapt to it. A higher level of education also had negative impact on efficiency to adaptation to the crisis. In the period of high turbulence practical skills were more important than education. Lastly, experience in managing company in past crisis did not also work. Absence of such experience helps the managers to think outside the box and develop non-standard solutions and decision to overcome the crisis. Interesting, but political linkages are more valuable for CEO than for the rest of team to adapt to the crisis. Conversely, STEM education is important for the team but negative for CEO.

Table 5 shows the values of Blau index and the correlation between index of adaptation and index of HC across companies.

Table 5. Impact of HC on adaptation to crisis across Russian IT companies.

Company	Correlations			Heterogeneity
	Entire team	CEO	Team ex CEO	Blau index
Ozon Holding PLC	0.684	0.509	0.720	0.6410
Positive Technologies Group	0.673	0.786	0.645	0.6408
Headhunter PLC	0.561	0.571	0.560	0.6584
Yandex PLC	0.523	0.482	0.530	0.6657
VK Group	0.513	0.643	0.488	0.6661
Softline	0.509	0.591	0.494	0.6621
Selectel	0.500	0.500	0.500	0.6448
Cian PLC	0.454	0.422	0.461	0.6660

Ozon Holding and Positive Technologies had the most efficient HC to resist the cancel culture; Cian scored the lowest. Companies with homogeneous HC better adapted to the crisis.

Table 6 studied the correlation between indices for entire team, CEO alone and team without CEO.

Table 6. Correlation between indices for various combinations of top management

#	Indices	Spearman correlation	The strength of linkage
1	Index of HC of the entire team	0.33	Moderate positive

2	Index of HC of CEO alone	0.43	Moderate positive
3	Index of HC of management (ex CEO)	0.42	Moderate positive
4	Blau index of the entire team	-0.55	Average negative

H1, H2 and H3 are proved. There is a moderate positive relationship between the Index of adaptation and Index of HC across the entire team, CEO and the team excluding CEO. Russian IT companies with the higher quality of HC more effectively adapted to cancel culture in the considered period.

H4 is rejected. Table 4 shows that strengths of the relationship between the Index of adaptation and Index of HC had the similar magnitude for CEO and for the rest of the team.

H5 is rejected. Table 6 shows that IT companies with more homogeneous HC of top management adapted better than those with heterogeneous HC.

Table 7 showed the impact of heterogeneity of HC on adaptation to the crises across individual qualities.

Table 7. Correlation of index of adaptation to Blau index across qualities of HC.

#	Qualities of human capital	Correlation
1	Age	-0,37
2	Tenure	-0,48
3	Possession of STEM education	0,14
4	Possession of financial education/training	-0,23
5	Highest level of education	-0,17
6	Working experience in international companies	0,11
7	Experience in managing a company during a crisis	0,67
8	Experience in IT industry	0,44
9	Openness	-0,18
10	Political linkages	0,18

The homogeneity of top management team in such qualities as age and tenure support the adaptation. Conversely, the team should be heterogeneous in such qualities as experience in crises and experience in IT field.

Conclusion

The objective was to assess the impact of the quality of HC of top management on the effectiveness of the adaptation of Russian IT companies to the crisis of 2022. The results showed that the quality of HC moderately and positively influences the success of Russian IT companies in adapting to the crisis. The hypothesis about the greater influence of the quality of HC of CEO compared to that of the rest of the top management team was not confirmed. The hypothesis about the importance of the high heterogeneity of the management team at times of crisis was also rejected. The most valuable HC qualities which fostering the adaptation were: (1) young age; (2) taking office before the crisis; (3) members of team have experience of working in global international companies, (4) the team members have same industry previous work experience; (5) high openness to external stakeholders. Conversely, the higher level of education; (2) financial skills; (3) experience in previous crises (mostly financial turmoil) do not support the adaptation to cancel culture crisis.

Acknowledgement

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Impact of ESG Characteristics on the M&A Premiums

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Abstract:
This paper investigates the influence of ESG scores on M&A transactions, specifically focusing on the premium paid by acquirers. Using Thomson Reuters Refinitiv data, the study employs models to isolate the impact of ESG scores while accounting for other factors that determine takeover premiums in M&A transactions. The findings indicate a significant positive effect of the Target Corporate Governance score on M&A premiums, after controlling for factors such as Target company EBITDA margin, EBITDA 3-year growth, D/E ratio, Liquidity, Insider binary variable, and Cross-border binary variable. Overall ESG scores, as well as individual Environmental and Social scores, were not found to be significant. Notably, Target high ESG performance were found to have a significant impact on premiums and Low ESG Acquirers were found overpaying High ESG Targets, highlighting the importance of this trend in the current economy.

1. Introduction

In recent decades, there has been a significant increase in the attention given to corporate social responsibility (CSR) by investors, companies, consumers, and government regulators. According to the Global Sustainable Investment Alliance (2020), assets under management for socially responsible investing (SRI) have reached USD 35.3 trillion, representing a 15% growth in two years and equating to 36% of all professionally managed assets in regions covered by the report (Europe, United States, Canada, Australasia, Japan). This trend has been particularly pronounced since the 2008 financial crisis. Companies operating in countries that have adopted sustainable development standards are required to meet various environmental and social indicators, which can impact their reputation, revenue, and profitability. Failure to meet these standards can result in additional taxes and legal risks. Such companies may also experience higher cost of capital, as banks may raise rates for companies that do not meet accepted standards. On the other hand, investments in Environmental, Social and Governance (ESG) initiatives lead to longer planning horizons, reduced risks, and lower debt and equity costs.

The integration of ESG considerations into financial decision making has become increasingly important in recent years (Cellier & Chollet, 2016; von Wallis & Klein, 2014). Among the ways ESG affects the financial results of companies: reducing the risk of scandals and fines and, thus, attracting capital on reduced cost, creating a positive brand and reducing operating costs in the long term. This trend has extended to the area of mergers and acquisitions (M&A), with many companies and investors considering the ESG performance of potential targets as the significant aspect (Cheng et al., 2014; Ioannou & Serafeim, 2010). However, there is a very limited understanding of exactly how ESG characteristics affect the propensity of firms to pay premiums in M&A transactions. At the same time, studies of the effect of financial performance directly on premiums are conducted regularly, from different perspectives and for different samples.

The purpose of this paper is to evaluate the value of ESG scoring in M&A deals by analyzing its impact on takeover premiums, instead of stock market performance as explored in prior research. The analysis will control for other target financial characteristics as a confounder, such as profitability, D/E ratio, growth, liquidity, insidership, and cross-borderness. Additionally, the study will investigate whether acquirers with higher ESG scores are willing

to pay a premium for a high-performing target or vice versa. The study will utilize ESG scores provided by Thomson Reuters, which account for materiality impact, size, and transparency biases and are an enhanced version of the ASSET4 ratings. Moreover, separated evaluation of Environmental, Social, and Governance factors will be conducted to account for the significance of each component.

2. Relevance of the paper to the Strategic finance topic

An M&A deal is usually considered a strategic investment decision aimed at achieving financial growth and value creation above the value of the companies participating in the transaction separately (Barney, 1991), this effect is known as synergy. Since the firm-beneficiary of an M&A deal receives synergy effects, a premium is usually added to the transaction price as all parties realize that the buyer will receive more value for the assets than they are worth on their own as part of a separate business (Jensen & Ruback, 1983). The value of such investments in the purchase of other companies, whether vertical or horizontal transaction, is achieved only after a long period of integration, but allows the company to set a strategic course of development.

The modern approach to ESG is at the intersection of shareholder theory and stakeholder theory, implying the maximization of shareholder welfare by reducing strategic risks to firm's sustainable development and meeting shareholder expectations from the company's corporate CSR policy, beyond the maximization of financial results. There is a growing body of evidence that suggests a significant link between ESG performance and financial performance. A meta-analysis by von Wallis and Klein (2014) found that just over half of the studies showed that ESG funds performed on par with conventional investments, while, among the remaining studies, most showed a positive relationship, and only a few studies found a negative relationship. Many companies and investors believe that ESG performance is a key indicator of a company's overall health and sustainability, and that it can impact a company's financial performance in several ways. There are studies that ESG allows company to attract and retain customers, employees, and other stakeholders, which can result in increased sales, higher productivity, and lower operational costs (El Ghoul et al., 2011; Manrique & Martí-Ballester, 2017; Nakao et al., 2007; Russo & Fouts, 1997), improves financial performance measured by total assets value, return on assets, return on equity, leverage, turnover ratio, market value of equity over book value of equity (Cellier & Chollet, 2016; Deng et al., 2013; Eccles et al., 2014; Flammer, 2015; Tang et al., 2012), lowers cost of capital (Bouslah et al., 2013; MSCI, 2020; Oikonomou et al., 2012), can help a company avoid legal, regulatory, fraud and corruption risk, and improve decision-making, all of which can contribute to improved financial performance (Jo & Harjoto, 2011; Yen & André, 2019).

Thus, ESG policy and M&A performance are key areas of strategic development of corporations and are closely related to the financial results, sustainable development and risks of the company. The relevance of this research is determined by the lack of studies that concentrated on the relationship between ESG and bid premiums since most of the studies investigate the direct link between ESG and firm's financial indicators. Only study found conducted by Gomes and Marsat (2018) has found a connection between CSR and the takeover premium. However, that research was limited to Environmental and Social factors from 2003-2014, which does not fully capture the latest ESG trends. Additionally, they defined CSR as a risk factor specific to firms, which differs from the approach of this thesis. This study incorporates recent ESG developments, such as the European Union's ESG taxonomy and investment trends.

3. The research question and methods

Thus, the research question is: «How ESG scores affect premiums in M&A deals?» The first hypothesis aims to establish a link between the Target's ESG score and the takeover premium:

H0: There is no relationship between Target's ESG scores and the takeover premium.

HA: There is a relationship between Target's ESG scores and the takeover premium.

It is assumed that the acquirer will conduct a comprehensive due diligence process to minimize information asymmetries and gain a thorough understanding of the target company (Laamanen, 2007). This process will provide the acquirer with access to non-public information, which should enable them to evaluate the true value of the target company's intangible resources and capabilities.

The second hypothesis aims to determine if there is moderating effect of Acquirer's ESG score. Are acquirers with high ESG scores are willing to pay a higher takeover premium for a target with a high ESG score compared to Acquirers with a low ESG score?

H0: There is no significant difference between Acquirer ESG groups in their propensity to pay a premium for a target with a high ESG score.

Ha: There is significant difference between Acquirer ESG groups in their propensity to pay a premium for a target with a high ESG score.

Table 1. Target and Acquirer ESG score quadrants

Acquirer ESG Score	LOW – HIGH	HIGH – HIGH	Target ESG Score
	LOW – LOW	HIGH – LOW	

To gather sample data of M&A deals, firm's financials and ESG scores for this study, Thomson Reuters Eikon Refinitiv database is used. This provider offers one of the largest financial markets data and infrastructure globally, with a focus on the financial community. Its database is reliable and optimized for investors, banks, corporates, and others, with over 70 years of historical data from 175 countries (Thomson Reuters, 2021a; Thomson Reuters, 2021b). To ensure external validity, transactions between 2010 and 2020 are studied, ensuring that the sample is up-to-date and not significantly impacted by crises. Deals between public companies from North America and European Union are used. The sample consists of deals where the acquirer owned less than 50% at the announcement and had a higher ownership percentage than 50% post-merger. The dataset is cleaned for any insufficient data. Financial firms are excluded from the study because they traditionally focus more on short-term and purely financial profitability, and studies find no meaningful links between investments by financial institutions and non-financial determinants. The market prices are obtained by parsing data from Yahoo Finance using Python.

The takeover premium is measured as the difference between the offer price and the market price of the target company (Chan & Walter, 2014);

$$Deal\ value_t = \frac{Offer_t - Market\ Price_{4\ weeks\ prior\ t}}{Market\ Price_{4\ weeks\ prior\ t}}$$

Where: t is deal official date and gap of 4 weeks before transaction used to exclude the vast majority of cases in which market rumors before the transaction influenced the price.

Firstly, an ordinary least squares (OLS) analysis conducted to establish the link between the takeover premium and Target's ESG scores.

Formula 1 (Target ESG): $Premium = \beta_0 + \beta_1 * log(Target\ ESG) + \beta_2 * (EBITDA\ Margin) + \beta_3 * (Growth) + \beta_4 * (Liquidity) + \beta_5 * (Debt/Equity) + \beta_5 * (Insider\ dummy) + \beta_6 * (Crossborder\ dummy)$

Formula 2 (Target E, S and G): $Premium = \beta_0 + \beta_1 * log(Target\ E) + \beta_2 * log(Target\ S) + \beta_3 * log(Target\ G) + \beta_4 * (EBITDA\ Margin) + \beta_5 * (Growth) + \beta_6 * (Liquidity) + \beta_7 * (Debt/Equity) + \beta_8 * (Insider\ dummy) + \beta_9 * (Crossborder\ dummy)$

EBITDA Margin calculated as the ratio of EBITDA to net profit at the time of the transaction. *Growth* is calculated as the Target EBITDA Growth over 3 years before the deal, in percentage terms. EBITDA is chosen over net income because it excludes the effects of a company's capital structure and tax situation, which may be accounted differently by different Acquirers, while EBITDA is a more accurate measure of a company's true earnings power.

Liquidity is calculated as current assets divided by current liabilities. *Debt to Equity* is an indicator of solvency. Calculated as standard.

If the acquirer holds between 0% and 5% ownership pre-deal, the *Insider dummy* is assigned a value of 1, otherwise, 0. *Cross-Border* is a dummy variable where the value is 1 if the acquirer's host country is different from the target host country.

Table 2. Descriptive statistics.

Variable	Observations	Mean	St. dev.	Min	Max
Premium	398	.1303034	.303501	.5275448	.2066515
log(Target ESG)	398	3.869363	.4482969	2.83532	4.603644
log(Target E)	398	3.779351	.5682223	.4631034	4.593294
log(Target S)	398	3.825097	.5421115	.8050096	4.58185
log(Target G)	398	2.293836	.8610638	.0477394	4.536551
EBITDA Margin	398	28.30658	7.377304	10.09521	49.74563
Growth	398	35.90441	6.190107	21.17335	52.01485
Liquidity	398	99.92152	11.15234	71.16144	128.8808
Debt/Equity	398	2.114027	.6339861	.5164471	3.949974
Insider dummy	398	.220100	-	0	1
Crossborder dummy	398	.540201	-	0	1

Source: Author's calculations using STATA

The second part of the analysis involves categorizing the acquirers into high and low ESG performers based on their scores. The top 50% forming the high group and the bottom 50% forming the low group. This creates two samples, consisting of 212 acquirers in the low group and 186 acquirers in the high group. Similarly, the targets are divided into groups based on their ESG performance, Target ESG Group, which is set to 1 if the target is among the top

ESG performers and 0 otherwise. The regression in formula 3 is then applied to both groups.

Formula 3 (Acquirer/Target ESG Groups): $Premium$

$$= \beta_0 + \beta_1 * (Target\ ESG\ Group) + \beta_2 * (EBITDA\ Margin) + \beta_3 \\ * (Growth) + \beta_4 * (Liquidity) + \beta_5 * (Debt/Equity) + \beta_5 \\ * (Insider\ dummy) + \beta_6 * (Crossborder\ dummy)$$

Acquirers and Targets are quite different in ESG rating (Chart №1), so it was considered appropriate to divide by the principle above the median (High ESG group) and below the median (Low ESG group).
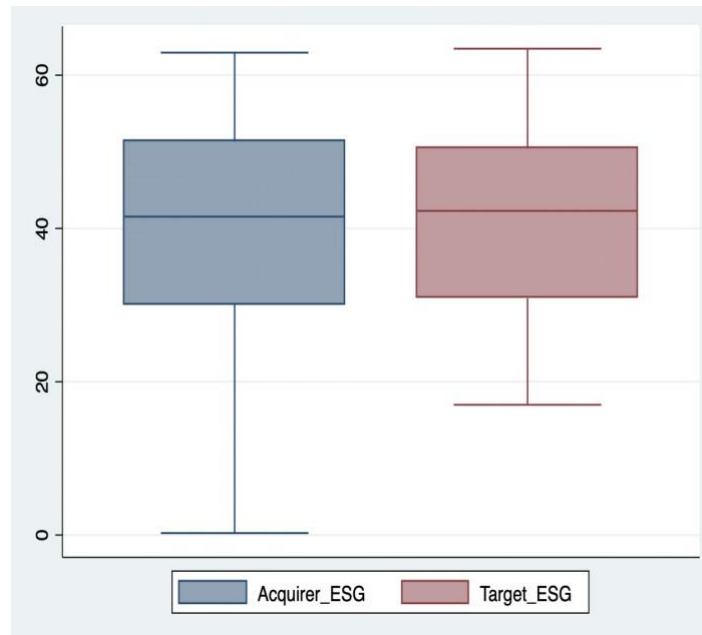
Chart №1. Box plot of ESG scores distributions of Acquirers and Targets (100-point scale).

Source: Author's calculations using STATA software

4. The results to be reported

As a result of the analysis, the following significant results were obtained: if Target's Governance rating (Thomson Reuters) increases by 1%, the premium to the market price increases by 1,1%, all else being equal (5% level of significance). The explanation for this may be that Acquirers have more confidence in Target's financial results with better corporate governance The following control variables yielded consistently significant results: EBITDA Margin (pp); Target's 3-year EBITDA growth (pp); D/E ratio; Current Liquidity (pp); Insider dummy.

In the meantime, Target's overall ESG score remained insignificant, as well as Target's E and S scores. Cross-border dummy was insignificant among the control variables. More detailed results can be found in Table 3.

Table 3. Results from OLS regressions on Acquirer ESG score, Target ESG score, and underlying dimensions of target ESG (p-values in parenthesis).

	Target ESG	Target E, S and G
Log(Target ESG)	-0.1853058 (0.340)	
Log(Target E)		-0.1199246 (0.477)
Log(Target S)		0.0574892 (0.736)
Log(Target G)		**1.10013 ** (0.011)**
EBITDA Margin, p.p.	**0.1060317 ** (0.017)**	**0.170697 ** (0.023)**
D/E Ratio	**-0.7041711 *** (0.006)**	**-0.5615283 *** (0.009)**
Liquidity, p.p.	**0.1264073 ** (0.029)**	**0.0821535 ** (0.013)**
Growth, p.p.	**0.0441211 *** (0.008)**	**0.0332733 ** (0.042)**
Cross border dummy	0.1385642 (0.429)	0.1672152 (0.342)
Insider dummy	**0.6219836 * (0.052)**	**0.6485379 ** (0.031)**
constant	**-3.160789 ** (0.025)**	**-2.706221 * (0.072)**
Observations	398	398
R^2	0.7089	**0.7570**
*p<0.1; **p<0.05; ***p<0.01		

Source: Author's calculations using STATA

Thus, regarding Hypothesis №1: we have enough evidence to reject H_0 that there is no relationship between ESG and bid premiums.

Regarding Hypothesis №2: significant (5% level) and positive coefficient was found indicating that low-performing acquirers are inclined to pay a 9,53% higher premium for a target with an above-median ESG performance. That could suggest that low-performing companies are engaging in greenwashing practices by acquiring high ESG performing companies, or they may be acquiring resources and capabilities to enhance their ESG performance. Meanwhile, there is an insignificant negative coefficient for the high-performing Target group. Among the control variables, all the same variables are consistently significant. More detailed results can be found in Table 4.

Table 4. Effects of target and acquirer ESG Groups (High/Low) on Takeover Premium

	Low Acquirer ESG	High Acquirer ESG
Target ESG Group	**0.0953 ** (0.048)**	-0.06838 (0.189)
EBITDA Margin, p.p.	**0.46537 ** (0.032)**	**0.53678 ** (0.048)**
D/E Ratio	**-0.989264 ** (0.037)**	**-0.964326 ** (0.021)**
Liquidity, p.p.	**0.1044274 *** **(0,097)**	0.0905410 (0,124)
Growth, p.p.	**0.64624 *** **(0.067)**	**0.67489 *** **(0.099)**
Cross border dummy	0.05478942 (0.162)	0.05414625 (0.158)
Insider dummy	**0.603406 *** **(0.070)**	**0.63444 *** **(0.087)**
constant	**1.411103 *** (0.010)**	**1.578101 *** (0.008)**
Observations	212	186
R^2	**0.812**	0.639
*p<0.1; **p<0.05; ***p<0.01		

Source: Author's calculations using STATA

Thus, we have enough evidence to reject H$_0$ that there is no significant difference between High and Low ESG Acquirers in their propensity to pay a premium for High ESG Targets.

Thus, this study helps close the research gap in examining the direct link between ESG and M&A premiums by controlling for the confounder in the form of financial performance, while most research is conducted on the relationship between ESG and financial performance. Apparently, there may be an endogeneity problem here, since companies with better financial performance can afford higher ESG Scores, and not the other way around, as stated in the paper. However, it is assumed that such an effect, if there is one, is insignificant for the sample. At the same time, it was not found possible to find an instrument variable that can replace ESG and that will not correlate with financial performance, because it contradicts the fundamental idea that the firm works to meet the financial interests of stakeholders.

For Practitioners: strategic investors should consider Target's Corporate Governance determinants as a significant determinant during pre-deal due diligence. Legal risks, scandals and corporate fraud can be avoided by paying attention to the following indicators:
- Board size optimality, gender and ethnic diversity;
- Independent directors: presence and share in the board;
- CEO: education, compensation, ownership and duality;
- Ownership concentration, including governmental;
- Employee representation and ownership;
- Audit quality.

Some limitations and challenges encountered in this study. It is important to note that responsible investments and ESG scores are still in the early stages of development, and this thesis is based on a limited number of observations. To gain a better understanding of the value creation potential from ESG, further research is necessary, using a more robust dataset.

It is also important to consider that the study was conducted on Thomson Reuters Refinitiv ESG scores. It is a recognized and legitimate source of data, but ESG scores are divergent and different rating agencies rate them differently.

In the future, such studies can, on the one hand, be refined to the level of individual determinants within the ESG-rating. For example, the impact of certain corporate governance indicators such as CEO duality or board diversity on M&A results. On the other hand, they can be refined for individual industries, because different industries have peculiarities in the context of ESG: fast-growing IT start-ups may have problems with corporate governance and have no problems with pollution and be socially diversified. And large chemical manufacturers may have a large and responsible corporate governance apparatus, but cause significant environmental damage and have hazardous working conditions. Third, it makes sense to introduce additional controls on geographic and political determinants, since it is believed that business adapts its priorities depending on the political environment.

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The Wedge between Ownership and Control, Shareholder Identity, and Corporate Disclosure

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Abstract:
We explore the dual class stock setting to study the effect of separating ownership and control on corporate disclosure. Our analysis relies on a unique panel dataset of publicly traded firms in an emerging economy where dual class stock companies emerged exogenously during the privatization process. Using conventional methods of panel data analysis, we find that the separation of ownership and control due to the issue of dual class stock results in lower corporate disclose. Disclosure also decreases in the wedge between the ownership and control rights of the largest shareholder (specifically, it increases in ownership rights, but decreases in control rights). There is evidence that the type of the controlling shareholder matters. The negative effect of the wedge is more pronounced when the largest shareholder is a domestic private person, natural or legal, and is virtually absent for foreign shareholders from non-offshore jurisdictions. State and state-related companies as well as foreign owners from offshore jurisdictions occupy an intermediate position.

1. Introduction

Corporate governance and corporate disclosure have recently been viewed as inseparable issues and fundamental factors affecting the performance of companies, stock markets and economies at large (Cerbioni and Parbonetti, 2007). Considerable attention in academia has been drawn to potentially complementary or substitutive nature of the relationship between the two (Beekes et al., 2016; Enache and Hussainey, 2020). The implications of separating ownership and control for corporate disclosure is a case in point.

According to agency theory, which has been the dominant framework for analyzing corporate disclosure (Cotter et al., 2011), the separation of ownership and control is fraught with high agency costs associated with excessive compensation, the consumption of perks, related party transactions, and other private benefits of control. The separation of ownership and control may thus induce managers and/or controlling owners to opt for low disclosure standards which helps them mask their consumption of private benefits. However, managers and/or controlling shareholders can also use disclosure to assure investors about the protection of their interests, especially when the firm needs additional external financing and potential agency costs are high. Therefore, the separation of ownership and control may theoretically result in both higher and lower disclosure, which makes it an empirical issue.

In addressing this issue, the empirical literature primarily focuses on ownership concentration (as a rule, in the hands of insiders) and shareholder identity (typically, families, institutional investors, foreign entities, and government). Indeed, ownership concentration is seen as an essential mechanism of corporate governance, reducing the wedge between ownership and control and the severity of agency conflicts in a widely held firm (Shleifer and Vishny, 1997). However, it is fraught with agency conflicts between the large shareholders and minority owners (e.g., Becht et al., 2003). As regards shareholder identity, the emphasis is placed on

shareholders' different incentives and abilities to govern and manage the firm.[1] The empirical results are rather mixed. In particular, ownership concentration is often found to negatively affect disclosure (e.g., Lakhal, 2005; Lepore et al., 2018), foreign ownership is typically associated with better disclosure (e.g., Amran and Devi, 2008; Hu et al., 2018) while government ownership appears to be most controversial.[2] Overall, the evidence as to whether and how the separation of ownership and control affects corporate disclosure remains ambiguous.

There is a relatively thin but growing literature that explores the dual-class ownership setting, where agency costs are exacerbated by the divergence between insider voting and cash flow rights, to study the consequences of separating ownership and control for corporate disclosure. Indeed, dual class stock is one of the most explicit and visible mechanisms of separating ownership and control that exacerbates agency problems within firms. Many scholars argue that shareholders with disproportionally high voting rights may take self-serving actions at the expense of minority shareholders (e.g., Masulis et al., 2009). Therefore, on the one hand, the setting seems to be extremely useful for expanding the knowledge about the relationship between disclosure and corporate governance. On the other hand, however, it is highly problematic as dual class stock companies usually emerge endogenously, for example, due to their founders' desire to retain control over productive assets while obtaining external financing, and may be very different from single class stock firms.[3] Therefore, empirical studies that use the dual-class ownership setting to learn something about the whole population of firms have to struggle against the selectivity issues accompanying the companies' decisions to issue different classes of stock (e.g., Cao et al. 2020).

The existing literature that links disclosure to the separation of ownership and control in a dual class stock setting often takes a simplified approach where the disproportionate control rights are measured with a single dummy. This is the approach adopted, for example, in Irani and Oesch (2013), Li and Zaiats (2017), and Solomon et al. (2020). The findings of such analyses are mixed.[4] Few papers focusing on disclosure make an attempt to quantify the wedge between ownership and control stemming from the issue of dual class stock. In particular, Palas et al. (2023) emphasize the importance of the size of the wedge and find that "a larger wedge is correlated with "older," smaller, more profitable, and less leveraged firms and a higher quality of reporting." No paper in this strand of the literature, to our best knowledge, has tried to differentiate the effect of the wedge based on the identity of the controlling shareholder. As noted by Aggarwal et al. (2022, p. 150), there is a general lack of knowledge regarding "the effects of dual-class structures on different outcomes, such as valuation and innovation" while "[t]he type of controller and wedge between economic and voting rights may have an effect on various outcomes".

Our paper intends to fill in some of the gaps outlined above. We study the implications of the control-ownership wedge for corporate disclosure using an unusually clean setting and a rich dataset from an emerging economy, Russia of the first decade of the new century. First, we take advantage of the fact that the dual class equity structure in Russian companies emerged *en masse*

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[1] For example, government ownership is often associated with the lack of ownership incentives for bureaucrats involved in the governance of state firms (Vickers and Yarrow, 1991) and the possibility for bureaucrats and politicians to interfere in state-owned firms, including outright expropriation for personal gains (Shleifer, 1998).

[2] Indeed, Alotaibi and Hussainey (2016) report a negative effect of state ownership on disclosure in Saudi Arabia, Lan et al. (2013) finds a quadratic convex association in China while Amran and Devi (2008) report a positive association in Malaysia.

[3] In particular, Amoako-Adu et al. (2014) show that the issue of dual class stock is more typical of family companies: for example, 83.2% of companies with dual class stock from the S&P 1500 list are family firms (those with dominance of the family in the ownership structure). Among comparable companies with single class stock, family firms account for only 29.04%.

[4] For example, Tinaikar (2014), who focuses on managerial compensation disclosure, finds that it is lower in dual class firms compared to single class ones; Li and Zaiats (2017) report that dual class status is associated with poorer information environment and increased accrual-based earnings management while Solomon et al. (2020) show that the quality of financial reports is higher for dual-class companies than for their single-class counterparts.

in an exogenous manner due to the specifics of the privatization process of the early 1990s (Muravyev at al., 2014).[5] Thus, the concern that the decision to have a single-class ownership structure vs. a dual-class one is not exogenous and there is sample selection bias (e.g., Lim 2016) is of little or no importance in our analysis. Second, we have detailed data that not only identify dual class stock companies, but also provide us with a direct measure of the magnitude of the wedge between ownership and control. Third, we have information about the identity of largest shareholders in firms. As a result, we are able to address the poorly studied issues how the separation of ownership and control, the magnitude of the wedge as well as the type of the controller affect corporate disclosure.

The data for our study are assembled from several sources, with the Standard and Poor's (S&P) Transparency and Disclosure Index, the SKRIN and SPARK database being the primary ones. Most data on ownership were hand-collected from annual and quarterly reports available in the SKRIN and SPARK. In total, we have an unbalanced panel of 125 companies observed over 2002-2010. Using conventional techniques of panel data analysis, we find considerably lower disclosure (by 6,5%-9%) in companies with more severe agency conflicts (i.e., dual class stock firms as compared to single class stock ones). The amount of disclosure appears to be a decreasing function of the wedge between ownership and control rights of the largest shareholder (specifically, disclosure increases in ownership rights, but decreases in control rights). We also find evidence that the type of controlling shareholders matters. The negative effect of the wedge is more pronounced when the largest shareholder is a Russian private person, natural or legal, and is virtually absent for foreign shareholders from non-offshore jurisdictions. State and state-related companies as well as foreign owners from offshore jurisdictions occupy an intermediate position. There is little evidence to suggest that the composition of corporate boards mediates these relationships.

The rest of the paper is organized as follows. Section 2 present a brief review of the relevant literature. Section 3 describes the data and methods employed. Section 4 presents the main empirical results. Finally, section 5 draws some conclusions.

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[5] In Russia, the key driver of the issue of dual class stock was the capital intensity of the firms offered for privatization in the early 1990s. Managers and employees of capital intensive firms were unable to accumulate enough funds to buy 51 per cent of shares under Privatization Option 2 and therefore opted for Privatization Option 1 which implied the establishment of a dual class stock structure with preference (non-voting) shares amounting to up to 25% of capital. These shares were then distributed among managers and employees for free (see Hare and Muravyev, 2003).

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Are Acquisitions Promoting R&D? The Case of European IT Sector

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Abstract:
The paper investigates the relationship between M&A activity and R&D intensity and spending growth of both acquiring companies and their targets in the European IT sector. Innovation efforts and R&D play a foundational role for companies seeking to further develop their products and services and secure a sufficient market share. This is especially relevant for the knowledge intensive fields, particularly for the Innovation and Technology Sector.
The data used for the research combines information about M&A deals in Innovation and Technology sector of the EU between 2007 and 2021. Difference-in-difference estimation method is used to analyze the effect of M&A activity on the companies involved. The results show that the R&D intensity of both acquirers and targets decreases in the post-merger period. As for R&D expenditures, they increase for acquiring companies, while the effect is opposite for their targets.

1. Introduction

There has been a continuous debate in the scientific community as to the effect mergers and acquisitions have on the innovation efforts and R&D activity of companies that participate in the M&A activity. The discussion of mergers' impact on innovation has resurfaced in the scientific community due to the recent abundance of mergers in the high-tech industries (Haucap, Rasch and Stiebale, 2019). Authors have especially started to voice their concerns approximately from 2015, when the wave of mergers attributed to the US largest technological companies, namely Google, Amazon, Facebook, Apple, and Microsoft (GAFAM) was identified (Gautier and Lamesch, 2020). Later it was discovered that a significant percentage of these mergers turned to be killer acquisitions', meaning the core product of the acquired startup was discontinued shortly after the acquisition.

Relevance of this research is determined by two main points. Firstly, the companies in the Innovation and Technology Sector are constantly pressured to add assets that are more valuable, offer innovative products, and show astounding growth rates (Argentesi *et al.*, 2019). Secondly, as constant innovation and R&D spending is inherent for this sector, a thorough research into how M&A activity is affecting innovation efforts is especially relevant (Christofi *et al.*, 2019).

Analysis of the previous research performed on the topic shows that the relationship between innovation efforts and M&A activity is not conclusively settled (Szücs, 2014). There are two polarizing opinions in the scientific community, the first one stating that M&A puts a strain on innovation efforts of the merged entity, while the second one presents findings that, in some cases suggest a positive effect on R&D of firms involved in a merger.

As most of the research performed on this topic considers only one side of the M&A deal or does not make a distinction between the two, our study is designed to explore the difference between the effect on innovation activity of targets and the effect on the acquirers.

The paper is organized as follows. The first part is theoretical and is focused on the study of the already-existing research on Innovation efforts and M&A activity in the Technology and Innovation field, its relationship, and other factors that influence R&D intensity and merger activity in the sector. The second part is methodological and consists of a detailed data

description of data used and the empirical strategy chosen for its analysis. In the next part, the results are presented and discussed regarding hypotheses stated in the beginning. Finally, in the last part the conclusions are drawn, together with an outline of practical implications and future research opportunities.

2. Literature review

Due to the significant development of high technologies on the market, and, consequently, growth in the number of mergers and acquisitions in the IT sector, the question of the impact on the companies' innovative activity as well as the presence of innovation in the market, is being raised more and more often. Mergers between companies on the Innovation and Technology market commonly cause concerns about decline of competition on the market and the number of innovations being introduced into the market. One of the illustrative examples was the merger between the drug company Pfizer and its rival, Hospira. The European Union's competition commissioner, Margrethe Vestager, said about this transaction: "We only approved the deal after Pfizer agreed to sell the European rights to an arthritis drug it was developing. One concern was that Hospira already had a competing drug on the market, and we thought Pfizer might stop work on its own drug if the deal went ahead as planned. Which would have meant less of the innovation that we depend on as patients" (Haucap, Rasch and Stiebale, 2019, p. 284).

The problem of competition and availability of technologies on the market is described by Gautier and Lamesch (2021), Motta and Pietz (2021). It was pointed out on the example of five largest technological companies in the market: Google, Amazon, Facebook, Apple, and Microsoft (GAFAM). The analysis of the past five years of these companies' general growth strategies revealed that they had an active merger activity in the field, purchasing primarily promising technological startups. However, it is not yet completely clear whether all these mergers are carried out in line with existing laws of antitrust authorities and, more importantly, if these regulations could even be fully applied to controversial merger cases in this new digital economy.

Park and Sonenshine (2012) found that horizontal mergers lead to a decline in post-merger innovation in comparison with the level of innovation that would have prevailed had a merger not occurred, only for the sample of mergers that were challenged by the antitrust authorities. The authors claim that mergers may happen because challenged companies may cut back on duplicative R&D. At the same time, it was mentioned that the growth in both the R&D and patenting of challenged firms from the pre-merger to the post-merger period was lower than that of non-merged firms over the same period.

Recent studies describe various theoretical and practical approaches that allow drawing empirical predictions about the relation between acquisitions and R&D incentives. Szücs (2014) provides an estimation of probit model and difference-in-difference analysis. The results of this research support the idea that mergers have a negative effect on R&D spending during the post-merger period. Acquirers show R&D expenditure reduction as well. However, the reason for such changes can be the diversion of financial and managerial resources to restructuring after the acquisition of the company.

Cefis and Marsili (2015) estimated dynamic random effect probit model and transition probabilities for the two groups of firms: M&A active and M&A non-active to understand if there is the difference in innovation patterns between two main groups of firms. The results of investigation suggest that if the firm has previously participated in M&A, then the probability of transition from a non-innovator to an innovator, and the probability of continuing to be an innovator significantly increases. As for the impact on firms of different sizes, small firms in some cases become innovators.

Chou and Chu (2022) measures M&A activity as one industry-level factor that is responsible for the knowledge spillovers, variable that, in turn, encompasses the variations in the innovation

activity of standalone firms in the industry. Authors show that an active M&A market positively affects ideas exchange between the firms and ensures their knowledge base growth.

The model by Zhou, Yan, and Liu (2019) considers both a down-stream firm and an up-stream firm in terms of the production chain. The model shows that a vertical merger reduces the risk premium of the innovation project.

Phillips and Zhdanov (2013) investigate the impact of mergers and acquisitions on firm's willingness to invest in research and development (R&D) and innovations. In accordance with the provided theory, large firms can outsource R&D investment to small ones. Later those small firms that successfully innovate become attractive targets for acquisition and exit through strategic sales can be considered as the motivation to continue to spend on R&D. The paper also suggests that mergers can be a way to acquire innovation as a substitute strategy for development of R&D.

After analysing the literature on the topic, a research gap for the study was identified. First, previous studies would typically focus only on one side of an M&A deal (acquirers or targets), or do not differentiate between them while performing their analysis. In addition, several articles explored used short-term data available on the topic. Because it can take a longer period to restructure innovation efforts within a merged entity, this approach provides limited explanatory power. Finally, studies on the topic are focused on a vast array of industries, and the ones attracting the interest of the scientific community, and the most referenced ones, are mostly performed with data about non-R&D intensive sectors. A closer look into innovation-driven industry is, therefore, required.

Based on the gap identified, we formulated the following hypotheses.

Hypothesis 1 R&D intensity of the acquirer experiences a substantial decrease after the merger, but growth of R&D spending is not negatively affected.

Hypothesis 2 Growth of R&D spending and R&D intensity are negatively affected by the merger for target.

Hypothesis 3 R&D intensity and R&D growth of companies in the Computer Programming subgroup is influenced the least after the merger.

3 Methodology

Data collection and description

The companies evaluated in the study were taken from the European Commission (EC) database. To be selected for the research, mergers had to have value significant enough to be reported to the EC and issued a notification. A second criterion used was the sector they operated at the moment of the deal. EC database groups companies based on the NACE (2013) code. Data sample is composed of companies that operate in the field of Scientific and Technical activities as well as in the field of Information and Telecommunication and are based in Europe. Companies with more than one merger during the observed period were excluded from the sample to avoid possible bias when interpreting the results. Using this sample of companies, we collected balance sheet data for them in the period from 2010 to 2021. In addition, the company's age was calculated, and two additional indicators were added. The first one, R&D Intensity, was measured as R&D expenses divided by company's Revenue from business activities. The second one, R&D growth, defined as change in the R&D expenses compared to the previous year, is designed to see whether a company's spending on R&D decreased between two consecutive periods. The data was collected using Refinitiv Eikon base and K-10 reports of the companies. Companies without R&D data were dropped from the dataset.

The final sample consists of 85 companies. These companies were divided into subgroups determined based on categorization from the European Commission. These include, Business support service activities, Computer programming, Data processing, Manufacturing, and Telecommunications. Finally, financial data was collected on non-merging companies that would later form a control group for the analysis using the same database and K-10 reports. As

for the composition of the control group, it was required for the companies included to be based in the European Union, operate in the Innovation and Technology sector as per their specification in the data base used, as well as report their R&D expenses and other financial information throughout the specified time. In addition, it was required for these companies not to be reported to the EU regulatory authorities (the European Commission) on the ground of participation in an M&A deal significant enough to be reported starting from 2007 to 2021. Finally, the companies that we were left with were examined to see if the parallel trend assumption would be held in each case. This assumption implies that in the absence of treatment, the difference between the treatment group and control group would hold constant over time.

Figures 1 and 2 demonstrate the change in average R&D intensity and R&D growth for acquirers, targets, and control group around four years before and four years after the merger. Prior to the merger both acquirers and targets demonstrated the same trend to a slight decrease in the R&D intensity with small fluctuations. After the merger (year 0) the dynamics of the two groups of companies remains the same: acquirers have been showing steady decrease over the next 4 years, approximately 16% for the whole period, while the R&D intensity of targets has almost the same values. Compared to the treatment group, R&D Intensity of control group is much higher, the difference is approximately 50%. However, the graph does not demonstrate any significant fluctuations except for two years, when the value increased from 0.14 to 0.16.

As for the trend for R&D growth, it can be clearly seen a sharp decrease in growth by 44% for targets in the first years after the mergers, later growth became more stable. Acquirers demonstrate fluctuations over the whole period; however, a positive trend can be observed with the 26% average growth. The R&D growth of acquirers is caused by the transition of R&D assets from the targets' to the acquirers' books after the merger. As for the control group, the graphic has a U-shaped form: after a sustained decline with the lowest point of 3.3%, the number began to grow.
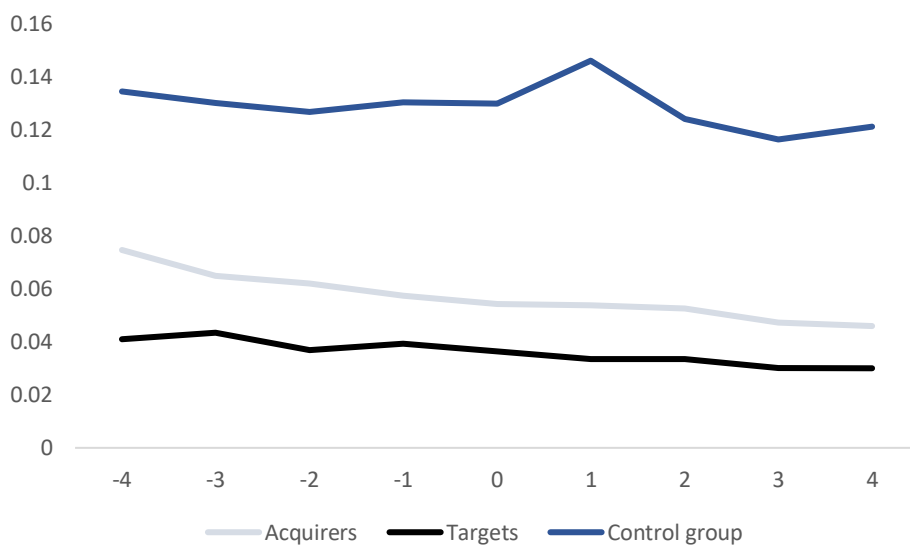
Figure 1. R&D Intensity
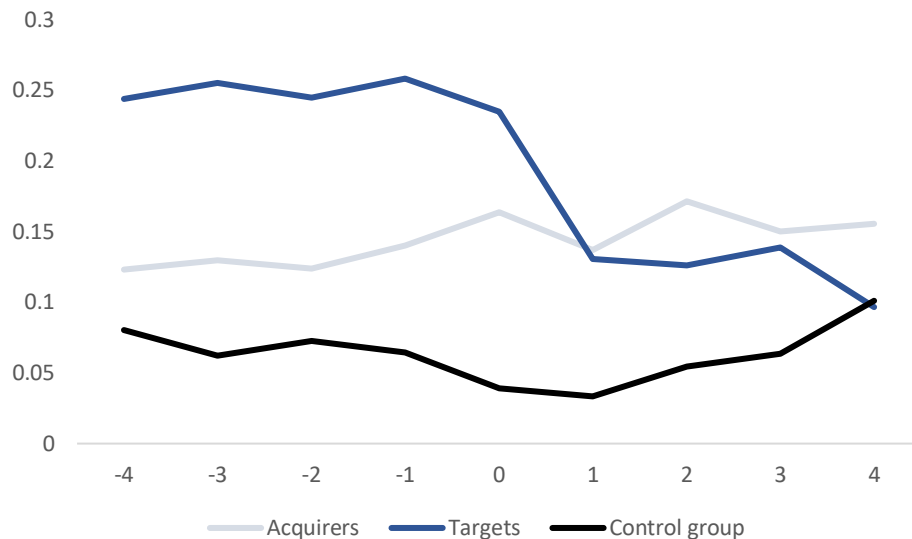
Figure 2. R&D growth

Summary statistics for both pre-merger and post-merger periods are listed in Table 1.

Table 1 Average values of firm-level variables for control and treatment groups before and after the M&A deal

Variable	Acquieres		Targets		Control group	
	Before	After	Before	After	Before	After
R&D intensity	0.07	0.04	0.04	0.03	0.13	0.13
R&D growth	0.13	0.15	0.25	0.12	0.07	0.06
Total assets	68.31	93.13	26.23	29.28	51.69	72.92
Total debt	18.82	31.48	48.07	68.23	22.19	37.31
Revenues	40.04	49.12	25.45	26.64	26.66	33.91
Net income	6.25	7.31	1.61	1.59	1.68	2.91

Source: Authors' estimations based on data retrieved from Eurostat.

To receive an additional insight into the data collected and its characteristics, probit models were constructed. We estimate the binary choice model where the dependent variable equals 1 if the firm was an acquirer and 0 if the firm was a target. R&D intensity, R&D growth, total debt, net income, total assets, and age have been added as explanatory variables. For these variables we took pre-merger data as it could potentially affect both the decision to merge and future R&D efforts of companies. We expected that the model can include U-shaped or inverse U-shaped relationship with the role of the firm in a merger. To account for possible non-linearities in assets and age, we also include squared total assets and age. The model was estimated with random effects as the outcome does not vary over time for companies.

Table 2 presents results after calculation of margins for the estimated model. Acquirers on average are more R&D intensive compared to non-acquiring companies. As was shown previously, targets were characterized by a staggering average R&D growth of more than 20% pre-merger. This could indicate that targets are usually striving to become innovation-intensive, and acquirers, seeing that they have a lower level of R&D intensity, might consider M&A as a new way of attaining new technology or know-how, as well as receiving a potential competitive advantage. Negative coefficient for square of age shows that very young or very old companies are less likely to be acquirers than middle-aged companies. The positive coefficients for squares of total assets show that acquirers are usually companies with a very high or very small value of total assets.

Table 2. The results of probit model estimation

Variable	Coefficient
R&D intensity	.566*
	(.809)
R&D growth	-.130*
	(.003)
Total Debt	-.022*
	(.019)
Net income	.002
	(.046)
Total assets	1.292***
	(.342)
Total assets^2	.044***
	(.023)
Age	.008***
	(.010)
Age^2	-.00004***
	(.000)
Wald chi2	64.75

Coefficients and standard errors of the models. ***, **, *- the level of significance 1%, 5% and 10% correspondingly

Research approach

We used difference-in-difference approach to examine the effect of mergers on incentives of firms to innovate. The key idea is to compare changes in outcomes of two groups overtime: the first group is treated in a specific way; the control group is not treated. The basic equation for estimation of treatment effect presented as follows:

$$y_{it} = \gamma + \gamma_i TREAT_i + \gamma_i POST_t + \beta TREAT_i \times POST_t + u_{it},$$

where $TREAT_i$ is a dummy variable of being treated or not; $POST_i$ is dummy variable for the post-treatment effect, and $TREAT_i$ x $POST_i$ is a treatment effect.

Therefore, the Difference - in - difference estimator can be defined in the following way:

$$\hat{\beta} = (\overline{Y_2^T} - \overline{Y_2^C}) - (\overline{Y_1^T} - \overline{Y_1^C}),$$

$\overline{Y_2^T} - \overline{Y_2^C}$ is the difference in average outcomes between treated and untreated after the treatment, while $\overline{Y_1^T} - \overline{Y_1^C}$ is the difference in average outcomes between treated and untreated groups before the treatment.

The assumption of the basic model is that there are only two periods present. The first one takes place before the treatment, and the second one happens after. As the main focus of the research is to find whether there is a change in R&D expenditures between these two periods, the dependent variable is constructed as the difference between the post-treatment and pre-treatment period (Ball & Sheridan, 2005):

$$X_{post} - X_{pre} = \alpha + \beta_1 D_1 + \beta_2 D_2 + \beta_3 X + e \text{ (1)}$$

To attain the X_{pre} indicator, the mean of either R&D growth of R&D intensity in the four years leading up to the year, where the M&A deal was registered, was calculated. Similarly, the X_{post} is the mean of the four years after the year M&A took place. D_1 here is a categorical variable that is equal to 1 if the company did not participate in M&A at all during the observed period, 2 if the company was an acquirer in an M&A deal, and 3 if the company was considered a target. D_2 is a categorical variable indicating a company's subcategory from the EC categorization. X is the set of control variables including financial indicators such as Total Assets, Debt, and Net Income.

However, some bias needed to be eliminated, in particular, regression to the mean. Thus, an additional variable X_{pre} was added to the model to account for the difference between the

companies, that was already present in the beginning of the observed period. The reason behind this addition is the assumption that initial value of R&D intensity in the companies not involved in the M&A as opposed to companies involved, was already substantially different from the beginning. If X_{pre} is correlated to D_1 variable, that indicates if the company has participated in M&A, then the first regression built would produce a biased result. The regression with an added variable is presented below:

$$X_{post} - X_{pre} = \alpha + \beta_1 D_1 + \beta_2 D_2 + \beta_3 X_{pre} + \beta_4 X + e \text{ (2)}$$

D_1 variable indicates if participating on either side of the M&A deal really affects the performance of the company regarding its initial performance in the pre-deal period. Hence, the true effect of the M&A deal on R&D intensity and growth is visible.

While the basic difference-in-difference model assumes that there are only two time periods, in practice there might be situations when treated and untreated groups have different trends in the average of the outcome variable. Additional challenges arise in the case of large time periods when treatments occur at different times. The basic equation (1) cannot be estimated in this case because the post-period dummy is not defined for control observations. To solve the problem of time-varying treatment effects, research usually apply the two-way fixed-effect model (3), where α_i is dummy-variable for cross-sectional units, α_t is time periods, and D_{it} is a treatment dummy (Goodman-Bacon, 2021):

$$y_{it} = \alpha_i + \alpha_t + \beta D_{it} + e_{it} \text{ (3)}$$

The estimated model is presented below:

$$y_{it} = \alpha_i + \alpha_t + \beta_1 D_t A_i + \beta_2 Ind_i + \beta_3 X_{it} + e_{it} \text{ (4)}.$$

Models were constructed based on the two dependent variables (y_{it}) discussed above: R&D intensity and growth of R&D spending. Control variables (X_{it}) were various financial indicators such as Total debt, Total assets, Net income, EBIT, as well as company's age and its subcategory from the EC categorization (Ind_i). Dummy variable D_{it} indicates treatment effect, but as treatments occur at different times, the variable was equal to 1 for the post-merger period and 0 for pre-merger period. A_i represents the dummy-variable that is equal 1 if company is an acquirer and 0 if the company is a target. The interaction of these two variables helps to test our hypothesis about the impact both on acquirers and targets in the pre–merger and post–merger periods. In contrast to the basic model, the control group has not been included in the model because groups (before and after merger periods) serve as controls for each other during periods when their treatment status does not change.

To track the evolution of innovation efforts through the years, before and after the merger took place, the timeline within the data set was designed. For this, a set of dummy variables was created to indicate how far away from the merger deal is the year currently looked at.

4. Results and discussion

The first models estimated used the econometric specifications (1) and (2) discussed above. Table 3 presents the results of cross-section data models.

Table 3 Cross-section data model

Variable	Equation 1		Equation 2	
	R&D intensity	R&D growth	R&D intensity	R&D growth
Treated (Acquirer)	-.375*** (.011)	1.485** (.069)	-.437*** (.009)	.568*** (.061)
Treated (Target)	-.340*** (.011)	-1.223** (.069)	-.437*** (.011)	-1.382*** (.059)
Initial value			-2.274*** (.065)	-.808*** (.129)

Business support	-.145** (.013)	-.465 (.087)	.0117*** (.013)	-.358 (.074)
Computer programming	-.012* (.012)	-.493* (.080)	.021** (.011)	.118** (.069)
Data processing	-.0402 (.013)	.461* (.091)	-.024 (.013)	.844** (.078)
Manufacturing	.109 (0.013)	-.997** (.084)	.012** (.012)	.149 (.074)
Revenue	.081 (.027)	-.094 (.018)	.049* (.025)	-.049 (.015)
Total Debt	.535** (.062)	.025** (.004)	.265* (.0575)	.049* (.0034)
Total assets	-.015 (.027)	-.022* (.017)	-.394 (.025)	.015** (.015)
Adjusted R-squared	0.271	0.212	0.543	0.496

Coefficients and standard errors of the models. ***, **, *- the level of significance 1%, 5% and 10% correspondingly

Examining the coefficients for the first and second equation in terms of R&D intensity, we can observe that the indicator for the acquirer and the target went up from -.375 to -.437 and from -.340 to -.437 respectively, which shows that controlling for the initial value helped in determining that effect for M&A participants becomes more noticeable. As for the R&D growth of the acquirer, there is a noticeable decline from 1.485 to .568, however, the effect of target becomes even more pronounced with coefficient going from -1.223 to -1.382. This could mean that M&A did not have a major effect on R&D growth of the acquirer, but it is attributed to the decrease in the R&D activity of the target.

Based on the given outputs and considering the hypotheses formulated at the beginning, only some predictions were confirmed during the analysis. The first one stated that the R&D intensity of the acquirer experienced a substantial decrease after the merger, but growth of R&D spending is not negatively affected. It was confirmed, as R&D intensity is indeed negatively affected by a merger. On the other hand, growth of R&D spending demonstrates positive dynamics over time. The second hypothesis about growth of R&D spending and R&D intensity being negatively affected by the merger for target, was partially confirmed. R&D spending has indeed declined after M&A, however, R&D intensity showed growth. The final hypothesis that stated that R&D intensity and R&D growth of companies in the Computer Programming group is influenced the least after the merger was rejected. This was confirmed for the R&D growth model, however, the least affected group in terms of R&D intensity was Manufacturing.

Next, the two-way fixed effects model was estimated (Table 4). The variable of interest – the interaction between two dummies - shows that a target's R&D intensity and R&D growth are negatively affected by mergers. The coefficients are negative and statistically significant, and the findings correspond to the models estimated with cross-sectional data. The effect on R&D spending is much more pronounced for targets, 0.336 average decrease compared to 0.168 average increase for acquirers. At the same time, positive coefficient for R&D growth of acquirers demonstrates that incentive to sustain the research activities continues to grow, while targets' innovative programs seem to diminish in post-merger period. It was discovered that R&D intensity was the most affected in the Business support activities category while the category least affected by M&A is Data processing. In terms of R&D growth, the least affected category is Computer programming, which corresponds with the previous model. Manufacturing demonstrates the greatest exposure to the impact of R&D growth changes.

Table 4 Panel data model

Variable	R&D intensity	R&D growth
Treated (Acquirer)	-.016**	.168**
	(.016)	(.073)
Treated (Target)	-.005***	-.336*
	(.003)	(.054)
Business support	.118**	-.077
	(.049)	(.188)
Computer programming	.068*	.045
	(.021)	(.085)
Data processing	.048**	.074
	(.023)	(.089)
Manufacturing	.051*	.101**
	(0.019)	(.080)
Net income	-.003*	.005
	(.001)	(.024)
Total Debt	.001	.005**
	(.001)	(.014)
Total assets	.005**	-.016
	(.003)	(.035)
EBIT	.002**	.076**
	(.001)	(.033)
Age	.004	-.0006*
	(.001)	(.0001)
F-statistics	40.35	33.01

Coefficients and standard errors of the models. ***, **, *- the level of
significance 1%, 5% and 10% correspondingly

If we evaluate these results as compared to previous studies on the topic, at first, there are a few differences that are noticeable. Desyllas and Hughes (2010) find that R&D intensity of high technology companies only decreases in the first year after the merger, but then stabilizes and starts to steadily climb up over a three-year window after the merger, R&D productivity is also found to increase simultaneously. While our findings contradict these of authors mentioned above, we are in line with other authors' research on the topic. Haucap, Rasch, and Stiebale (2019), discover that there is a negative effect on R&D intensity in the post-merger periods present, not only for firms participating in M&A activity but also for their competitors in possession of overlapping technologies. Scucz (2014) also confirms that R&D intensity of both the acquirer and the target faces a decline post-merger. Finally, Gautier and Lamesch (2021) discovered that M&A activity of large players in the Innovation and Technology Sector is destructive for innovation activity and R&D growth of target firms, and in some cases even contributes to the discontinuation of its core product. In conclusion, results seem to mainly be in agreement with the latest research on the topic, however there is a few contradictions, perhaps due to a difference in measurement technics and R&D metrics under evaluation, that are chosen for each particular study.

5. Conclusion

In this paper, the effects of M&A activity on R&D intensity and R&D growth of both companies acting as acquirers and targets were studied. It was found that R&D intensity is negatively impacted in the post-merger period for both the target and the acquirer. While R&D growth experiences a decrease after the M&A for target, but not the acquirer. Based on the analysis of other studies on the topic, the pattern here is somewhat compatible to innovation-related

acquisitions, where an acquiring firm is looking for an acquisition of an already developed technology, instead of building one in-house. Seeing as target firms are characterized by a much higher percentage of R&D growth pre-merger, that decreases by half after the deal, this could be interpreted as a threat to its potential of being a continuously innovative enterprise. Considering possible implications here, since most merger targets are firms with high R&D intensity, it is important to establish controls to ensure that these innovation efforts are not disrupted while these firms perform M&A activity. Looking at the financial data, it is important to note that target firms had a considerable amount of debt in the pre-merger period, and after the merger, the debt has increased by about one third, while the assets increased only slightly, by approximately 15%. In the meantime, the acquirers showed considerable growth in assets, net income, and revenue, the latest having increased by more than 20%. An assumption here is that since R&D intensity is the ratio of R&D expenses to Revenue from Business Activities, and that ratio seem to be decreasing for both sides of the M&A activity, while R&D growth patterns differ between acquirers and targets, it is explained by a noticeable rise in Revenue for the acquirers, and a decline in the R&D spending for the target group. A negative R&D growth effect is a worrying sign that was present in cases related to targets and considering that these targets operate in a highly innovative field, this fact should be considered by competition authorities, when designing methods of supporting the competitive significance of target firms. A growing amount of debt and stagnated or severely decreasing R&D activity can cause the target's core good or service to be dissolved into the acquirer's assets or be discontinued. This could in turn lead to elimination of highly innovative market players, which is destructive to the competition within the sector, and as competition is one of the driving forces in sustaining stable growth in the sector and contributing to the welfare of customers, it is better to encourage careful supervision by competition authorities.

Possible limitations to the study include its limited geographical scope as the study was performed only on the companies based in the European Union, and the R&D intensity and growth patterns could significantly differ from region to region. Another limitation is the relatively small number of firms that report R&D expenditures in their financial data.

Considering future research opportunities, only the R&D inputs were measured during the study. Consequently, as a continuation of the study, it would be possible to now focus on the R&D outputs of firms (patents, innovative products, know-how technics, etc.) to determine if there is a correlation between inputs and outputs, as well as R&D intensity and growth. Another possible direction of research here is looking at how related target and acquirer really are. The relatedness could be measured either with technology produced by both of them and subcategory they operate on the market. This would provide a potential opportunity of discovering whether relatedness of companies is a potential threat of innovation, or, on the contrary, encouragement to knowledge transfer.

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Digital and Utilitarian Rights Application in the Financial Market

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Abstract:
The appearance of distributed registers technology has enabled the application of blockchain technology, smart contracts and led to the emergence of the digital rights market and, as a consequence, the digital financial assets market. The paper considers the main stages in the development of digital rights in the Russian Federation and their potential application to financial markets. The limitations in the application of digital rights are considered in detail and a comparison is made between classical financial market instruments and the potential opportunities of DFA. The conclusion is that DFAs are capable of covering any classical financial market instruments and also allow for the configuration of the most complex ones that the current infrastructure does not allow for, which may subsequently lead to a full transition of the financial market infrastructure to a blockchain-based DFA issuance infrastructure.

Keywords: *financial markets, blockchain, financial infrastructure, digital and utilitarian rights, digital financial assets.*

Introduction

The concepts of digital and utility rights are new to both the Russian market and Russian law. The complete introduction of the relevant digital rights have consisted of 4 significant stages of the legislation establishment and improvement. The paper considers these stages: 1. Appearance of "digital rights" as legal definition by the law [1], 2. The establishment of Law No. 259 of 02.08.2019 (On Crowdfunding) [2], which regulates the relations arising from the issue, accounting and trading of utilitarian digital rights (UDRs), and the investment attraction organisation [3]. The law defines three ways of investing for individuals or legal entities: a. granting of loans; b. purchasing of emissions; c. purchasing of utilitarian digital rights [4]. 3. Establishment of Law No. 259 of 31.07.2020 "On DFA". [5], Principal difference from the law (On Crowdfunding, point 2) is the possibility to issue analogues of any available financial instruments and to attract capital similar to the instruments of the classical financial market. DFA can certify the following digital rights: a. Monetary claims; b. The ability to exercise rights to emission securities; c. The right to participate in the capital of a non-public joint stock company; d. The right to demand the transfer of emission securities [5]. 4. Establishment of Law to improve the legislation [6], which was aimed at removing restrictions for the active development of the DFA market.

Digital and utilitarian rights application specifics

An elaborate regulatory environment allows the usage of information systems based on distributed registries for recording and transferring rights to be considered, while avoiding many operational errors, speeding up registry maintenance, increasing the transparency of any transactions and optimising the available infrastructure [9]. Digital and utilitarian rights can be used in a wide range of processes for all stakeholder parties (individuals, commercial banks, governments) for investment transactions, contractual covenants and margins. The paper has further explored how digital rights can optimise the financial market infrastructure: the current stock market infrastructure is highly complex, the organisation of trading requires the involvement of many intermediaries (dealers, brokers, clearing companies, custodians, etc.),

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each of which performs different functions. These functions are performed by large companies with the help of information systems and operational departments, which affects the cost of services for end-users. The problem of stock market infrastructure is a current problem and does not have a formed, comprehensive solution. There is therefore great potential for the reorganisation of the infrastructure through digital rights that are traded and accounted in the information system.

Digital rights can also be used in the OTC financial market infrastructure. Right now, in order to organise trading in the OTC market between legal entities, dealers themselves create all the necessary infrastructure to deal with margin control, covenant control as well as payments. Moreover, companies have to monitor each other's reliability to determine the reliability of the counterparties. The implementation of digital rights in the OTC market could bring the control of margin collateral to the smart contract level through automatic tracking of available balances, as well as monitoring compliance with transaction terms and making automatic payments when certain conditions are met.

The paper then conducted an analysis of classical instruments in financial markets and their corresponding digital rights. Groups of rights were analysed and compared to the flows of classic financial instruments.

1. Digital rights that certify monetary claims. The obligation of the issuer for such tokens is to pay out funds upon the occurrence of specified conditions. Obligations can be configured based on the following conditions:
   a. The monetary claims for this type of token can be analogous to the bonds'[1] financial requirements, i.e. the token owner will be paid money flows at a predetermined rate for a set period of time with a final maturity date for all obligations,
   b. The monetary claims on such a token may depend on the price of an asset (commodity, currency, stock, etc.). Thus the liabilities on the token will be paid depending on the change in the value of the underlying asset[2].
   c. The token can be contingent on a number of conditions (similar to an option or bicurrency deposit), for example, when the price of one of the assets reaches a given level in the FX Market and the stock does not, in which case a payment is paid out.
   d. The monetary claims for such a token can be configured similarly to a promissory note [9]. This instrument would not be useful in terms of a financial instrument, but in terms of facilitating payments between participants in the relationship with the possibility of imposing payment terms. However, this functionality could replace the digital rouble[3].
2. Digital rights that certify the ability to exercise rights over emissions. In this case, the token certifies rights to monetary flows on a given/set issue of securities (bonds or

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[1] A bond is a type of security in accordance with the Federal Law "On the Securities Market" dated 22.04.1996 N 39-FZ [7]. A token is not a bond. This comparison is given to explain the similarity of financial flows on such kind of tokens.

[2] Usually, the term "underlying asset" is used to reflect liabilities on derivative financial instruments. A token is not a derivative financial instrument, although its obligations can be configured similarly to a derivative financial instrument.

[3] The digital ruble is still the same Russian ruble, which will be issued by the Bank of Russia in digital form in addition to the existing forms of money. Citizens will be able to credit digital rubles to their electronic wallets and use them via mobile devices and other media both online and in the absence of access to the Internet and mobile communications (that is, in the offline mode). The digital ruble will complement the monetary circulation and will be used simultaneously with cash rubles and funds of the population and enterprises in accounts with commercial banks [8].

stocks)[4]. The difference is that in the first case, the token is an independent instrument and the monetary claims are paid by the issuer of the token. In the above variant - the token issuer receives monetary flows from the security issuer and redirects the monetary flow to the token owner. I.e. in this case, the token is only needed to optimise the stock market infrastructure (it is not the security itself that is traded on the stock market, but only the token in the distributed ledger).

3. Digital rights that certify the ability to participate in the capital of a non-public joint stock company. In this case, the stocks of a non-public joint stock company is issued in the form of tokens. I.e. in this case the token is an analogue of stocks. And this token is issued through information system operator but this emission should comply with Federal Law No. 39 "On Securities Market". In this case, if the issue in the form of stocks has been carried out earlier, the issue in the form of tokens is prohibited. Also, an issue in the form of tokens cannot be converted into an issue in the form of stocks.

4. Digital rights, which certify the right to request emission securities. The token allows the securities themselves to be received when the conditions described in the decision to issue the token are met. In this case, analogous to the second type, where distributed registry infrastructure is used instead of financial market infrastructure.

5. Utilitarian digital rights, certifying the right to require 1. the transfer of thing(s), 2. the performance of works and/or provision of services, 3. the transfer of exclusive rights to the results of intellectual activity and/or rights to use the results of intellectual activity.

6. Hybrid digital rights which combine obligations in the form of monetary claims or utilitarian digital rights. That is, the investor is free to choose which method of redemption it will use (to receive a physical tangible asset or service or a monetary claim on it).

To implement financial instruments through digital rights is needed a good technological base. Which includes distributed registry technology, high-frequency application/transaction processing, the ability to flexibly implement and embed smart contracts in a distributed registry, to ensure reliability and security of transactions. Also, distributed registries, which deployed by different information system operators should be integrated with each other, with depositaries (for issuing tokens that certify the exercise of rights to equity securities), as well as integrated with sources of various asset quotes (currency, commodity, stock) for proper processing of underlying assets and calculation of monetary claims on tokens.

Conclusion

In summary, the examples above of the financial instruments are not exhaustive. One of the advantages of using tokens is the ability to develop smart contracts that can be easily configured to pay claims for money when a variety of conditions are met, using software code. On this basis, it is possible to combine prices in the commodity, currency and stock markets to create flexible conditions and offer the most interesting DFA to customers. Digital rights can already replace existing classical financial market instruments. Moreover, there have already been a number of issues of monetary claims similar to bonds, which confirm the possibility of using DFA infrastructure. Thus, it is only a matter of time before the infrastructure shifts to blockchain and the organization of issuance through DFA.

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[4] This instrument is similar to the issue of a depositary receipt, which certifies the right to specified securities, but is traded separately in another jurisdiction. Here, by analogy, a token certifying the rights to monetary claims on equity securities, but traded in a distributed register, is circulated.

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ESG Performance and Communication: Assessing the Shielding Effect on Stock Shortfalls during ESG Controversies

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Abstract:
This paper investigates the belief in sustainable investing that ESG performance and communication protect investors against ESG-related risks. It examines the impact of a firm's ESG performance and communication on stock shortfalls during ESG controversies among SP500 firms.
The empirical results of the study demonstrate that superior ESG performance reduces stock shortfalls during ESG controversies, providing a shielding effect. However, enhanced ESG communication, measured by transparency and ratings, does not offer additional protection. The shielding effect of ESG performance remains the same regardless of the firm's transparency level.
These findings emphasize the importance of prioritizing ESG performance over communication efforts to mitigate the negative impact of ESG incidents on stock value.

Keywords: *sustainable investing, ESG performance, ESG communication, stock shortfalls, shielding effect*

1. Introduction

ESG investing has become increasingly popular, as evidenced by the growing number of funds dedicated to this approach. The rise in investments in green funds underscores the integration of environmental, social, and governance factors in investment decision-making. According to a PWC report, ESG-related assets under management in the US reached $4.5 trillion in 2021 and are expected to surpass $10.5 trillion by 2026. This significant growth reflects investor interest in ESG factors in the investment arena. Despite skepticism labeling ESG investing as a passing trend, its substantial market presence demonstrates a lasting shift towards sustainable and socially responsible investment practices.

2. Relevance of the paper to the track topic

Traditionally, the impact of ESG on investor utility is understood through three distinct channels.

1. **The cash flow channel.** Research by Gregory et al. (2014) indicates that firms with strong ESG characteristics have a competitive advantage, leading to resource efficiency, attraction of high-quality human capital, innovation, and superior cash flows. Meta-analyses by Friede et al. (2015) and Lu and Taylor (2015) support the idea that integrating ESG practices can drive financial outperformance, improving efficiency, reducing costs, and enhancing reputation and brand equity.

2. **The risk channel.** Studies by Eccles et al. (2014) and El Ghoul et al. (2011) suggest that a robust ESG profile contributes to lower systematic risk in green stocks. Green stocks are considered less vulnerable to market shocks, resulting in lower beta and lower cost of capital. High ESG firms also exhibit superior risk-control and compliance standards, leading to lower idiosyncratic tail risks (Godfrey et al., 2009; Jo and Na, 2012; Oikonomou et al., 2012). Additionally, green stocks can serve as a hedge against long-term sustainability risks, as proposed by Pastor, Stambaugh, and Taylor (2020).

3. **The sentiment channel**. Apart from financial considerations, investors choose green stocks based on ethical or moral convictions. Pedersen et al. (2021) suggest that investors driven by ESG factors derive additional utility from holding green stocks, aiming to make a positive impact through their investment choices.

This paper focuses on the risk channel, examining the impact of firms' ESG performance on risk. The cash flow channel is not addressed, as it can be argued that the benefits to shareholders come from the overlap between ESG and firm quality. Studies on materiality of ESG issues (Khan et al., 2016) suggest that sustainability issues directly impacting financial performance influence stock performance. Meanwhile, studies on quality premia show that high-quality stocks tend to have higher valuations and returns (Asness et al., 2019). Therefore, utilizing ESG information may not provide discernible benefits to rational investors assessing a stock's potential performance.

However, the same reasoning cannot be applied to the risk channel. It is conventionally believed that high ESG performance acts as a protective shield against ESG-related risks, such as environmental disasters, fraud, and regulatory breaches, which can have significant financial implications. However, there is a lack of comprehensive evidence, demonstrating that that green stocks are less vulnerable to the impacts of non-financial risks.

This study investigates whether shareholders of high-ESG performing firms experience greater resilience in their shareholder value during firm-specific ESG controversies. The analysis centers on stock shortfall during these controversies as a measure of the impact on shareholder value. The premise is that green stocks exhibit a lower magnitude of stock price decline compared to brown stocks, indicating a higher level of shareholder protection.

3. The research questions and methods
3.1. Hypotheses of the study
This study presents two hypotheses. The first hypothesis (H1) proposes that firms with higher ESG performance will encounter a smaller decrease in stock price during ESG controversies. A stronger ESG profile is expected to mitigate the decline in stock prices when confronted with ESG incidents, aligning with the notion that firm's ESG activities provide investor protection from non-financial risk.

The second hypothesis (H2) posits that firms with enhanced ESG communication, as indicated by higher ESG transparency and ratings, will experience reduced stock shortfalls when faced with ESG controversies. Moreover, increased transparency in disclosing ESG practices and performance is expected to amplify the protective effect of strong ESG performance. This hypothesis aligns with the limited attention theory, which suggests that investors allocate more attention to salient and easily understandable information compared to non-salient information (Hirshleifer and Teoh, 2003).

3.2 Cause and effect channels for the shielding effect of ESG
This study adopts the framework introduced by Pedersen et al. (2021) to examine the causal relationship between ESG factors and shortfalls. The framework identifies three types of investors: ESG-unaware, ESG-aware, and ESG-motivated investors. ESG-unaware investors do not consider ESG information when constructing their investment portfolios. ESG-aware investors, on the other hand, incorporate ESG information and assess its potential impact on a company's financial performance when making portfolio decisions. ESG-motivated investors not only integrate ESG information but also derive additional utility from investing in stocks with higher ESG ratings.

Consequently, two primary channels for the protective effect of firms' ESG performance during a controversy emerge. The first channel, driven by ESG-aware investors, can be explained as follows: (1) ESG controversies adversely affect firms' cash flow forecasts; (2) revisions in these forecasts largely contribute to the negative effects of ESG news on firm value; (3) investors incorporate firms' ESG performance in their forecasts, leading to lower downgrades in forecasts for high-performing firms.

The second channel is primarily influenced by ESG-motivated investors and can be described as follows: (1) ESG-motivated investors derive additional utility from holding greener stocks; (2)

these investors are willing to accept lower potential returns in order to maintain their exposure to ESG factors; (3) this myopia leads to smaller reduction in value for greener stocks.

The distinction between the two propagation channels lies in the factors influencing investor behavior. In the first channel, the tangible ESG performance of the company affects investors' forecasts, with actual ESG incidents and their impact on cash flow forecasts shaping investor expectations.

In contrast, the second channel is primarily driven by ESG communication, including the disclosure of ESG information and ratings. In this case, investors' decision-making is influenced by the communicated ESG performance rather than the actual performance itself.

Lastly, assessing the protective effect of ESG during controversies is challenging due to the difficulty of isolating its impact from other confounding variables. For instance, research by Drempetic et al. (2020) shows that a firm's ESG score is influenced by its size, with larger firms having greater disclosure capacity and higher ESG ratings. However, negative news about these firms tends to spread faster, leading to a more pronounced reaction to adverse incidents (Harrison et al., 1998).

Moreover, assessment of ESG shielding effect is further complicated by sector-level variations in ESG perceptions and performance (Berg, et al., 2022). "Sinful" industries tend to have lower ESG performance and experience greater investor reaction to incidents (Jo and Na, 2012). These industry-level divergences significantly impact drawdowns during controversies. Therefore, it is crucial to account for these confounding effects and control for industry-specific influences when evaluating the ESG shielding effect.

3.3. Estimation of shortfall during ESG controversies

Estimating shortfall poses challenges due to the inability to observe the stock value in a counterfactual scenario without the incident (P_t^N). Instead, one can only observe the price, given controversy (P_t^C), and reduction in value (VR_t) during the period. To overcome this, it is assumed that daily stock prices accurately reflect their present value. Thus, the discounted cash flow (DCF) model can be used to estimate the hypothetical price in the absence of the controversy:

$$\mathrm{E}[P_t^N] = (1 + r) * P_{t-1}^N - \mathrm{E}[CF_t]$$

With the assumption that expected cash flows are small relative to the firm value, which holds true considering the daily nature of the data set, an estimate of P_t^N can be reasonably calculated as follows:

$$\mathrm{E}[P_t^N] \cong (1 + r) * P_{t-1}^N$$

Consequently, an estimate of the shortfall (S_t) can be derived from the reduction in value during the period (VR_t) in the following manner:

$$\mathrm{E}[S_t] \cong \ln\left(\frac{P_t^C}{\mathrm{E}[P_t^N]}\right) \cong \ln\left(\frac{P_t^C}{P_{t-1}^C}\right) - \ln(1 + r) \cong VR_t - r$$

This study employs the following form of the Capital Asset Pricing Model (CAPM) to estimate the required rate of return:

$$\mathrm{E}[r_{i,t}] = r_t^{rf} + \beta_{i,t} * \left(\mathrm{E}[r_{m,t}] - r_t^{rf}\right),$$

where $\beta_{i,t}$ is *i-th* stock's beta at time *t*, $r_{m,t}$ is the return of the market at time *t*, and r_t^{rf} is the risk-free rate of return at time *t*.

Consequently, the shortfall (S_t) during the period can be measured as the excess risk-adjusted return (α) of a stock at the time of ESG controversy.

Thus, the shortfall (S_t) is estimated in the following steps: (1) $\beta_{i,t}$ is measured using the methodology outlined in Frazzini and Pedersen (2014); (2) expected return of a stock ($\mathrm{E}[r_{i,t}]$) is using the CAPM; and (3) shortfall (S_t) is measured as the difference between the daily reduction in value (VR_t) and the expected return ($\mathrm{E}[r_{i,t}]$).

3.4. Estimation of firms' ESG performance

Accurately evaluating firms' ESG performance is vital for assessing the shielding effect. However, the unobservable nature of ESG performance necessitates reliance on ESG ratings. Nonetheless, ratings from different agencies exhibit substantial variation for the same firm. Berg et al. (2022) find that 56% of rating divergence can be attributed to disparities in measurement methods. The study also uncovers a "rater" effect, where the rater's overall perception of a firm influences specific ESG category assessments.

The absence of a universally shared standardized framework for defining ESG characteristics further contributes to rating divergence. Billio et al. (2020) reveal significant heterogeneity in rating criteria and a lack of consensus on precise ESG component definitions. This lack of common ground leads to conflicting perspectives among rating agencies, diminishing agreement across providers.

The assessment of firms' ESG performance is further hindered by varying levels of transparency. This paper assumes that companies with strong ESG performance prioritize transparency. This assumption has its roots in empirical evidence. Consolandi et al. (2022) finds that managers focus on issues that yield rapid improvement in ESG scores and generate momentum. Voluntary disclosure is seen as a cost-effective way for companies to demonstrate ESG commitment and enhance performance (Reber et al., 2021). Consequently, transparent firms should be more likely to have high ESG performance than non-transparent ones.

This study assumes that ESG ratings ($R_{i,t}$) are an imprecise and biased indicator of true performance. The true ESG performance ($H_{i,t}$) is treated as a latent variable following a standard normal distribution. The study assumes three relationships concerning this latent variable and ESG ratings: (1) ESG ratings reflect underlying ESG performance; (2) ratings are positively skewed for transparent firms; and (3) measurement error is more significant for firms with lower transparency ($T_{i,t}$). To uncover this latent variable within the data limitations, the subsequent Bayesian model is used:

$$R_{i,t} \sim N(\mu_r, \sigma_r^2),$$
$$\mu_r = H_{i,t} + \beta_r^T * T_{i,t}$$
$$\sigma_r = \sigma_r^H * T_{i,t} + \sigma_r^L(1 - T_{i,t})$$

$$H_{i,t}, \beta_r^T \sim N(0, 1)$$
$$\sigma_r^H \sim HN(0.5, 0.01)$$
$$\sigma_r^L \sim HN(1, 0.01),$$

where $H_{i,t}$ represents the hidden ESG-performance of the firm, $T_{i,t}$ is a grouping variable indicating firm's transparency group, β_r^T is the biasing effect of transparency, σ_r^H and σ_r^L are the measurement errors for high and low transparent firms, respectively. This model is estimated simultaneously with each of the further proposed models in order to account for the error in measurement. $N(\mu, \sigma^2)$ represents a normal distribution with mean μ and standard deviation σ, while $HN(\mu, \sigma^2)$ is a half-normal distribution with mean μ and standard deviation σ.

3.5. Data sources and sampling strategy

A dataset pertaining to SP500 firms was constructed to examine the shielding effect of ESG. The dataset spans three years (January 2020 to December 2022) and incorporates data on ESG controversies sourced from Aylien, a provider of aggregated stock news data. The dataset consists of daily counts of news articles related to adversarial events, with a threshold of 100 negative articles per day used to identify controversial days. This approach resulted in the identification of 1229 distinct firm-controversy pairs.

ESG ratings and transparency scores of the firms were obtained from Standard and Poor ESG ratings. The ESG scores for each security s and year t were standardized, resulting in a standardized distribution with a mean of 0 and a standard deviation of 1 each year. This standardization allows for meaningful comparisons of ratings across different periods.

Price data, market capitalization, and sector information were sourced from Yahoo.Finance. The logarithm of market capitalization ($MC_{i,t}$) was utilized as a proxy to account for the confounding effect of firm size. The daily yield on a Treasury Bill, obtained from Kenneth R. French's data library, served as a proxy for the risk-free rate.

To enhance identification and streamline the computational process for statistical software, the shortfall was measured in basis points, with *lower* values corresponding to *higher* shortfalls. This measurement approach provides a more convenient representation and facilitates data analysis.

4. The results to be reported

4.1. Total effect of ESG performance on shortfall

The first model aims to assess the total shielding effect of firms' high ESG performance during controversies, considering both propagation channels. The formulation of the model is as follows:

$$S_{i,t} \sim N\left(\mu_{sf}, \sigma_{sf}^2\right),$$
$$\mu_{sf} = \beta_H * H_{i,t} + \alpha_I + \beta_{MC} * MC_{i,t}$$

$$\beta_H, \alpha_I, \beta_{MC} \sim N(0,1)$$
$$\sigma_{sf} = HN(2, 0.01),$$

where $S_{i,t}$ is the shortfall of the *i-th* stock at time *t*, $H_{i,t}$ represents the hidden ESG-performance of the firm, β_H captures the total effect of ESG performance on shortfalls during ESG controversies, α_I is an industry level effect, $\beta_{MC} * MC_{i,t}$ controls for the effect of size, and σ_{sf} is the conditional standard deviation of shortfall during a controversy.

The findings from the first model, presented in *Figure 2*, confirm expectations. The total effect of ESG performance on the shortfall is predominantly positive, with over 99% of the posterior distribution for β_H being above zero. This suggests that higher ESG performance of firms provides a protective shield to shareholders during crises, reducing potential losses. The median covariance coefficient of 0.35 indicates that a one-standard deviation increase in ESG performance corresponds to a 0.35 basis points reduction in shortfall during ESG controversies.

		Percentile			
	Median	**5%**	**95%**	**P[>0]**	
β_H	**0,35**	**0,08**	**0,62**	**99%**	
Firm Size	0,00	-0,03	0,02	43%	
Industry effects (α_I)					
Industrials	-0,31	-0,90	0,27	18%	
Consumer Discretionary	0,00	-0,61	0,61	49%	
Information Technology	-0,31	-1,04	0,42	24%	
Health Care	0,18	-0,65	1,00	63%	
Financials	0,00	-0,57	0,58	50%	
Communication Services	-0,19	-0,80	0,41	30%	
Consumer Staples	-0,46	-1,17	0,24	15%	
Energy	0,77	-0,40	1,92	86%	
Utilities	0,27	-1,06	1,58	64%	β_H
Real Estate	-0,09	-0,81	0,64	41%	
Materials	0,01	-1,51	1,54	51%	

Figure 2. Estimated total effect of firms' ESG performance (H) on shortfalls during controversies. 90% probability interval is highlighted in gray

Importantly, this effect is not influenced by the method used to estimate the latent variable. If we assume unbiased ESG scores and re-run the model, considering only measurement error, we would arrive at the same conclusions. In this scenario, the median covariance would be slightly

lower, around 0.25, but the majority of the probability distribution would still be above zero, indicating consistent results.

4.2. Moderating effect of ESG transparency on shortfall

The second model aims to assess the moderating effect of transparency on the shortfall. It focuses on investigating whether higher transparency enhances the protective effect of ESG performance. The model can be outlined as follows:

$$S_{i,t} \sim N(\mu_{sf}, \sigma_{sf}^2),$$
$$\mu_{sf} = \beta_H * H_{i,t} + \beta_{TH} * T_{i,t} * H_{i,t} + \alpha_I + \beta_{MC} * MC_{i,t}$$

$$\beta_{TH}, \alpha_I, \beta_H, \beta_{MC} \sim N(0,1)$$
$$\sigma_{sf} = HN(2, 0.01),$$

where $S_{i,t}$ is the shortfall of the i-th stock at time t, β_H and $\beta_H + \beta_{TH}$ are the total effects of ESG performance ($H_{i,t}$) on shortfalls for low and high transparency firms respectively, in which β_{TH} is a measurement of moderation effect, σ_{sf} is the conditional standard deviation of shortfall during a controversy, while the rest of the variables represent adjustments for potential confounding effects.

Figure 3 displays the results of the second model, revealing no significant moderating role of transparency in this relationship. The posterior distribution for β_{TH} is evenly distributed around zero, indicating a lack of substantial effect. Thus, the idea that transparency acts as a moderator in this relationship can be rejected. Therefore, subsequent models do not incorporate any moderating effect.

		Percentile			
	Median	5%	95%	P[>0]	
β_H	0,34	0,13	0,72	99%	
β_{TH}	-0,01	-0,68	0,17	17%	
β_{MC}	0,00	-0,02	0,03	58%	
Industry effects (α_I)					
Industrials	-0,32	-0,82	0,41	28%	
Consumer Discretionary	-0,01	-0,69	0,53	42%	
Information Technology	-0,32	-1,07	0,42	23%	
Health Care	0,17	-0,73	1,01	61%	
Financials	0,00	-0,72	0,49	38%	
Communication Services	-0,21	-0,72	0,59	42%	
Consumer Staples	-0,46	-1,14	0,31	18%	
Energy	0,78	-0,41	1,82	86%	
Utilities	0,26	-1,12	1,60	62%	
Real Estate	-0,08	-0,77	0,73	46%	
Materials	0,05	-1,47	1,57	53%	

Figure 3. Estimated moderation effect of ESG transparency on shortfalls during controversies. 90% probability intervals are highlighted in gray.

4.3. Total effect of ESG transparency on shortfall

The third model aims to assess the total effect of transparency on the shortfall during ESG controversies. Transparency is anticipated to impact shortfalls solely through the "sentiment" channel. To address potential confounding effects from the "forecast" channel, it is essential to account for the firms' level of ESG performance. The following model is employed to evaluate the total effect:

$$S_{i,t} \sim N(\mu_{sf}, \sigma_{sf}^2),$$
$$\mu_{sf} = \beta_T * T_{i,t} + \beta_H * H_{i,t} + \alpha_I + \beta_{MC} * MC_{i,t}$$

$$\beta_T, \, \alpha_I, \, \beta_H, \, \beta_{MC} \sim N(0,1)$$
$$\sigma_{sf} = HN(2, 0.01),$$

where $S_{i,t}$ is the shortfall of the *i-th* stock at time t, β_T is the total effect of ESG transparency ($T_{i,t}$) on shortfalls, σ_{sf} is the conditional standard deviation of shortfall during a controversy, while the rest of the variables represent adjustments for potential confounding effects.

Figure 4 displays the results of the third model. The findings suggest no shielding effect from transparency, as transparent firms exhibit average shortfalls 0.25 basis points higher than non-transparent firms. This may be due to faster diffusion of negative information among investors of transparent firms. However, it is important to note that over 17% of the posterior probability distribution for β_T is above zero, indicating a lack of statistical significance for this finding.

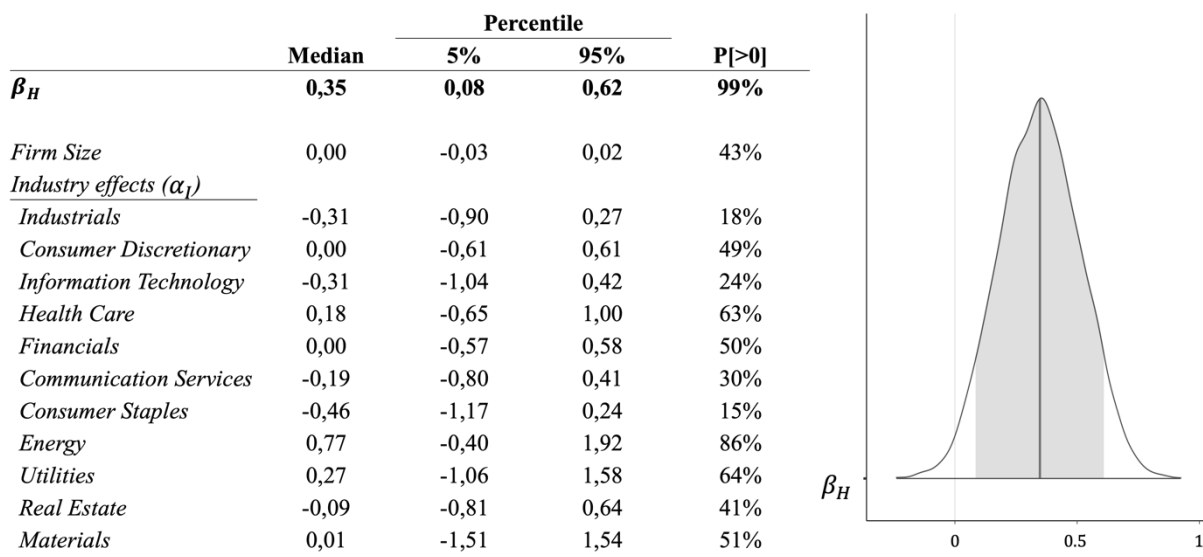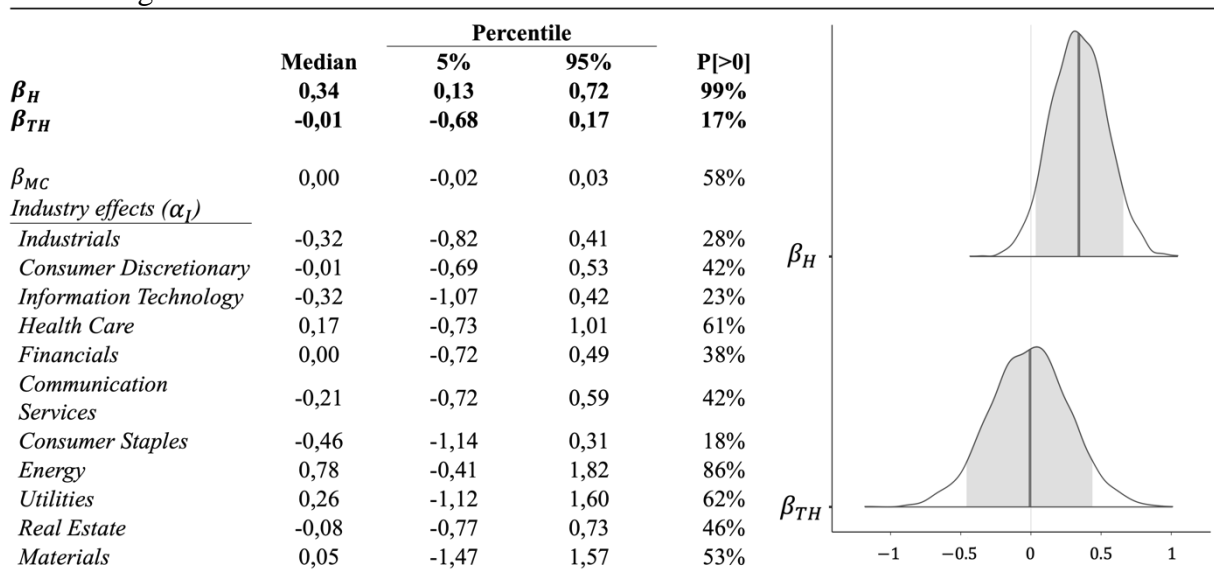|		Percentile			
	Median	**5%**	**95%**	**P[>0]**	
$\boldsymbol{\beta_T}$	**-0,25**	**-0,68**	**0,17**	**17%**	
β_H	0,43	0,13	0,72	99%	
β_{MC}	0,00	-0,02	0,03	58%	
Industry effects (α_I)					
Industrials	-0,21	-0,82	0,41	28%	
Consumer Discretionary	-0,08	-0,69	0,53	42%	
Information Technology	-0,34	-1,07	0,42	23%	
Health Care	0,15	-0,73	1,01	61%	
Financials	-0,11	-0,72	0,49	38%	
Communication Services	-0,08	-0,72	0,59	42%	
Consumer Staples	-0,41	-1,14	0,31	18%	
Energy	0,70	-0,41	1,82	86%	
Utilities	0,28	-1,12	1,60	62%	
Real Estate	-0,04	-0,77	0,73	46%	
Materials	0,06	-1,47	1,57	53%	

Figure 4. Estimated total effect of ESG transparency on shortfalls during controversies. 90% probability interval is highlighted in gray.

4.3. Total effect of ESG ratings on shortfall

The final model aims to quantify the overall impact of firm ESG ratings on the shortfalls observed during ESG controversies. Similar to transparency, the effect of ratings is expected to propagate through the "sentiment" channel. To accurately estimate the total effect, it is crucial to consider the potential confounding effects of ESG performance and transparency. The model can be summarized as follows:

$$S_{i,t} \sim N\left(\mu_{sf}, \sigma_{sf}^2\right),$$
$$\mu_{sf} = \beta_R * R_{i,t} + \beta_H * H_{i,t} + \beta_T * T_{i,t} + \alpha_I + \beta_{MC} * MC_{i,t}$$

$$\beta_R, \, \alpha_I, \, \beta_H, \, \beta_T, \, \beta_{MC} \sim N(0,1)$$
$$\sigma_{sf} = HN(2, 0.01),$$

where $S_{i,t}$ is the shortfall of the *i-th* stock at time t, β_R is the total effect of ESG ratings ($R_{i,t}$) on shortfalls, σ_{sf} is the conditional standard deviation of shortfall during a controversy, while the rest of the variables represent adjustments for potential confounding effects.

Figure 5 displays the results of the final regression. The posterior distribution for the coefficient β_R is evenly distributed around zero. The findings indicate that when considered in isolation, ESG ratings do not demonstrate a statistically significant effect on shortfalls.

		Percentile			
	Median	5%	95%	P[>0]	
β_R	**-0,28**	**-2,95**	**1,43**	**38%**	
β_H	0,73	-1,10	3,72	76%	
β_T	-0,11	-0,99	1,06	42%	
β_{MC}	0,00	-0,02	0,03	58%	
Industry effects (α_I)					
Industrials	-0,20	-0,80	0,44	31%	
Consumer Discretionary	-0,07	-0,68	0,55	42%	
Information Technology	-0,34	-1,08	0,43	23%	
Health Care	0,15	-0,69	1,01	61%	
Financials	-0,11	-0,69	0,50	38%	
Communication Services	-0,04	-0,69	0,65	47%	
Consumer Staples	-0,40	-1,10	0,33	19%	
Energy	0,73	-0,41	1,87	86%	
Utilities	0,23	-1,15	1,58	61%	
Real Estate	-0,06	-0,77	0,68	45%	
Materials	0,10	-1,43	1,61	54%	

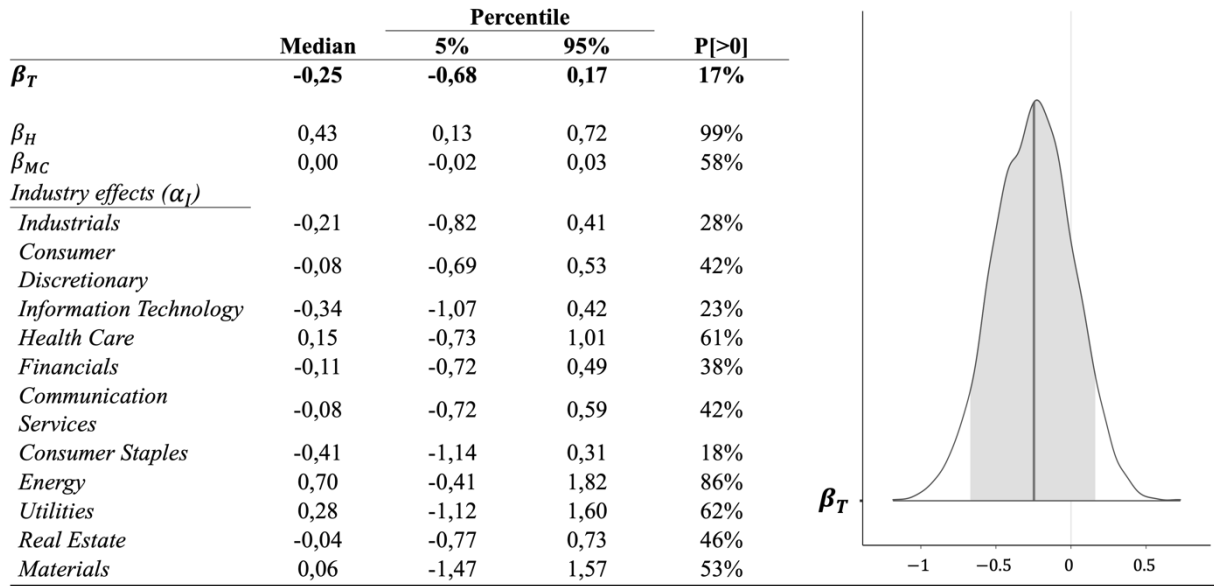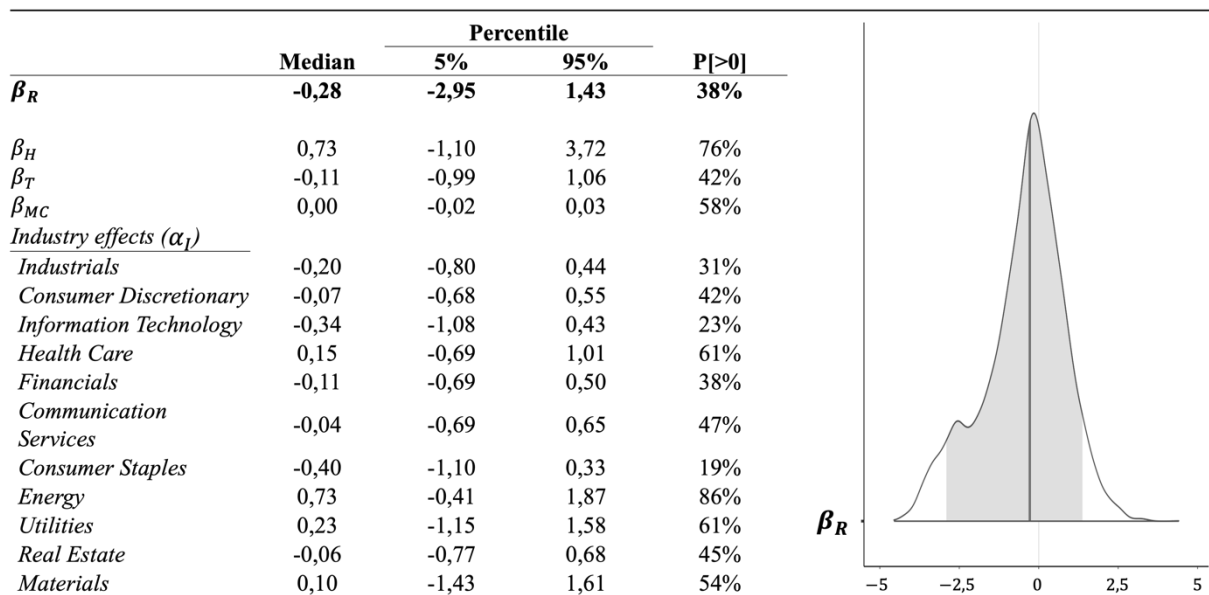*Figure 5. Estimated total effect of ESG ratings on shortfalls during controversies. 90% probability interval is highlighted in gray.*

4.4. Concluding remarks

This study confirms the importance of firm-level ESG practices in reducing ESG-related risks for investors. However, the impact of ESG activities varies. The results emphasize the vital role of ESG performance in mitigating the effect of ESG-related risks, while indicating that ESG communication does not offer additional protection.

Superior ESG performance provides a shielding effect for investors, reducing stock shortfalls during ESG controversies. Meanwhile, contrary to expectations, enhanced ESG communication, as measured by transparency and ratings, does not mitigate stock shortfalls during such incidents. Furthermore, the protective effect of higher ESG performance remains unaffected by the firm's transparency level. Thus, firms should prioritize enhancing their actual ESG performance to effectively safeguard investors from the effects of non-financial risks.

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Impact of the Board of Directors on the Relationship Between CEO Characteristics and Earnings Management

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Abstract:
The paper examines whether monitoring characteristics of the board of directors are able to reduce the ability of a powerful CEO to manage earnings. We consider board size, independence and the presence of an audit committee to examine board quality, and CEO duality, tenure and political connections as personality traits that give him more power to influence reporting practices. The study uses the modified Jones model to determine the level of earnings management. The sample consists of Russian companies that are included in the broad market stock index of the Moscow Stock Exchange in the period from 2007 to 2020. The results of this study suggest that some board quality characteristics can influence earnings management by a strong CEO.

1. Introduction

Earnings is a valuable source of information for external stakeholders during their decision-making. That is why a company's management may misrepresent the indicators in the reporting for the purpose of their personal benefits. Previous studies have shown that earnings management (EM) can be explained by the personal characteristics of those who make important strategic decisions in the company (Ali & Zhang, 2015; Davidson et al., 2005; Marinovic & Varas, 2019). These findings are consistent with upper echelons theory, which explains the relationship between the personal characteristics of top managers and firm performance (Hambrick, Mason, 1984).

At the same time, the willingness to manage earnings can be explained through the lens of agency theory (Jensen & Meckling, 1976). The company's top management seeks to increase its own well-being and may use financial instruments to manipulate reports. It may deviate from the long-term goals of the company, so the other side (the owner) tries to establish control over the agent. One of the most important instruments of management control in the context of earnings management is the board of directors, which is supposed to monitor and control the actions of management. Previous studies suggest characteristics of the board of directors which reflect its quality and may influence monitoring function (Peni, 2014).

Despite previous studies that suggest that CEO characteristics motivate earnings management and board characteristics reduce earnings management, we know little about the combination of these two areas. The literature typically examines earnings management from either CEO or board characteristics. The current paper aims to answer the following question: Can a qualified board influence earnings management, stimulated by CEOs' personality traits?

Russia provides a unique setting to address the research question. First, Russian corporate environment is non-transparent, and there is a certain lack of public business information (Lazareva et al., 2008). Financial statement's role for external stakeholder is huge, since it is one of few available sources of information. Second, Russian corporate culture is hierarchical and authoritarian, raising the importance of CEO personality in decision-making. Third, a board quality importance is reflected in Corporate Governance Code and authorities' statements.

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We test the research question using the sample of Russian companies included in the broad market stock index of the Moscow Stock Exchange in the period from 2007 to 2020. We use CEO personal characteristics such as tenure and duality. As for the board of directors, we focus on considering the size of the board, its independence, and the presence of an audit committee in the company. Empirical design is provided in two steps: first we estimate the value of earnings management in each company using the Jones model. Then we use the calculated value of EM to estimate, how it is influenced by CEO traits, and how this relationship is moderated by board qualification.

The remainder of the paper proceeds as follows. In the next section, we review the definition and reasons of earnings management, as well as CEO traits that stimulate it and board monitoring characteristics that potentially may decrease it. We then describe the empirical design of our research: question, sample, variables, and method. Next, we estimate earnings management using the sample of Russian companies and empirically test, how CEO and board characteristics influence it. The last section discusses the results of the paper.

2. Literature review
2.1. *Earnings management practice*

Financial statements, and earnings value in particular, is an important source of information, therefore it should provide reliable data. On the basis of this data, creditors, investors and other external users make decisions about the company. For a number of reasons, a company's management may deliberately influence external financial reporting for private purposes (Schipper, 1989). On the one hand, a firm manager could use earnings management (EM) to signal firm quality and managerial competence by meeting or beating a market expectation, and provide financial benefits to the firm. On the other hand, EM could be driven by managerial opportunism to inflate or smooth earnings. This opportunistic earnings management strategy could boost stock price in the short term and increase the manager's job security or compensation to the detriment of firm value in the long run (Griffin et al., 2021).

There are two legitimate methods of earnings management: accounting-based earnings management and real earnings management. When using the accounting-based earnings management, managers apply the tools of accounting standards: defining accounting estimates or accounting rules. For example, it may be to increase profits by making reserves for warranties (Griffin et al., 2021) or by choosing a depreciation policy. Real earnings management involves the use of transactions that have an impact on financial reporting performance, such as the reduction of expenditure on R&D and advertising campaigns (Roychowdhury, 2006).

Management can affect a company's performance in different ways. The misrepresentation of financial results due to earnings management misleads external users and does not allow them to assess the real financial situation of the company, which may lead to incorrect decision-making (Healy & Palepu, 2001). Consequently, earnings management may cause negative consequences for stakeholders, which include public authorities, investors and creditors. The revealing of earnings management lead to a decline in a company's share price (Dechow et al., 1995).

Given the negative consequences of earnings management, it is important to examine the reasons for it and the factors that can influence its size. There is a strand of literature that regard human factor underlying a decision to engage in EM.

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2.2. *CEO traits that stimulate earnings management*

According to the upper echelon theory, the personality of a CEO is directly related to the company's performance (Hambrick & Mason, 1984). CEOs make important strategic decisions and implement their ideas based on their personal experience and knowledge. To some extent the organization reflects the CEO's personality and therefore of his or her characteristics. Since the financial reporting process is the responsibility of an organization's management, there is a possibility that managers will misrepresent their reporting performance because of their personal characteristics. The most popular characteristics of a director that the literature associates with earnings management are experience and director duality.

Works that analyse director tenure as a factor in earnings management show mixed results. From the one hand, newly appointed directors are more prone to opportunistic incentives of EM. Gibbons & Murphy (1992) argue that market assesses CEOs abilities not based on his previous achievements, but on the base of his performance in the new position. This assessment is associated with future financial and non-financial benefits. Therefore directors are highly interested to show good reports in the beginning of their career. Company discretionary accruals are higher in the early years compared to the later years of a director's tenure, leading to an increase in return on assets (ROA) by 25% (Ali & Zhang, 2015). In addition, there is an assumption that directors who manage earnings in the early years in office are fired after the discovery of earnings management. Thus, the board takes preventive measures to discipline managers before their opportunistic behavior leads to serious negative consequences for the company (Hazarika et al., 2012). At the same time, there are papers that find that CEOs reinforce earnings management when they end their career as CEO (Marinovic & Varas, 2019).

In addition, there are papers that have explored director duality. Based on agency theory, they postulate that dual CEO has more power to increase his wealth, and earnings management may be one of such instruments. However, empirical findings fail to prove it, no meaningful relationship was found between CEO duality and firm performance, namely earnings management (Xie et al., 2003; Davidson et al., 2005).

Thus, the literature proves that personal characteristics of a director influence the decision to manage earnings. The question arises as to whether managing earnings can be regulated through good corporate governance within the company.

2.3. *Managing earnings management by board monitoring*

Since earnings management can have a negative impact on the company itself, and is therefore undesirable for external stakeholders, the question of tools that can deter CEOs from earnings management becomes relevant (Krishnan & Parsons, 2008). According to the agency theory, quality of corporate governance can act as a deterrent to CEOs (Jensen & Meckling, 1976). Among all corporate governance tools, the board of directors is key for organizational efficiency, reducing agency costs and maintaining investor confidence (García-Sánchez et al., 2017; Shleifer & Vishny, 1997). Continuous monitoring of a company's management in order to protect shareholders' interests is one of the main functions of this supervisory body (Gillan, 2006). In terms of earnings management, it is implied that board monitoring should primarily regulate accounting violations and ensure quality and reliable disclosure of financial statements.

In the corporate governance literature, there is a large body of work devoted to determining the optimal composition of the board to facilitate the quality of the monitoring function. One of the most studied characteristics of a board is its size. There is no consensus in the literature on the relationship between board size and board quality. A number of papers note that larger boards may face coordination problems and shifting responsibilities (Hermalin & Weisbach, 2001). Therefore, smaller boards contribute to better monitoring. The effectiveness of small boards in reducing EM has been shown in research on both developed (Xie et al., 2003) and developing countries (Nikulin et al., 2020). However, other researchers find that small

boards are characterized by a lack of different experiences and knowledge, which can negatively affect decision-making (Peni, 2014). The need for a larger board to reduce EM is also supported empirically by samples from different countries.

Another important characteristic of board of directors quality is independence. Independent directors are believed to be more objective and rational in performing their responsibilities, monitor and control managers more effectively, and therefore better protect shareholders from opportunistic behaviour by managers (Fama & Jensen, 1983). In addition, they can also bring their experience and knowledge to advise and monitor management more effectively. There is an empirical evidence that independent directors limit the practice of earnings management (Cornett et al., 2008; Klein, 2002; Nikulin et al., 2020; Xie et al., 2003). Moreover, the impact is greater when companies operate in countries with higher levels of legality and enforcement (Uribe-Bohorquez et al., 2018). The opposite results found in the literature are most likely due to regional specificities in corporate governance, in particular the limited use of independent directors' qualifications to perform their functions.

Traditionally, the existence of an audit committee in a company has also been associated with a board's monitoring function. The audit committee is designed to provide monitoring and advice to management on the financial reporting process. In addition, the committee helps to address asymmetries of information between management, the board of directors and the external auditors (Klein, 2002). Thus, the audit committee contributes to improving the quality of financial reporting. However, the empirical results of studying the role of the audit committee in reducing EM are mixed. For example, Li and Li (2008) found no evidence that the existence of an audit committee is associated with less earnings manipulation. Some authors believe that in addition to the existence of a committee, there is a need to examine its composition. Some countries have additional requirements for the presence of a financial expert on the committee. Companies where audit committee members have financial expertise have lower levels of earnings management (Badolato et al., 2014). Bilal et al. (2018) refine this result by showing that accounting financial experts have a stronger association with earnings quality than non-accounting financial experts.

3. Research question

According to the theoretical foundations and previous empirical results, earnings management can be associated with CEO traits. The most popular ones, revealed by previous studies are tenure and duality. We are going to test their influence on the EM size in Russian companies.

The empirical findings on the relationship between CEO characteristics and manipulation are ambiguous. There may be external and internal factors that influence this relationship. One of the most important mechanisms for influencing management is the board of directors, which can act as a deterrent to CEO manipulation through its monitoring function. Therefore, this paper considers the characteristics of the board that are usually associated with the monitoring function. These are board independence, board size and the presence of an audit committee. Traditionally, these characteristics have been used to study the optimal composition of the board in order to decrease EM by better monitoring. In this study, we are primarily interested in the board's ability to control the CEO's actions in relation to earnings management.

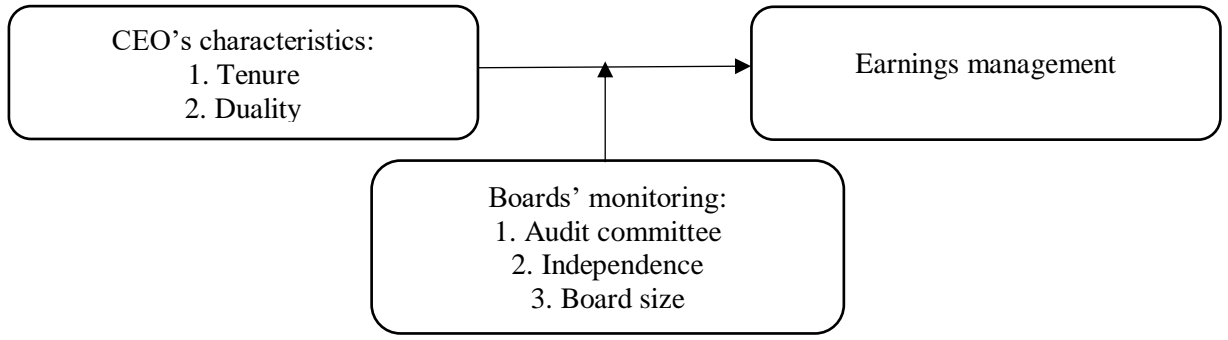The research question of the current study is represented on the Figure 1.

Fig. 1. The scheme of the study

4. Data and Methodology

We start with the earnings management estimation, applying a modified Jones model (Dechow et al., 1995). The model is one of the most frequently used method to find the level of accrual-based earnings management.

$$\frac{TA_{it}}{A_{it-1}} = \alpha_0 + \alpha_1 \cdot \frac{1}{A_{it-1}} + \alpha_2 \cdot \frac{\Delta S_{it}}{A_{t-1}} + \alpha_3 \cdot \frac{PPE_{it}}{A_{t-1}} + \varepsilon_{it}, \qquad (1)$$

where TA_{it} is the total accruals defined as difference between net income and net operating cash flow for a firm i in year t. A_{it-1} is the total assets of a firm i in year t-1. ΔS_{it} is the change in sales of a firm i in year t. PPE_{it} denotes the property, plant, and equipment. The estimated residuals are defined as the proxy for accrual-based earnings management by the following equation:

$$EM_{it} = \frac{TA_{it}}{A_{it-1}} - \frac{\widehat{TA_{it}}}{A_{it-1}}, \qquad (2)$$

Then we use it as a dependent variable in following models:

$$EM_{it} = \beta_0 + \beta_1 \cdot Tenure_{it} + \beta_2 \cdot Duality_{it} + \beta_3 \cdot Size_{it} + \beta_4 \cdot Leverage_{it} +$$
$$+ \beta_5 \cdot ROA_{it} + \beta_6 \cdot IndepShare_{it} + \beta_7 \cdot BoardSize_{it} + \beta_8 \cdot AuditCommitte_{it} +$$
$$+ \beta_9 \cdot Tenure_{i,t} \cdot BoardSize_{it} + \beta_{10} \cdot Tenure_{i,t} \cdot IndepShare_{it} +$$
$$+ \beta_{11} \cdot Duality_{it} \cdot BoardSize_{it} + \beta_{12} \cdot Duality_{it} \cdot IndepShare_{it} +$$
$$+ \beta_{13} \cdot Tenure_{it} \cdot AuditCommitte_{it} + \beta_{14} \cdot Duality_{i,t} \cdot AuditCommitte_{it} + \gamma \cdot CV_{it} + \varepsilon_{it} \quad (3)$$

where $EM_{i,t}$ is the level of earnings management, $Tenure_{i,t}$ is the CEO's tenure calculated in years, $Duality_{i,t}$ is a dummy variable which indicate a situation when CEO appointed on board, $Size_{i,t}$ is the logarithm of assets, $Leverage_{i,t}$ is the debt to equity ratio, $ROA_{i,t}$ is the return on assets, $IndepShare_{i,t}$ is the share of independent directors on board, $AuditCommitte_{i,t}$ is a dummy variable which indicates the presence of audit committee in a company. CV is a vector of control variables: leverage (debt to equity ratio), size (natural logarithm of total assets), and return on assets (roa – net income to total assets).

$$EM_{it} = \beta_0 + \beta_1 \cdot Tenure1_{i,t} + \beta_2 \cdot Tenure3_{i,t} + \beta_3 \cdot Duality_{it} + \beta_4 \cdot Size_{it} +$$
$$+ \beta_5 \cdot Leverage_{it} + \beta_6 \cdot ROA_{it} + \beta_7 \cdot IndepShare_{it} + \beta_8 \cdot BoardSize_{it} +$$
$$+ \beta_9 \cdot AuditCommitte_{it} + \beta_{10} \cdot Tenure1_{i,t} \cdot BoardSize_{it} + \beta_{11} \cdot Tenure1_{i,t} \cdot IndepShare_{it}$$
$$+ \beta_{12} \cdot Duality_{it} \cdot BoardSize_{it} + \beta_{13} \cdot Duality_{it} \cdot IndepShare_{it} +$$
$$+ \beta_{14} \cdot Tenure1_{it} \cdot AuditCommitte_{it} + \beta_{15} \cdot Duality_{i,t} \cdot AuditCommitte_{it} + \gamma \cdot CV_{it} + \varepsilon_{it}$$
$$(4)$$

$$EM_{it} = \beta_0 + \beta_1 \cdot Tenure1_{i,t} + \beta_2 \cdot Tenure3_{i,t} + \beta_3 \cdot Duality_{it} + \beta_4 \cdot Size_{it} +$$
$$+ \beta_5 \cdot Leverage_{it} + \beta_6 \cdot ROA_{it} + \beta_7 \cdot IndepShare_{it} + \beta_8 \cdot BoardSize_{it} +$$

$$+ \beta_9 \cdot AuditCommitte_{it} + \beta_{10} \cdot Tenure3_{i,t} \cdot BoardSize_{it} + \beta_{11} \cdot Tenure3_{i,t} \cdot IndepShare_{it}$$
$$+ \beta_{12} \cdot Duality_{it} \cdot BoardSize_{it} + \beta_{13} \cdot Duality_{it} \cdot IndepShare_{it} +$$
$$+ \beta_{14} \cdot Tenure3_{it} \cdot AuditCommitte_{it} + \beta_{15} \cdot Duality_{i,t} \cdot AuditCommitte_{it} + \gamma \cdot CV_{it} + \varepsilon_{it}$$
(5)

Also, we divide $Tenure_{i,t}$ in the set of dummy variables. Thus, models (4) and (5) contain $Tenure1_{i,t}$ is a dummy which contains CEO with tenure 0-3 years, $Tenure3_{i,t}$ is a dummy for CEO with tenure more than 15 years. $Tenure2_{i,t}$ is not used to avoid the multicollinearity.

The sample consists of Russian companies included in the broad market stock index of the Moscow Exchange. It includes the largest Russian companies by market capitalization. Companies are considered in the period from 2007 to 2020.

Table 1 contains main summary statistics of variables. The average CEO working experience is around 6 years. More than 50% of the CEO have 3-15 years' experience and around 40% have less than 3 years. Usually, CEO has a board position. The average board size is between 9-10 directors and around 3 directors are independent.

Table 1. Summary statistics

Statistic	N	Mean	St. Dev.	Min	Max
EM	668	0.070	0.077	0.0002	0.537
Tenure	668	6.204	5.204	1	28
Tenure1	668	0.383	0.487	0	1
Tenure2	668	0.536	0.499	0	1
Tenure3	668	0.081	0.273	0	1
Duality	668	0.826	0.379	0	1
Size	668	11.824	1.923	4.890	16.966
Leverage	668	1.477	4.400	-43.411	36.818
ROA	668	0.048	0.110	-0.822	0.544
AuditCommittee	668	0.843	0.364	0	1
IndepShare	668	0.247	0.204	0.000	0.778
BoardSize	668	9.731	2.317	4	15

5. Results

We estimate models with fixed effects using OLS. The baseline results are provided in Table 2.

Table 2. OLS with fixed effects regressions

	Dependent variable:		
	EM		
	(1)	(2)	(3)
Tenure	-0.009*		
	(0.005)		
Tenure1		0.084***	0.016**

		(0.030)	(0.007)
Tenure3		-0.009	-0.048
		(0.011)	(0.060)
Duality	-0.096**	-0.103**	-0.100**
	(0.043)	(0.045)	(0.046)
Size	-0.004	-0.006	-0.004
	(0.008)	(0.008)	(0.008)
Leverage	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
ROA	-0.275***	-0.280***	-0.275***
	(0.077)	(0.076)	(0.076)
AuditCommittee	-0.044	-0.014	-0.028
	(0.034)	(0.041)	(0.035)
IndepShare	0.005	0.009	0.013
	(0.059)	(0.061)	(0.056)
BoardSize	-0.003	-0.0004	-0.002
	(0.006)	(0.005)	(0.004)
Tenure*AuditCommittee	0.006*		
	(0.003)		
Tenure1*AuditCommittee		-0.020	
		(0.020)	
Duality*AuditCommittee	0.011	0.017	0.024
	(0.036)	(0.038)	(0.035)
Tenure*IndepShare	0.001		
	(0.003)		
Tenure*BoardSize	0.0001		
	(0.0004)		
Tenure1*IndepShare		0.024	
		(0.028)	
Tenure1*BoardSize		-0.006*	
		(0.003)	
Tenure3*IndepShare			0.090
			(0.055)
Tenure3*BoardSize			0.001
			(0.005)
Duality*IndepShare	-0.042	-0.061	-0.056
	(0.062)	(0.064)	(0.060)
Duality*BoardSize	0.008*	0.009*	0.007*
	(0.004)	(0.004)	(0.004)
Observations	668	668	668
R^2	0.182	0.187	0.178
Adjusted R^2	0.056	0.061	0.051

Note: * - pval < 0.1, ** pval < 0.05, *** pval <0.01; robust SE used

The results show audit committee can moderate the CEO's influence on EM. According to the result, higher CEO working experience decrease the ability of audit committee to control EM. It contradicts previous works that show the influence of audit committee on EM by decreasing the information asymmetry and monitoring improvements (Chen, Duh, Shiue, 2008; Alzoubi, 2019). However, it may imply that audit committees trust the CEO's judgments and actions, and probably allow EM.

CEO appointed on the board could increase the EM in the companies with the larger board of directors. It can be explained by the decline in the coordination between board members (Li and Li, 2008). At the same time, results show that the larger boards can decrease newly appointed CEOs' influence on earnings management.

However, the results do not support the importance of independent directors in earnings management control.

6. Conclusion

CEO's earnings management practices usually mislead external users that influence on their decision-making. Even board of directors sometimes do not have enough power to prevent such behavior. According to the results, board of directors decrease the level of earnings management in a situation of presence a newly appointed CEO. In other cases, boards probably support decisions of CEOs with a long work experience and the audit committee cannot prevent it.

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Identification and Analysis of Key Bankruptcy Factors of Russian Manufacturing and Mining Companies: Machine Learning Approach

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Abstract:
This paper is devoted to determination of the main indicators of potential bankruptcy of Russian companies and identification of the thresholds for these indicators based on the data of medium and large mining and manufacturing companies for the period of 2012-2022 years. The study uses machine learning methods that allow processing a larger array of observations and encompassing a range of different factors that are not included in previously developed models. 25 indicators including capital structure indicators, profitability, financial stability and liquidity are analyzed in the research. Different models are tested, two subsamples of mining and manufacturing companies are analyzed and the time period before the bankruptcy prior which machine learning models are capable to anticipate the default risk is identified.
Results show that the maximum period for default prediction equals to two years and the most important factors for default identification are Sales/Total Assets and Logarithm of Working Capital.

Keywords: *bankruptcy factors, default, machine learning, Random Forest, Classification tree, financial insolvency*

1. INTRODUCTION

During the period of the last 25 years Russian Federation actively follows the course of development of the market economy. The more comfortable it is for business to develop; the more successful the country's economy will be. The government should create the conditions favorable for business and ensure economic stability. The President of Russian Federation Vladimir Putin stated 6 key goals for 2023. One of them is outstripping the growth of the manufacturing industry. Moreover, nowadays governance pays special attention to business development and support. In Russia there is a national project "Small and medium-sized entrepreneurship and support for individual entrepreneurial initiative". However, it is not only government who is responsible for business' financial solvency. The companies have to take care of themselves, anticipate difficulties, build a plan for an unfavorable picture of the future. Usually, financial indicators can provide a lot of information to the business' owners, management and other stakeholders, if these parties are able to interpret them in a proper way.

The main problem is that there is no tutorial for stakeholders to estimate the current position of the business and determine risks. Today the statistics tells us that the number of corporate bankruptcies decreased in 2022 in comparison to 2021 (9055 in 2022 versus 10 319 in 2021) (Fedresurs, 2022). At the same time, several factors must be taken into consideration (Advgazeta, 2022):

- In 2022 from April to October there was a moratorium on creditors filing bankruptcy applications, with the exception of developers;
- Sanctions (fines or penalties) will not be applied for violation of the deadlines for fulfilling obligations and for late fulfillment of the obligation to pay taxes and other mandatory payments that arose before the date of the moratorium;
- For the period of the moratorium proceedings on property penalties for claims that arose before April 1, 2022 are suspended.

Even though it is stated that in October after moratorium termination there was no surge

in bankruptcies, it is evident that the government implemented solid measures to prevent growth of bankruptcies and banned bankruptcy mechanism for six months in fact. These measures allowed to decrease the number of business collapses, but in general this number is still high. The forecasted protracted worldwide crisis will affect Russian business' sustainability.

To support the economy and be viable business needs to understand the reasons and preconditions of financial insolvency. When USSR developed in direction of planned economy model, in the US in the late 60s the first bankruptcy prediction model appeared. In 1990 western investigations reached the peak in this research area. The new methods began to be applied, which replaced econometric models. Koh, H.C. and Killough, L.N. in 1990 used discriminant analysis to assess the going concern status of the companies (Koh. H, 1990). At the same time Lisa R. Gilbert, K. Menon, Kenneth B. Schwartz went further and published their work in which they predicted bankruptcy for firms in difficult financial position. It means that they created a sample of companies in financial distress and tried to determine which of these companies went bankrupt and which of them would stay alive. What is interesting of their research is that they tried to "discriminate between 'at risk' firms that survive and 'at risk' firms that fail (Gilbert L., 1990). Comparing with us, it should be mentioned that in 1991 we just started a long process of transition to a market economy. Since we are lagging in the application of the scientific approach in business, Russian companies do not have the clear and precise instrument for bankruptcy prediction.

Currently machine learning instruments are extremely popular in different spheres. The bankruptcy issues are investigated using Neural Network, Random Forest, Decision Trees and other machine learning instruments. This research is dedicated to exploration of patterns of bankruptcy in Russian companies. There is a range of different foreign studies which apply these instruments (Li Y, 2018; Zieba M., 2016). Within the list of Russian researchers one of the most popular is A.M. Karminskiy who works on comparison of effectiveness of different machine learning algorithms in terms of bankruptcy prediction. The main advantages of machine learning methods are resistance to outliers, possibility to train the model and higher level of precision (Karminskiy, 2019). We conducted the research on bankruptcy issue using the Neural Networks, Random Forest and classical econometric models of E. Altman, J. Ohlson, V. Zhdanov. Machine learning instruments have shown considerably higher level of accuracy. For instance, Random Forest model was correct in 86% of cases in determination of bankruptcy. Similar to A.M. Karminskiy research we came to the conclusion that non-financial factors do not have significant influence on bankruptcy probability (Zhukov A., 2022). That is why in this research we focused only on financial factors and their influence on bankruptcy probability.

In general, researchers apply one or several instruments (either econometrical, machine learning or both) to determine key factors or the probability of bankruptcy. In some studies, the quality and applicability of instruments are estimated. However, it seems crucial to go deeper and analyze these key factors that can be named as the most important ones. What can be done is the identification of thresholds or boundaries that separate potentially bankrupt companies from "healthy" ones. The general goal of this research is to determine the main indicators of potential bankruptcy of Russian medium and large mining and manufacturing companies on the basis of different machine learning methods and identify the thresholds for these indicators.

During the analysis five main research questions were stated:

- What are the key bankruptcy factors for Russian business in analyzed industries?

- Is there any difference in bankruptcy factors when predicting bankruptcy 1, 2, 3 or 4 years before the event?

- What are the boundaries for financial indicators which distinguish between bankrupt and "healthy" companies?

- Are there any differences between industries within the sample?

It is expected to estimate the importance of factors (variables) using Random Forest approach. This is done, firstly, to highlight the factors that require the most attention and,

secondly, to cut off unnecessary factors for subsequent analysis and focus only on the most important ones.

After answering the question on key factors of bankruptcy the boundaries for these factors are determined. It means that we focus on several financial indicators and identify the thresholds crossing of which means moving towards bankruptcy or vice versa in the direction of recovery. Then, we go deeper and focus on the subsamples which consist of observations from two industries: mining and manufacturing.

2. RELEVANCE OF THE PAPER TO "STRATEGIC FINANCE" TRACK

Strategic finance implies the activities of a company aimed at improving the competitiveness of a business by attracting additional capital (financing) and allocating it among potential investment opportunities (investing). Improper execution of these activities may lead to an increased risk of financial instability for the company. Unfortunately, in many

cases it is impossible to find out the difficulties of a company being an external stakeholder. The research provides hints that allow conducting the analysis of companies' financial position. As a result of applying the method described in this study stakeholders are able to identify companies that are inclined to default and companies that will survive with certain probability.

It seems relevant to provide landmarks for investors, external analysts, banks, and even internal stakeholders such as managers and the board of directors. There is no scientific approach to help stakeholders to detect the bankruptcy risk in advance.

3. RESEARCH METHODS

This research uses machine learning instruments for analysis because they allow you to solve problems that econometric methods cannot cope with. The figure 3.1 shows how the machine learning instruments are applied in this work.

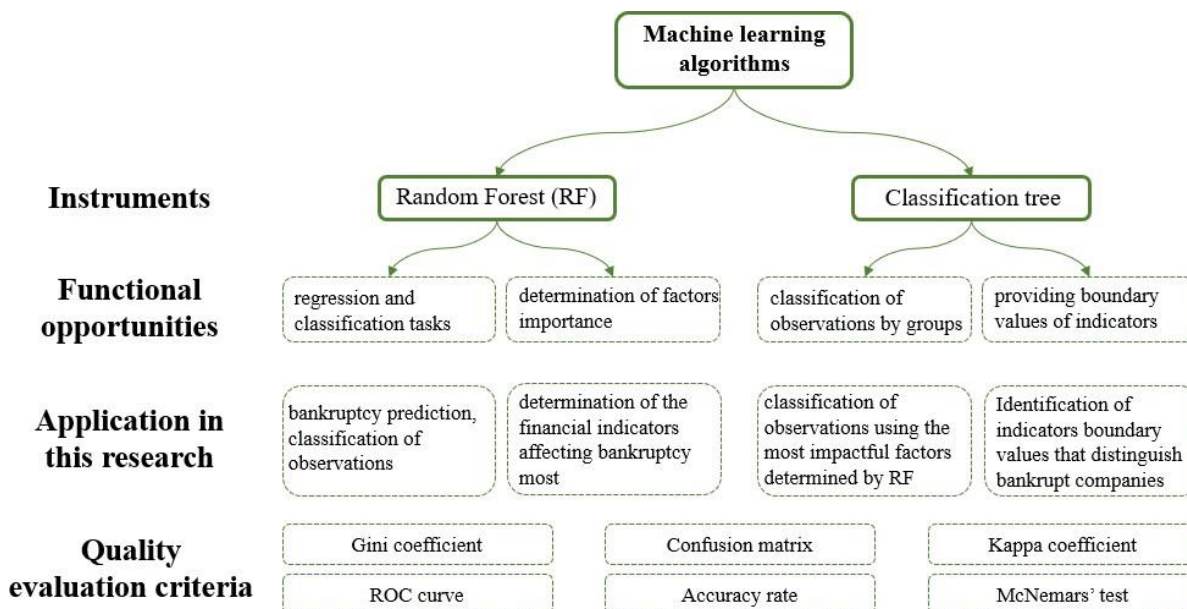**Fig 3.1.** ML algorithms in the research Source: (Behr A., 2016; Fomina E., 2018; Ivankova S., 2022)

3.1. Random Forest

Random Forest is the instrument used on the first stage of the research. It predicts the value of dependent variable. The dependent variable is the binary variable: 1 means a company is bankrupt, 0 means company is "healthy". The method is based on the construction of the

extensive amount of decision trees. The classification is carried out by classifiers voting (classifier is an individual tree). The regression score is determined by averaging the scores of all regressions. Initially, the sample is divided into the training and testing subsamples. The classic proportions are 70%-30% or 80%-20% correspondingly. The model trains itself using the 70-80% of sample and after that the quality of model is checked by the testing subsample (Chistiakov S., 2013).

3.2. Classification trees

The Classification tree is the instrument used in the second stage of the research.

Classification trees is the most flexible method of multidimensional analysis that allows to predict whether an object belongs to a certain class. The logic of train and test samples is the same. The class of the object/observation is given by a dependent variable (1 or 0).

Independent variables are those that allow to predict whether an object belongs to a certain class. As a result of this method the decision tree is constructed (Fomina E., 2018).

3.3. Key evaluation criteria

Traditionally, the following quality metrics of machine learning models are distinguished:

1.   Metrics calculated from confusion matrix. These are accuracy rate, sensitivity/recall, specificity, precision, F1. Accuracy is the overall percent of correctly predicted observations;

2.   ROC curve is one of the most important and recognized method in evaluation of model quality. AUC-ROC indicator higher than 0,7 are considered satisfactory, higher than 0,8 are very good and higher than 0,9 are perfect models;

3.   Gini coefficient is equal to $(AUC-0{,}5) \times 2 \times 100\%$. It is also a widespread indicator for model quality estimation.

3.4. Sample description

Sample of the research consists of manufacturing and mining large and medium size Russian companies. The sample is collected starting from 2012 to 2021. To extract large and medium-sized companies two criteria are used: yearly sales that should be higher than 800 mln RUB and average number of employees that should be higher than 100. Ultimately, 4 337 companies are collected, 1 296 of them are bankrupt, figure 3.2.
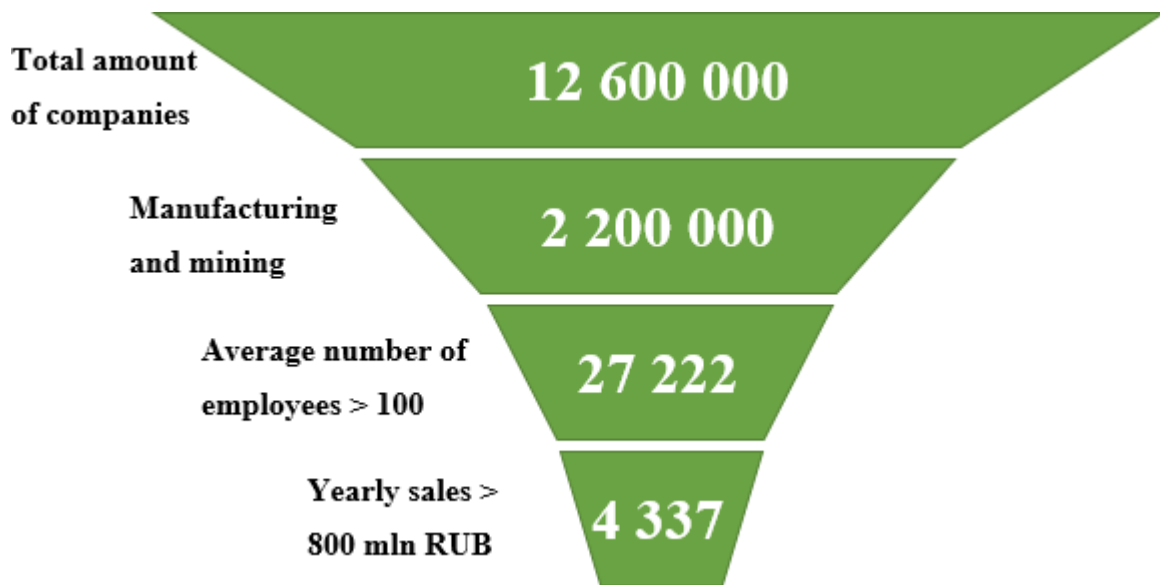
Fig. 3.2. Sample funnel
Source: own study

After the outliers' exclusion procedure, the sample contains 3 624 companies 951 of which are bankrupt.

3.5. Variables and descriptive statistics

The analysis is done using the financial indicators presented in the table 3.1 (Zieba M., 2016):

Table 3.1.   Research variables

ID	Description (each variable is calculated for period t unless otherwise stated)
X1	Retained Earnings/Total Assets
X2	EBIT/Total Assets
X3	Sales/Total Assets
X4	Gross Profit/Short-term Liabilities
X5	Gross Profit/Total Assets
X6	Sales(t)/Sales(t-1)
X7	Net Profit/Sales
X8	Net Profit/Total Liabilities
X9	Gross Profit/Interest
X10	Working Capital/Fixed Assets
X11	Logarithm Total Assets
X12	OPEX/Total Liabilities
X13	Profit on Sales/Sales
X14	Current Assets-Inventory-Receivables/Short-term Liabilities
X15	Operating Profit/Sales
X16	Receivables×365/Sales
X17	Net Profit/Inventory
X18	Current Assets-Inventory/Short-term Liabilities
X19	Inventory×365/COGS
X20	Equity/Fixed Assets
X21	Logarithm Working Capital
X22	COGS/Sales
X23	Long-term Liabilities/Equity
X24	Sales/Fixed Assets
X25	Current Assets/Short-term Liabilities

Source: own study

The indicators are brought from several research devoted to bankruptcy problem (Li Y., 2018; Zieba M., 2016). Final sample consists of 25 variables due to the following reasons:

1.   Differences between RAS and IFRS, some variables cannot be calculated;

2.   Some variables have strong correlation with others and are excluded. Analysis procedure consists of five stages which are presented in figure 3.3.
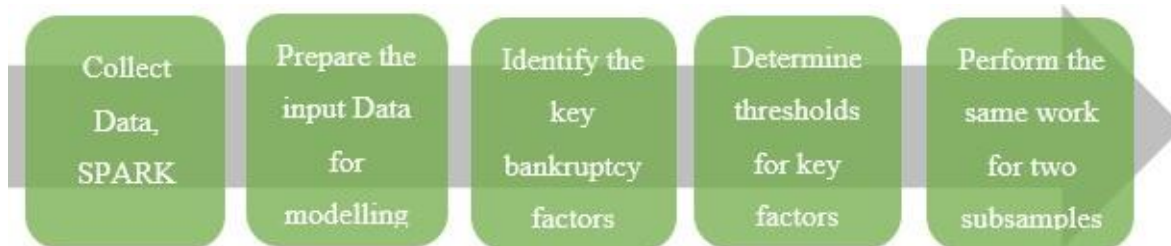
Fig 3.3. Analysis procedure

Source:own study

1.   Collect the data

The data on Russian companies is collected using SPARK database from 2012 to 2021.

2.   Prepare the input data

The criterion of high correlation for this research is the correlation that exceeds 0,5. Furthermore, the observations with missed data are deleted. The observations with evident mistakes are deleted. Finally, the outliers are excluded (Pompe P., 1996).

3.   Identify the key bankruptcy factors

In this step all 25 indicators are analyzed. The goal is to rank indicators using Random Forest according to the importance of their influence on the independent variable – bankruptcy probability.

4.   Determine thresholds for key factors

The several key variables identified before are analyzed on the 4th stage. Using machine learning Classification Tree algorithm, the thresholds for these factors are determined. The output is the understanding of the boundaries separating bankrupt from "healthy" companies.

5.   Perform the same work for two subsamples

The most important factors are determined for the subsamples and Classification Tree is used to identify the thresholds for the most important factors in each industry.

The methodology of machine learning algorithms application is presented on figure 3.4.
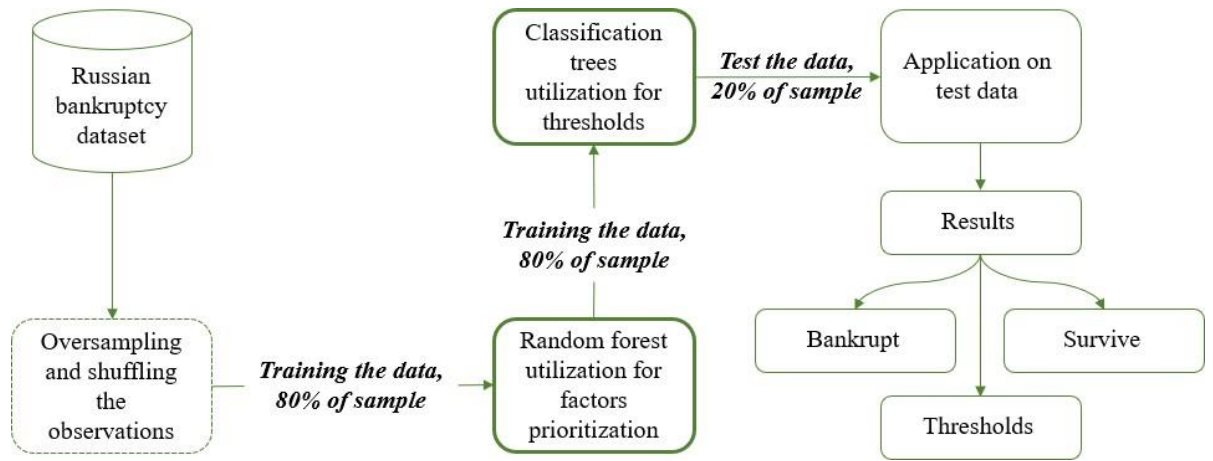
Fig 3.4. Architecture Diagram

4. EMRIPICAL RESULTS

The study includes construction of 4 types of models using Random Forest algorithm. The dependent variable is binary one. It reflects whether the company is bankrupt in period T or not. Bankrupt companies are indicated as 1 and operating companies are indicated as 0. 1st type of model implies insertion of independent variables in period T-1. For bankrupt observations it means, that we are willing to make model predict default and determine the most important factors 1 year before the actual event. The 2nd type of model implies insertion of independent variables in period T-2, the 3rd type – T-3 and the 4th type – T-4. Models are built for general sample, subsample of mining companies and subsample of manufacturing ones. It means that finally 12 models are made.

However, only 5 models out of 12 are significant according to F1 criterion. Random Forest models that aimed at predicting bankruptcy 3 and 4 years beforehand are insignificant.

On the second stage Classification Tree is used. We can rely only on significant models. Thus, we apply Classification Tree only for those indicators that are determined by a significant Random Forest model.

Finally, the most important factors affecting the bankruptcy most are determined. 1 year before the default stakeholders should pay attention to Logarithm of Working Capital (threshold = 18) and Sales/Total Assets (threshold = 0,15). 2 years before the default Equity/Fixed Assets (threshold = 0,04) is the most impactful factor.

In general, profitability and financial stability indicators are those that affect bankruptcy most.

5. CONCLUSION

As a result, the range of outcomes is formulated:

1. It is possible to predict bankruptcy using Random Forest algorithm only 1 or 2 years before the default. The models with independent variables related to periods T-3 or T- 4 (where T is the bankruptcy year) are not precise according to F1 indicator;

2. The key bankruptcy factors to pay attention that might indicate bankruptcy according to both Random Forest and Classification tree outcomes:

   a. in 1 year before bankruptcy: Logarithm of Working Capital, Sales/Total Assets;

   b. in 2 years before bankruptcy: Equity/Fixed Assets and Operating Profit/Sales;

3. The main boundaries/thresholds that separate "healthy" companies and companies under risk are:

   a. in 1 year before bankruptcy: if a company has Sales/Total Assets lower than 0,15 and Logarithm of Working Capital lower than 18, then the bankruptcy risk is 88%;

   b. in 2 years before bankruptcy: if a company has Equity/Fixed Assets lower than 0,04; then the bankruptcy risk is 84%;

5.   The Random Forest algorithm correctly classified 91,1% - 97,1% of test sample observations in those models that are accepted according to F1 criterion. These results are comparable to other similar studies;

6.   The Classification tree algorithm correctly classified 87,9% - 95,6% of test sample observations in those models that are accepted according to F1 criterion. Classification tree models also demonstrated high ROC-AUC and Gini coefficients.

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The Health Care Policy, Management, and Innovations

Comparative Evaluation of the Effectiveness of Medical Institutions in Municipalities Based on the Application of the Method of Analysis of the DEA Functioning Environment (Case Study of the Sverdlovsk Region)

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Abstract:
The activities of medical institutions of municipalities have a number of features that affect the process of evaluating the effectiveness of their activities. One of the main specific features is the economic environment for the functioning of medical institutions. Due to weak competition, the cost of medical services is assigned artificially and does not reflect their real value, so the use of cost estimates for the effectiveness of medical organizations is not always justified. To assess the effectiveness of medical institutions, other methods began to be used, including the method of analysis of the operating environment, which allows for a comparative assessment, taking into account a variety of resources and performance results. The application of this method was considered in our work for a comparative assessment of the effectiveness of medical institutions in the municipalities of the Sverdlovsk region. The information base of the study is the data of annual statistical reports of medical organizations of 58 municipalities of the Sverdlovsk region for the period 2011 - 2021. As a result of the study, groups of relatively effective and inefficient medical organizations of municipalities were identified, which confirms the relative stability of their effectiveness and rare cases of transition from the group of lagging behind to the group of more successful ones.

Keywords: *method of analysis of the functioning environment, municipalities, medical institutions, performance evaluation*

1. Introduction

Among all the current and strategic tasks of public health in Russia and the world, decision-making processes for optimizing the performance of regional health systems are extremely important.

Due to the heterogeneity and spatial differentiation of the Russian regions, the healthcare systems of the territories have significant differences. At the same time, at present, general methodological approaches to assessing the effectiveness of the health care system as a whole have not been recognized, which leads to a difficult choice in the disposal of resources and their effective use in the regions. It should be noted that there is an ongoing process of finding a balance between the needs of the population in medical services and the capabilities of healthcare systems in terms of the availability of capacities and results both at the federal and subfederal levels.

A comparative assessment of the effectiveness of medical institutions in municipalities is an urgent task in terms of developing an algorithm for this procedure, designed to take into account:

−   availability of spatial and temporal data on indicators of public health and the activities of medical organizations;

−   availability of spatial and temporal data on the resource provision of medical organizations, on the performance of medical organizations and the state of public health;

−   informative spatial and temporal data on the activities of medical organizations and health indicators.

–   the specifics of the calculation of statistical indicators, the social orientation of this area and the difficulties of using the results of the assessment.

The ability to give a comparative assessment of the performance of medical institutions using a limited set of indicators makes it possible to link the final results of their work with the functions. It should be noted that the evaluation of the effectiveness of medical institutions largely depends on the specific conditions of the territories, is part of the strategic processes at the federal and subfederal levels, and is also associated with the implementation of national projects and programs in the healthcare sector.

Traditionally, quantitative indicators are complemented by quality data or more in-depth assessments to move from measuring parameters to analyzing system performance and identifying appropriate policy options.

The methodology for assessing the effectiveness of medical institutions can be considered as a multifunctional data analysis tool necessary for the distribution of budgetary funds, the growth of the economic and social well-being of the population and the effectiveness of medical institutions.

The purpose of the presented work was to conduct monitoring and comparative evaluation of the effectiveness of medical institutions in municipalities using the method of analysis of the functioning environment (Data Envelopment Analysis - DEA) according to open data from the health care system of the Sverdlovsk region for the period 2011 - 2021.

The research objectives included the following:

–   substantiation of key input and output parameters for building a model for a comparative assessment of the effectiveness of medical institutions, taking into account their capabilities and the needs of the population of municipalities of the Sverdlovsk region;

–   comparative assessment of the effectiveness of medical institutions in municipalities based on the method of analysis of the DEA functioning environment in the context of 58 municipalities of the Sverdlovsk region according to data for 2011 - 2021.

The hypotheses of the study were the following statements *:*

–   the polarization of the distribution of resources of medical organizations of municipalities of the Sverdlovsk region reduces the availability of medical services to the population;

–   the multidirectional resource provision and incidence dynamics in the municipalities of the Sverdlovsk region is evidence of the inefficiency of the regional healthcare system;

–   a decrease in the capacity of outpatient clinics, a reduction in the number of medical personnel leads to an increase in the intensity of the work of medical organizations in the Sverdlovsk region against the backdrop of an increase in the incidence of the population.

2. Material and research methods

of analysis of the DEA functioning environment was chosen . The method of analysis of the DEA functioning environment allows for a comparative assessment of the effectiveness of the socio-economic system, taking into account the many types of resources and services provided and under the influence of various environmental factors. Bibliographic analysis showed that over 40 years (1978–2021) the number of articles using the DEA environment analysis method was more than 10,000, mostly performed for evaluation for the healthcare sector.

Research in the field of application of the method of analysis of the DEA functioning environment can be divided into three groups.

The first group includes studies in which the objects of study were national and regional health care systems. The description of their functioning was carried out on the basis of the model "costs" - "output" ("input" - "output"). In them, as variables describing costs, the authors consider such resource indicators used by health care systems as the costs of the corresponding

macro-subject for health care, the number of doctors, the number of nursing staff, the proportion of vaccinated patients. The role of variable results ("output") in these studies is played by such indicators of the analyzed macroeconomic systems as life expectancy, mortality, the number of treated patients, and the incidence of the population.

The second group includes studies in which medical institutions acted as the studied health care objects. In this group of works, as well as the first one, the "costs" – "output" model serves as a methodological basis for measuring efficiency. The specificity of healthcare facilities is taken into account through lists of variables that describe the resources used and the results obtained. As variable resources most often appear: the number of doctors and nursing staff of a medical institution, the number of beds, the amount of revenue and expenses of a medical institution. At the same time, the results of the activities of a medical institution, as a rule, were represented by indicators of the number of treated patients, bed days, outpatient visits, surgical interventions, and mortality in a medical institution.

The third group included works in which the authors analyzed the effectiveness of the departments of medical institutions or the effectiveness of the treatment processes for patients with a specific diagnosis.

In our opinion, the advantage of the method of analysis of the DEA functioning environment is the possibility of simultaneously including several indicators of costs and results. The task of the DEA operation environment analysis method is to estimate the production possibilities frontier of compared objects based on empirical data. The production possibility frontier is formed by the most efficient enterprises with an efficiency indicator of 1, and the efficiency of others is estimated through the distance to the frontier, their efficiency indicator is in the range from 0 to 1.

Each medical institution has a unique set of characteristics that are difficult to compare with each other, reflecting its features. This circumstance makes the assumption of the possibility of scaling the ratios of resource costs and performance results achieved by a particular organization with a constant productivity unrealistic.

The method of analysis of the functioning environment allows for a comparative assessment of efficiency in the interpretation of Pareto- Kopmans [2], namely, an organizational unit is effective if and only if:

1) an improvement in the level of costs (decrease) of any type of resource is impossible without a deterioration (increase) in the level of costs of at least one other type of resource or a reduction in the volume of output of at least one product;

2) improvement in the volume of output (increase) of any type of product is impossible without deterioration (reduction) in the volume of output of at least one product or an increase in the level of costs of at least one resource.

To apply the method in our study, the following model parameters were determined:

– model type - radial CCR (Charnes , Coopers , Rhodes , 1978) . This type of model assumes constant returns to scale;

– the model is result oriented. The goal of such a model is to maximize the output parameters, while the input parameters should either remain at the original level or decrease;

– a combination of cost and benefit factors.

As The key input parameters for a comparative assessment of the effectiveness of medical institutions were selected in the context of municipalities: provision with beds (number of beds per 10 thousand population), provision with paramedical personnel per 10 thousand population, provision with doctors of all specialties per 10 thousand population, the actual capacity of outpatient departments of medical organizations, the incidence of the population per 1000 people, the average monthly salary by category of medical personnel. The output parameters were represented by indicators: the number of visits to doctors per 1 inhabitant per year, bed turnover in days and the number of patients who dropped out on an annualized basis for the considered period of time.

The information base of the study was the aggregated data of the annual statistical reports of medical organizations of 58 municipalities of the Sverdlovsk region, contained in the annual information bulletins " The state of health of the population and performance indicators of the health care system of the Sverdlovsk region" for the period 2011 - 2021 .

In addition, we used the results of in-depth and semi-structured interviews with experts (representatives of municipalities, the Ministry of Health of the Sverdlovsk Region, Roszdravnadzor for the Sverdlovsk Region) for the period 2011-2021 .

The search for a solution was carried out using the MaxDEA software product Lite 12.0.

In contrast to the existing studies on this issue, an attempt was made to determine the modified performance indicators and costs of medical institutions in the municipalities of the Sverdlovsk region, taking into account the optimization of resource use.

3. Empirical results and conclusions

Thus, after conducting a comparative assessment of the effectiveness of medical institutions in municipalities based on the methodology for analyzing the environment for the functioning of the DEA based on the materials of the municipalities of the Sverdlovsk region for 2011 - 2021 . the following conclusions were made:

1. groups of relatively effective and inefficient medical organizations of municipalities were identified, which confirms the relative stability of their effectiveness and individual cases of transition from the group of lagging behind to the group of more successful ones.

Five relatively effective municipalities of the Sverdlovsk region according to the method of analysis of the DEA functioning environment (for the period 2011-2021)

MO / Year	2011	2012	2013	2014	2015		2016	2017	2018	2019	2020	2021
GO Verkh-Neyvinsky	1	1	1	1	1		1	1	1	1	1	1
Moscow Region Yekaterinburg	1	1	1	1	1		1	1	1	1	1	1
GO ZATO Free	0.99	1	1	1	1		1	1	1	1	1	1
Ivdelsky GO	1	1	1	1	1		1	1	1	1	1	0.93
GO Nizhnyaya Salda	1	1	1	1	1		1	1	1	1	0.92	1

Five low-performing municipalities of the Sverdlovsk region as assessed by the analysis of the DEA functioning environment (for the period 2011-2021)

MO / Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
GO Verkhotursky	0.89	0.86	0.87	0.83	0.88	0.98	0.86	0.79	0.83	0.75	0.76
MO Alapaevsk	1	0.50	0.63	0.73	0.88	0.98	0.92	0.94	0.92	0.82	0.82
Irbit municipality, Irbitskoe municipality	0.84	0.65	0.66	0.75	0.85	0.99	0.89	0.90	0.86	0.83	0.82
Severouralsky GO	0.82	0.76	0.78	0.81	1	0.98	0.80	0.82	0.81	0.72	0.71
Volchansky GO	0.74	0.87	0.65	0.87	0.58	1	0.67	0.74	0.78	0.80	0.80

Changing the efficiency of medical organizations in the evaluation of the analysis of the environment of the functioning of the DEA. Dynamics of transitions from category to category (for the period 2011-2021). 7 municipalities with positive dynamics

MO / Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2021 to 2011
GO ZATO Free	0.99	1	1	1	1	1	1	1	1	1	1	1.01
GO Upper Tura	0.89	0.89	0.91	0.96	0.95	1	1	1	1	1	1	1.12
Kushvinsky GO	0.86	0.99	0.92	0.87	0.91	0.99	0.95	0.95	0.96	0.84	0.91	1.06
GO Krasnoufimsky, MO Krasnoufimsky district	0.91	0.82	0.85	0.94	0.94	1.00	0.94	0.95	0.94	0.89	0.92	1.01
Slobodo-Turinsky MR	0.90	0.87	0.62	0.90	0.87	0.99	0.88	0.96	0.94	0.88	0.91	1.01
Artinsky GO	0.80	0.86	0.85	0.81	0.88	0.99	0.91	0.94	0.92	0.85	0.83	1.04
Volchansky GO	0.74	0.87	0.65	0.87	0.58	1	0.67	0.74	0.78	0.80	0.80	1.08

2. a high degree of lack of doctors and paramedical personnel of medical organizations was revealed, which is aggravated by the level of qualification of employees.

Dynamics of the provision of medical personnel in the municipalities of the Sverdlovsk region (2011-2021)
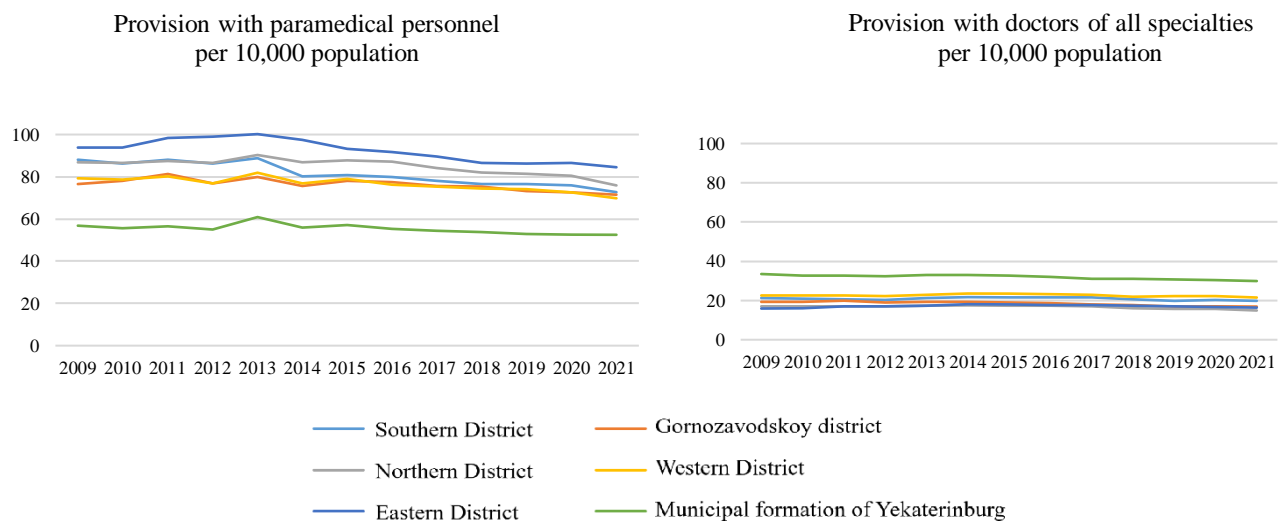
3. a deterioration in the quality of public health and the availability of medical care was found, which is manifested in an increase in the number of severe chronic diseases (hypertension, coronary heart disease, angina pectoris, myocardial infarction, oncological pathology, etc.) against the background of an increase in the amount of investment in the healthcare system.

Incidence per 1000 people
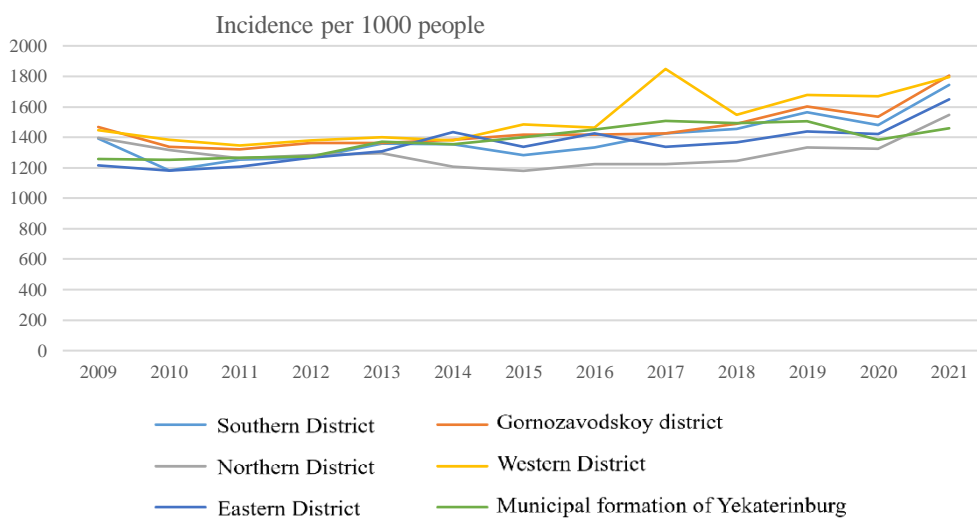
4.   many medical organizations in municipalities are characterized by a decrease in the capacity of medical institutions with high rates of work intensity, which reduces the quality of work of medical personnel and limits the ability to provide medical care to the population.

Actual APU capacity per 10,000 population
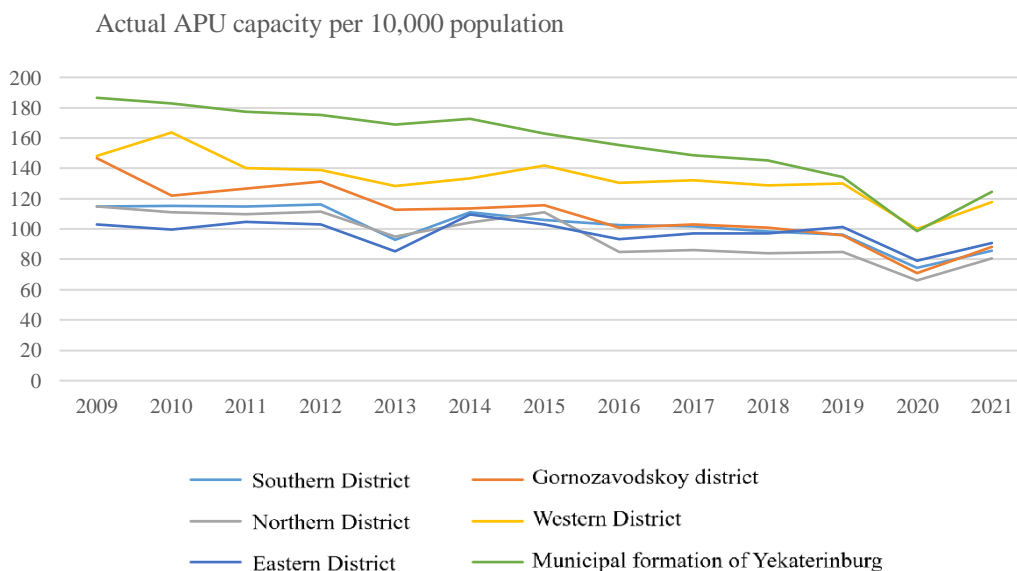
5.   approbation of the method of analysis of the DEA functioning environment made it possible to evaluate the comparative effectiveness of medical organizations in the municipalities of the Sverdlovsk region and determine the modified volume of resource consumption or the provision of services for inefficient organizations.

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Health Care Utilization and Patient Choice between Public and Private Providers in Russia

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Abstract:
This study aims to determine factors that influence health care utilization and patient choice of public and private health care providers in Russia. We test Andersen's behavioral model of health care utilization using data from the 2022 round of the Russian National Health Telephone Survey. Several regression approaches to modeling patient choice are applied to account for potential problems of sample selection and the two-level structure of the choice problem. Factors associated with choosing to use health care services and preferring public or private providers are determined. Predisposing factors (gender, age, marital status, education level, city size) and enabling factors (employment status and income) are associated with both health care utilization and patient choice behavior, while need factors (self-assessed health and number of chronic diseases) are linked to seeking medical help but do not affect choices between public and private health care providers in Russia.

1. Introduction

The demand for medical help from health care providers varies between different groups of people. Research has shown that women visit health care providers more frequently than men, more educated people seek more medical help than less educated individuals, etc. (Babitsch et al., 2012). Although some intergroup differences in health care utilization are universal, many of them differ between countries (Hajek et al., 2021). For example, U.S. citizens with low incomes were found to be less likely to seek help of health care providers (Blackwell et al., 2009), while in Australia the opposite was observed – low-income individuals were more likely to visit health care facilities (Parslow et al., 2002). Such variation in behaviors could be partially explained by different settings of health care systems in those countries as well as by cultural differences between them (Babitsch et al., 2012).

The Russian health care system has its unique features that could affect health care utilization behaviors of its citizens (Shakirov, 2019). One of such features is the relation between public and private health care providers. In most instances of medical help seeking, people in Russia have the opportunity to choose where they would like to get help. Their patient choice could be between different locations of the same providers, between multi-specialty or single-specialty clinics as well as between public or private health care providers. As with health care utilization, patient choice behavior varies between different groups of people (Victoor et al., 2012).

Differences in health care utilization and patient choice between public and private health care providers are explained by the behavioral model of health care utilization (also known as «Andersen's model of health care utilization») (Andersen, 1995). This model identifies three groups of factors that affect one's behavior of seeking medical care: (1) predisposing factors – socioeconomic characteristics of individuals and their health beliefs; (2) enabling factors –

factors which enable or hinder patients from getting medical help, e.g., their income and medical insurance; 3) need factors – factors describing whether and how much medical help patients require, i.e., because of their health state, their chronic diseases, their risk factors. Andersen's model of health care utilization requires testing in different health care systems, as contextual settings may affect the three aforementioned groups of factors (Andersen & Davidson, 2001).

In this study, we aim to determine factors that influence health care utilization and patient choice of public and private health care providers in the Russian health care system.

2. Relevance of the paper to the track topic

This study is most fitting for the Health Care Policy, Management, and Innovations track of the conference. Differences in health care utilization between Russian citizens found in this research may signal to policymakers that there are problems associated with access to care and therefore may improve the implementation of health care policies. Understanding patient choice between public and private health care providers helps those providers learn more about who their consumers are and potentially informs health care management decisions.

3. The research questions and methods

Two main research questions are raised in this study: (1) What factors influence health care utilization behaviors of Russian citizens? & (2) What factors affect Russian patients' choices between public and private health care providers? Statistical and regression analysis methods are applied to answering these research questions.

We use data from the 2022 round of the Russian National Health Telephone Survey (RNHTS) (Russian National Health Telephone Survey, 2022). RNHTS is the first public health surveillance study in Russia. The aim of RNTHS is to obtain unique representative data on health-related quality of life, health-related behaviors, and health care utilization indicators for the adult Russian population. In 2022, a total of 2150 respondents were randomly surveyed to obtain RNHTS round 1 data. The collected sample was representative with respect to gender, age, federal districts, and type of settlement (urban or rural).

In terms of health care utilization and patient choice behavior, respondents were asked to report whether they sought help from public or private health care providers in the past year, and if they did, they were surveyed about the details of their last visits to such health care facilities (e.g., whether they paid out of pocket for medical help). Their answers helped us to identify whether each respondent sought medical help overall and whether they visited public and/or private health care providers in the past 12 months. These data served as dependent variables in the analysis and were represented using binary variables (Table 1).

Table 1. Dependent variables of health care utilization and patient choice

Dependent variable	Variable values and description
Going to any health care provider (health care utilization)	0 = Did not go to any health care provider in the last 12 months
	1 = Went to a health care provider in the last 12 months
Going to a private health care provider (patient choice)	0 = Went only to public health care providers in the last 12 months
	1 = Went to a private health care provider in the last 12 months

We estimated four types of regression models: (1) probit models – one probit model for health care utilization and one separate probit model for patient choice; (2) bivariate probit model – one probit regression that models health care utilization and patient choice jointly; (3) Heckman probit model with sample selection – a two-step procedure that accounts for selection

into the sample; (4) nested logit model – a discrete choice model that accounts for the two-level decision process of health care utilization and patient choice (i.e., first, a person decides whether to get medical help or not, and second, they decide which provider to go to).

The same independent variables were used in the four types of regression models. These variables were factors from Andersen's model of health care utilization. They can be divided into three groups: predisposing factors (gender, age, marital status, education level, city size); enabling factors (employment status, monthly household income per person); need factors (self-assessed health, health state (problems in at least one domain of health-related quality of life) using the EQ-5D-3L questionnaire, number of reported chronic diseases, disability (functional limitations) using the WG-SS questionnaire).

4. The results to be reported

Most respondents sought help from health care providers in the last 12 months (79,0%). Also, most respondents at least once in the past year went to a private health care facility (65,3%). Within-group proportions of respondents going to any health care facilities and private health care facilities are presented in Table 2. According to Pearson's chi-square test for independence results, we observe statistically significant (at 10%) differences in proportions for almost all groups of respondents. We also found that individuals who sought health care and attended private clinics were, on average, younger than those who did not (43,3 ± 0,4 vs 46,3 ± 0,8 and 41,6 ± 0,5 vs 46,5 ± 0,8).

Table 2. Health care utilization and patient choice in different groups of respondents

Respondent characteristics (Andersen's model factors)		Went to any health care provider		Went to a private health care provider	
		% or mean	p-value	% or mean	p-value
Gender	Female	84,2 %	0,00	68,6 %	0,02
	Male	72,9 %		61,0 %	
Age		43,3 ± 0,4	0,00	41,6 ± 0,5	0,00
Marital status	Single	76,9 %	0,00	61,0 %	0,00
	Married	80,8 %		68,8 %	
Education level	Secondary	73,9 %	0,00	54,1 %	0,00
	Vocational	74,7 %		55,7 %	
	Higher	82,9 %		73,3 %	
City size (in thousands of people)	< 100	76,1 %	0,00	60,1 %	0,00
	100 – 500	81,4 %		67,1 %	
	500 – 1000	76,1 %		73,3 %	
	> 1000	83,6 %		69,2 %	
Employment status	Not employed	76,6 %	0,00	61,0 %	0,00
	Employed	80,4 %		67,8 %	
Monthly income (in thousands of rubles)	< 20	75,7 %	0,02	59,3 %	0,00
	20 – 40	80,8 %		67,4 %	
	40 – 60	80,6 %		64,3 %	
	> 60	82,0 %		76,6 %	
Self-assessed health	Bad or worse	86,8 %	0,00	56,8 %	0,00
	Good or better	77,4 %		67,2 %	
EQ-5D-3L	No problems	72,3 %	0,00	66,0 %	0,71

questionna ire	Some problems	83,8 %			64,9 %	
Chronic diseases	0	73,6 %	0,00		68,6 %	0,08
	1	84,2 %			63,4 %	
	> 1	83,1 %			62,4 %	
WG-SS questionna ire	No disability	78,4 %	0,09		66,4 %	0,02
	Some disability	84,0 %			56,6 %	

Regression estimation results are presented in average marginal effects (AME) with their standard errors (SE). Table 3 demonstrates results of two probit models' estimations. We observe that all three groups of factors from Andersen's model of health care utilization affect overall health care utilization, while only two groups of factors influence patient choice between public and private health care providers. Predisposing factors estimates in both models show that male respondents and older individuals were less likely to seek medical help and visit private health care facilities, while married people and those with higher education were more likely to do that. Out of three categories of city size, significant marginal effects were found for only one of them in each regression. As for enabling factors, being employed was associated with overall health care utilization but not with choosing private health care providers, whereas being in the second income category was linked to seeking medical help and being in the highest income category was linked to going to private health care facilities. Almost all variables in the need factors group were associated with higher chances of overall health care utilization if respondents were in worse health conditions (had lower self-assessed health, problems in health-related quality of life or chronic diseases). As for patient choice between public and private health care providers, no significant effects of need factors on patients' choices were observed.

Table 3. Estimates of two probit models for health care utilization and patient choice

Respondent characteristics (Andersen's model factors)	Went to any health care provider		Went to a private health care provider	
	AME	SE	AME	SE
Male	-0,11***	(0,02)	-0,09***	(0,03)
Age	-0,00***	(0,00)	-0,00***	(0,00)
Married	0,06***	(0,02)	0,08***	(0,03)
Education level: Vocational	0,00	(0,03)	0,02	(0,04)
Education level: Higher	0,07**	(0,03)	0,15***	(0,04)
City size (in thousands of people): 100 – 500	0,03	(0,02)	0,04	(0,03)
City size (in thousands of people): 500 – 1000	-0,04	(0,03)	0,08**	(0,04)
City size (in thousands of people): > 1000	0,04*	(0,02)	0,03	(0,03)
Employed	0,04*	(0,02)	0,00	(0,03)
Monthly income (in thousands of rubles): 20 – 40	0,05**	(0,02)	0,04	(0,03)
Monthly income (in thousands of rubles): 40 – 60	0,04	(0,03)	-0,02	(0,04)
Monthly income (in thousands of rubles): > 60	0,05	(0,03)	0,09**	(0,04)
Self-assessed health: Good or better	-0,08***	(0,03)	0,02	(0,04)
EQ-5D-3L questionnaire: some problems	0,08***	(0,02)	0,02	(0,03)
Chronic diseases: 1	0,10***	(0,02)	-0,02	(0,03)

Chronic diseases: > 1	0,10***	(0,03)	0,03	(0,03)
WG-SS questionnaire: some disability	0,01	(0,03)	-0,02	(0,04)
Observations	1760		1387	
Pseudo R^2	0,09		0,06	

Note: significance: * p < 0,1; ** p < 0,05; *** p < 0,01.

The remaining three types of regression models demonstrate similar findings, although several necessary modifications are made to them (i.e., some variables are excluded or transformed). Those regressions are aimed at mitigating some potential biases existing in probit models estimates from Table 3.

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Examining the Pathway from Self-Sacrificial Leadership to Psychological Well-Being: The Serial Mediation of Psychological Empowerment and Job Satisfaction

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Abstract:
This study examines the role of self-sacrificial leadership in enhancing the psychological well-being of nurses. This study has considered psychological empowerment and job satisfaction as sequential mediators between self-sacrificial leadership on their well-being. Data was gathered from 234 nurses working in hospitals. The results show that when supervisors exhibit self-sacrificial behaviors, it positively impacts the psychological well-being of nurses. Furthermore, it was found that psychological empowerment and job satisfaction act as ordered mediators between self-sacrificial leadership and psychological well-being. The study's findings suggest that hospital bosses should lead by putting others first. This can make nurses feel happier and more satisfied with their jobs by making them feel valued and in control of their work.

Keywords: *Self-sacrificial leadership, psychological well-being, psychological empowerment, job satisfaction.*

Introduction

Self-sacrifice is widely recognized as a crucial component of the human moral framework and serves as the foundation for ethical decision-making (Joseph, 2015). In recent years, scholars have turned their attention to investigate the social and psychological factors that explain how Self-sacrificial leadership (SSL) affects employee work-related results (Li et al., 2016; Mostafa & Bottomley, 2020). The current study has added to this notion by testing the sequential mediation of psychological empowerment and job satisfaction between SSL and Psychological well-being (PWB). The United Nations (2015) recognized the critical importance of well-being among employees and placed "good health and well-being" at third position in its 17 SDGs. Therefore, companies are urged to take care of their employees' physical and mental health, not only to promote a healthy and happy organizational environment but also to support their organizational sustainable development (Spreitzer and Porath, 2012).

The conservation of resources theory (Hobfoll, 1989) has has been utilized to understand the connection between SSL and PWB. Drawing on the conservation of resource theory, this study explores how self-sacrificial leadership improves the psychological well-being of nurses through the sequential mediation of psychological empowerment and job satisfaction. According to this theory, job resources provided by self-sacrificial leaders (i.e., emotional and social support) contribute to employee well-being (Salanova et al., 2005).

Based on prior literature, the study has led to the formulation of the following hypotheses:

Hypothesis H1: SSL has a positive effect on psychological empowerment.

Hypothesis H2: There is a positive relationship between SSL and job satisfaction.

Hypothesis H3: psychological empowerment mediates the relationship between SSL and PWB.

Hypothesis H4: Job satisfaction mediate the relationship between SSL and PWB.

Hypothesis H5: psychological empowerment and job satisfaction sequentially mediate the relationship between SSL and PWB.
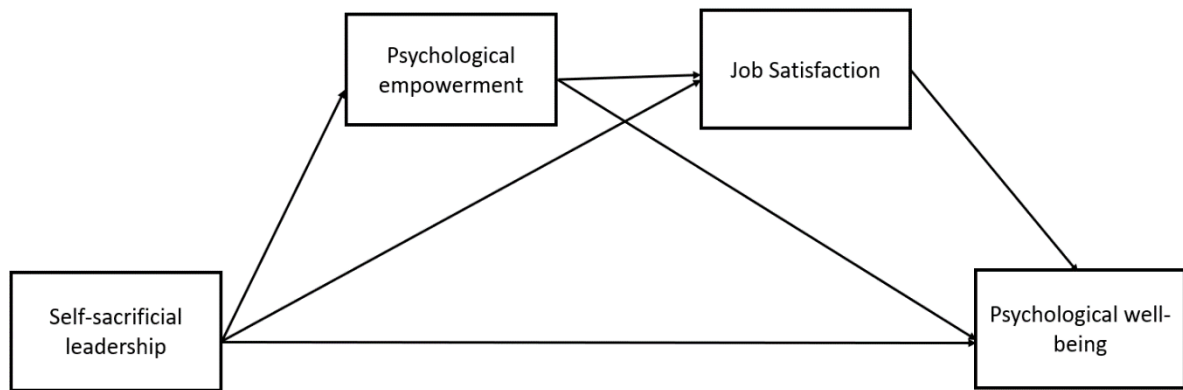
Figure1. The theoretical framework of the present study

Data was collected from 234 nurses working in hospitals to study the influence of self-sacrificial leadership on nurses' well-being through the serial mediations of psychological empowerment and job satisfaction. Data was analyzed in two steps. In the first step, CFA was performed using AMOS software. In the second step, SPSS and Process Macro for SPSS was used to examine descriptive statistics, Cronbach's alpha and correlations, and hypotheses testing.

As predicted, the findings indicate that self-sacrificial behaviors of supervisors indeed serve to increase nurses' psychological well-being within their roles. Psychological empowerment and job satisfaction are observed as sequential mediators that link self-sacrificial leadership and nurses' well-being. This study indicates a new theoretical perspective of conservation of resource (COR) theory to explore the relationship between self-sacrificial leadership and employee well-being. The research offers valuable insight to hospital management to implement self-sacrificial leadership to positively influence nurses' well-being through empowerment and job satisfaction.

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Digital Transformation of the Healthcare System: a View from the Regions (Case of the Sverdlovsk and Tyumen Regions)

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Abstract:
The study is aimed at identifying typical models of digitalization of regional healthcare systems in the Russian Federation. The main research method is to study cases of digital transformation of regional healthcare systems in the Sverdlovsk and Tyumen regions. It has been established that the effectiveness of the "centralized" model of digitalization (the case of the Tyumen region) is higher than the "decentralized" one (the case of the Sverdlovsk region). Promising areas for continuing the study are the assessment of the final results of the digital transformation of regional healthcare systems, as well as the identification of factors influencing the choice of a digitalization model by individual regions of Russia.

Keywords: *healthcare, digital transformation, regional healthcare system*

Introduction
The digital transformation of healthcare is a process of building a new model of work of medical organizations, healthcare authorities and mechanisms for interaction with patients, which is formed due to the introduction of digital technologies [2]. The priority goal of digitalization of the healthcare system is to improve the health of the population through the prevention and early diagnosis of diseases and the implementation of the principle of patient focus.

In Russia, digitalization is one of the most important trends in healthcare development. Information systems and services are being actively implemented by both state and municipal hospitals and private clinics. They are widely demanded by the population: healthcare services are the most popular among public electronic services [2].

In December 2021, the Government of the Russian Federation approved the strategic direction (strategy) for the digital transformation of healthcare. Healthcare is one of the sectors for which digital maturity is assessed as part of monitoring the achievement of the corresponding indicator of the national goal "Digital Transformation".

At the same time, the speed and results of the implementation of the digital healthcare transformation program in the regions of Russia are characterized by high differentiation.

The research question and methods
The purpose of this study is to identify typical models of digitalization of regional healthcare systems in the Russian Federation.

The assessment of the scale and dynamics of healthcare digitalization is based on the use of relevant indicators. To explore different approaches to measuring the level of digitalization, it is necessary to provide the following methodological explanations.

Digital transformation is a qualitative change in business processes or methods of economic activity as a result of the introduction of digital technologies, leading to significant socio-economic effects [3].

Thus, digital transformation is the next stage of development after digitization (translation of analog data and processes into a machine-readable form), and digitalization, which means the use of digital technologies to improve the efficiency of certain areas or

activities. The basis of digital transformation is an ecosystem of digital technologies, the constant development of which stimulates economic and social changes [3].

To assess the level of digitalization of countries, regions, industries and sectors of the economy, digital development ratings are widely used.

One of the criteria for assessing the achievement of digital transformation goals is the level of digital maturity of countries, industries, organizations and public authorities [2].

To assess digital maturity, the governments of OECD member countries use indicators such as the presence of digital platforms, the use and storage of data, openness, and user control. The World Bank is developing a maturity index in the GovTech category (GovTech Maturity Index, GTMI), covering the functioning of state systems and their technical capabilities, the completeness of services provided, and the degree of involvement of the population [6].

The Digital Acceleration Index (DAI), introduced by BCG, allows you to assess the level of development of digital competencies in a company and compare it with comparable competitors, industry averages, and digital leaders in 36 categories [2].

For the purposes of monitoring the implementation of national projects, the digital maturity of key sectors of the economy and the social sphere in Russia is assessed in the following main areas:

1. specialists who intensively use information and communication technologies employed in the economy;

2. expenses of organizations for the implementation and use of modern digital solutions;

3. the level of use in the industries of the most significant digital technologies and specialized software (SW);

4. industry indices, which include a unique set of indicators for each industry.

The basic method of this study is to study cases of digital transformation of regional healthcare systems in two regions of the Ural Federal District (Sverdlovsk and Tyumen regions). The evaluation of various parameters of the digital maturity of healthcare in Russia was carried out on the basis of data from Rosstat (EMISS system. State Statistics) and the Institute for Statistical Research and Economics of Knowledge of the National Research University Higher School of Economics.

Results

The digital transformation of the industry helps to reduce costs, improve the quality and accessibility of medical services, and increase their social and economic efficiency [3].

An extremely wide range of digital technologies that have found application in the field of healthcare: artificial intelligence; computer vision technologies; biomonitoring devices; theranostic devices that combine the functions of diagnostics and treatment, etc.

The spread of medical devices and the development of genetic diagnostic technologies lead to an enormous increase in the volume of medical data. Improving big data management technologies in medicine will reduce the cost of providing high-tech medical care.

The COVID-19 pandemic has become a powerful driver for the development of telemedicine services that help optimize logistics and mechanisms for interaction between different levels of the healthcare system, increasing the efficiency of using intellectual and material resources. The global telemedicine market is expected to grow from $61 billion to $187 billion over the period from 2021 to 2027 [2].

The development of legally significant electronic document management has significantly increased the convenience of making an appointment and simplified the work of doctors, relieving them of some of the routine operations. Algorithms for data analysis based on the information contained in electronic medical records allow you to warn in a timely manner about the need to undergo additional examinations or write a prescription for a medicine.

In the provision of medical care, robots are increasingly used: for disinfection of laboratory and operating rooms, for the care of chronic patients, as well as for operations in cardiology, oncology, ophthalmology and other branches of medicine.

The priority areas for the digital transformation of Russian healthcare are:
- implementation of specialized medical information systems,
- launch of electronic services and services,
- development of telemedicine services,
- improvement of mechanisms for remote monitoring of health status.

The key tasks of the digital transformation of domestic healthcare are to ensure the continuity of the provision of medical services, dynamic management of healthcare resources, the transition to electronic document management, the formation of electronic knowledge bases in the field of therapy, and reducing the time spent by medical workers on activities not related to the provision of medical care.

The digital transformation strategy of Russian healthcare involves the implementation of two major interdepartmental projects [2]:

The project "Creation of a single digital contour in healthcare based on a unified state information system in the field of healthcare" (USISZ), which is aimed at creating conditions for effective electronic document management in the healthcare system.

The project "Medical platform solutions of the federal level", involving the introduction of specialized vertically integrated medical information systems (VIMIS).

Digital technologies in healthcare are widely used. The most common are cloud services (used by 32.6% of organizations) and digital platforms (18.3%). Geographic information systems are used by 15.8% of healthcare organizations, the Internet of things - 13.8%. RFID tags and big data are in demand in less than 10% of organizations. The least common are additive technologies - 0.9% and digital twins - 0.8% [2].

However, the level of use of special software in healthcare (2020) is significantly lower than in the economy as a whole. Thus, organization resource planning (ERP) systems were used by 3.8% of organizations in the industry (for the economy as a whole - 13%); programs for the management of automated production - 4.2% (7.7%); product lifecycle management systems (PLM/PDM) – 1.0 (3.5%) [2].

The total cost of healthcare organizations for the implementation and use of digital technologies in 2020 amounted to 60.8 billion rubles, but the share of costs for digital technologies in the gross value added of healthcare is lower than the average for the economy - 1.6% and 2. 7%, respectively [2].

Most of the costs of digital technologies in healthcare are for machinery and equipment - 45% (2020 data), and the share of software costs is small - 19% (for the economy as a whole - 30%). There is a positive trend in the implementation of digital medical solutions, which form the basis for further digitalization of the industry [2].

In 2020, 42.1 thousand ICT specialists were employed in the healthcare sector, including 38.8 thousand IT specialists, that is, 0.8 and 0.7% of those employed in the industry, respectively. The number of ICT specialists in healthcare is higher than in education, mining and agriculture [2]. However, there is an acute shortage of specialists with the necessary digital competencies in the industry (both medical workers and specialists in the field of organization and management of healthcare).

The Healthcare Digital Maturity Assessment has been underway since 2020. The composition of indicators for assessing digital maturity is determined in accordance with the goals and objectives of the national project "Healthcare".

The difference in approaches to the digitalization of regional healthcare systems is due to the existence of many factors influencing this process. Conducting a full-fledged typology of currently existing models of digitalization of healthcare systems in the Russian regions is an urgent, but rather difficult task. However, the use of the "case study" method for the primary

empirical study of the process of digital transformation of healthcare in the regions of the Ural Federal District made it possible to identify the following typical models.

1. "Centralized" model of digitalization (case of the Tyumen region). The characteristic features of this model are:

   – The strategy and tactics of digitalization of health care in the region are developed according to the "top-down" principle, when the choice of the type of medical information system (MIS) used by state and municipal medical organizations, as well as the procedure and timing of their implementation is carried out at the regional level (for example, by the Ministry of Health and Ministry of Digital Development).

   – Use of (predominantly) one type of MIS by all healthcare organizations in the region.

   – Financing (partial) of the process of introducing HIS in state and municipal medical organizations in the region at the expense of budgetary funds.

   – Controlling the results of digitalization of the healthcare system by state authorities of the constituent entity of the Russian Federation.

2. Decentralized model of digitalization (case of the Sverdlovsk region). This model has the following features:

   – Key strategic indicators of digitalization of the regional healthcare system are determined (concretized) by the executive and legislative bodies of the constituent entity of the Russian Federation. But medical organizations have a high degree of independence in making tactical decisions in the field of digitalization of activities.

   – The choice of the type of HIS by healthcare organizations is carried out based on the specifics of their activities, which leads to the introduction of a variety of software products.

   – Medical organizations finance the costs of implementing and operating MIS on their own (mainly at the expense of "extra-budgetary" income).

   – The state authorities of the region of the Russian Federation monitor the results of digitalization, however, their functions to support and adjust the process of digitalization of the activities of medical organizations are minimized.

Of undoubted interest is the assessment of the effectiveness of the identified models of digitalization of regional healthcare systems. To do this, you can use the data of the rating of digital health maturity of Russian regions [1]. So, in 2021, the Tyumen region occupied a leading position in the ranking (5th place), while the Sverdlovsk region was in 67th place with a rating below the national average [1].

An analysis of individual indicators of the digital maturity of health care systems in the Tyumen and Sverdlovsk regions in dynamics can be carried out on the basis of Rosstat data.

The proportion of citizens who are users of the Unified Portal of State and Municipal Services (EPGU), who have access to electronic medical documents in the Patient's Personal Account "My Health", in the Russian Federation increased from 20% to 45% from December 2021 to April 2023 In the Tyumen region, this figure is close to 100%, while in the Sverdlovsk region it is only 19% (at the end of the study period).

On average in Russia, 67.6% of patients make remote appointments with a doctor (Fig. 4). In the Tyumen region, remote appointment with a doctor is available to 100% of patients. In the Sverdlovsk region, approximately every third patient makes an appointment remotely (38%, April 2023).

As of the end of April 2023, the share of state and municipal medical organizations that use medical information systems integrated with the Unified State Health Information System in the Sverdlovsk region was 75%, in the Tyumen region - more than 92% (on average in the Russian Federation - 89%).

The share of state and municipal medical organizations connected to the centralized subsystems of state information systems in the field of healthcare in Russia reached 97.7% (April 2023). In the studied regions, this indicator was 100% fulfilled.

The results of our analysis confirm the relatively low level of digital maturity of the healthcare system in the Sverdlovsk region [5].

Thus, the effectiveness of the "centralized" model of digitalization of the regional healthcare system (the case of the Tyumen region) is higher than the "decentralized" one (the case of the Sverdlovsk region).

This conclusion is based on an analysis of the available intermediate indicators of the digital maturity of healthcare in the regions. To increase the reliability of the assessment, it is necessary to take into account the final results of the digital transformation of regional health systems. Conceptually, to determine the final results of digital transformation in healthcare, one can use the methodological scheme of quality in healthcare proposed by A. Donabedian [4]. The triad of Donabedian indicators includes: 1) the quality of the structure of the organization of treatment; 2) the quality of the medical care process; 3) the quality of the results. The health care outcomes according to this scheme can be measured as the ratio of the achieved results of treatment to the planned ones (for example, the level of survival, patient satisfaction with the quality of care, cost-effectiveness of treatment, etc.) [7, 8].

Conclusion

The introduction of digital technologies leads to the construction of new models for the functioning of medical organizations, healthcare management bodies and mechanisms for interacting with patients, that is, it transforms the healthcare system as a whole.

Currently, the goals and indicators for assessing the digital maturity of Russian healthcare are focused mainly on the development of information systems and the introduction of electronic services.

The study of the practice of digital transformation of regional healthcare systems has made it possible to identify typical models of digitalization. It has been established that the effectiveness of the centralized model of digitalization of the regional healthcare system (the case of the Tyumen region) is higher than the "decentralized" one (the case of the Sverdlovsk region). So far, this conclusion is based on an analysis of the available intermediate indicators of the digital maturity of healthcare in these regions. To improve the reliability of estimates, it is necessary to measure the final results of the digital transformation of regional health systems, as well as to identify the factors influencing the choice of a digitalization model.

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Association between Functional Disability and Health-related Quality of Life in Russia

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Abstract:
Having a comprehensive understanding of the intricate relationship between disability and health-related quality of life (HRQoL) is essential for healthcare providers to offer effective services to individuals from all population groups. It is necessary to assess HRQoL comprehensively, taking into account the physical, psychological, and social dimensions of well-being, to accurately measure the impact of disability on overall well-being. This article uses data from the Russian National Health Telephone Survey to 1) present the interaction between functional disability and HRQoL, and 2) describe the relationship between functional disability and HRQoL measures assessed through self-reported and societal perspective (utilities) measures. The study found that 11.4% of the sample reported severe functional health problems, while 30.2% reported some functional difficulties in at least one dimension. From a self-reported perspective, disability, chronic diseases, elderly status, income, and employment significantly influenced HRQoL. However, from a societal perspective (utilities measures), only health-related conditions had an impact on HRQoL.

Introduction

The conventional approach to measuring health in Russia has been limited in scope and focused on identifying deficiencies, typically through metrics related to morbidity or mortality. However, this approach fails to fully capture the subjective experiences of individuals and their perceptions of how specific diseases affect their daily routines. To gain a more comprehensive understanding of the impact of chronic illness, it is crucial to consider health-related quality of life (HRQoL) as a key indicator of wellbeing. The adverse effects of poor health conditions and disability on the socio-economic development of aging society are multifaceted, leading to a range of complex losses. These include demographic consequences such as increased mortality rates among individuals with poor health, economic impacts such as early retirement and absenteeism, and social repercussions such as social tension and deprivation (Ridhwan et al., 2022). The process of ageing presents a multitude of challenges and concerns, with disability being one of the prominent issues. Although numerous older individuals make valuable contributions to their communities and society at large, there is a growing prevalence of functional disability among the elderly that can be performed by their different activities of daily living. Given the new demographic reality, it is crucial to implement and collect population HRQoL measures aimed at adapting Russian institutions to the changing landscape. By incorporating HRQoL data into patient management and policy decision-making, clinicians and policymakers can gain valuable insights into the experiences of individuals with different health conditions (Guyatt et al., 1993). Although functional disability is an important public health issue, there are still insufficient data on its prevalence among population. In Russia, the official definition of disability is employed in censuses and major population surveys, rendering official statistics the principal source of information regarding the disability status of the population (Proklova et al., 2020). According to Rosstat data, only 7.5% of the Russian population was officially classified as disabled at the beginning of 2023 year[1]. However, this figure may not accurately reflect the true number of individuals who experience functional limitations. Physically disabled people experience more

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[1] RosStat. Disability statistics, 2023. Available from: https://rosstat.gov.ru/folder/13964

restrictions in social activities than healthy people, which are associated with lower level of well-being and relative poor HRQoL (Rajati et al., 2018). Therefore, one of the key issues in measurement of health-related quality of life is the responsiveness of HRQoL measures to differences in the underlying ill health of those being studied.

Previous studies have linked poor HRQoL with higher age, unemployment, lower education, insufficient income, illness, poverty, physical activity or sleeping status (Gobbens & Remmen, 2019; Lund et al., 2011; Burström et al., 2001). The previous studies provides evidence of an inverse relationship between the number of morbidities and HRQoL (Heyworth et al., 2009; Wang et al., 2008). Education level, marital status and urban dwelling do not appear to be significant determinants of HRQoL problems in Russia; but chronic diseases and frequent "blue mood" reduce HRQoL significantly (Khabibullina et al., 2022).

From one side, the disability per se may not decrease the individual's quality of life. Occupation or meaningful occupational activities as well as social integration and time of onset of disability are factors which are associated with the satisfaction with one's life situation (Viemerö & Krause, 1998). From the other side, there was find a significant relationship between disability and the loss of quality of life in both physical and mental dimensions (Mar et al, 2010). These findings highlight the importance of addressing the impact of disability on quality of life and developing interventions to improve the well-being of disabled individuals.

This study aims to (1) explore the interaction between functional disability and HRQoL (2) describe the relationship between health-related quality of life measures, functional disability and basic demographic characteristics, as assessed through both self-reported and societal perspective (utilities) measures.

1. Data and methods

The study is based on cross-sectional data from the Russian National Health Telephone Survey that was collected between July and August 2022. The survey involved 2150 individuals aged 18 years and older and included questions related to socio-demographic factors, general health indicators, health behavior, and experiences seeking medical care. A multistage stratified probability sample of the adult population was used during the survey, which allowed for a representative sample of the adult population of Russia by gender, age, region of residence, and type of settlement. Ethical approval for the study was obtained from the local ethics committee of the First Moscow State Medical University (Sechenov University). Protocol No. 15-22 dated July 21, 2022.

The EQ-5D-3L[2] general health-related quality of life questionnaire has been employed for the purpose of characterizing and assessing health outcomes of general population. The EQ-5D provides a simple descriptive profile, EQ-VAS and a single summary index value for health status that can be used in the clinical or economic evaluation of health care as well as in population health surveys. To derive the summary index score an appropriate value set is used from Omelyanovskiy et al, 2021, which provides values (weights) for each health state description according to the preferences of the general Russian population. To evaluate the relationship between HRQoL and functional disability through self-reported perspective, we utilized EQ-VAS scores as the dependent variable, and we employed EQ-5D index (utilities) measures to examine the societal perspective of this relationship.

For estimating the proportion of people with disabilities we use the most prevalent approach proposed by the Washington Group (WG) on Disability Statistics[3]. The Short Set of WG questions (WG-SS) were developed to ensure cross-national comparability of data for populations with diverse cultural and economic backgrounds. The domains were chosen based on simplicity, universality, and comparability criteria. It is anticipated that the responses to these

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[2] The EuroQol Group. Available from: https://euroqol.org/eq-5d-instruments/eq-5d-3l-about/
[3] The Washington Group on Disability Statistics. Available from: https://www.washingtongroup-disability.com/

questions will capture the majority of individuals and represent the most frequent limitations in basic actions.

Sociodemographic and HRQoL characteristics were presented with frequency and percentage for categorical variables and mean values with standard errors for continuous variables. Chi square and ANOVA tests was performed to test significant difference between the functional impairments categories. Sensitivity of the EQ-VAS to factors influencing health status was explored using a multivariate regression model and sensitivity of the EQ-5D index to factors influencing health status was explored using an Adjusted Limited Dependent Variable Mixture Models (ALDVMM) in line with Hernandez-Alava et al, 2014.

2. Results

Analyses were performed in 1785 subjects who completed the questionnaires EQ-5D-3L, WG-SS and socio-demographic questions. Based on the results of public health monitoring, it was found that a mere 30% of the population do not encounter any challenges across the six functional domains of the WG-SS. Disability (severe functional health problems) reported 11,4% (in Rosstat - 2023 – 7,5%). Problems in the EQ-5D-3L domains were common and generally increased with increasing disability level (Table 1).

Table 1. EQ-5D-3L health dimensions vs WG-SS status

	No difficulty	Some difficulty	Disability	Total
EQ-5D:Mobility				
no problems	96,29	73,8	36,27	76,3
some problems	3,71	26,2	*63,73*	23,7
Chi-sq=303,45, p= 0,000				
EQ-5D:Self-care				
no problems	99,63	96,16	70,59	94,29
some problems	0,37	3,84	*29,41*	5,71
Chi-sq=247,99, p= 0,000				
EQ-5D:Usual activity				
no problems	94,81	76,87	41,18	78,21
some problems	5,19	23,13	*58,82*	21,79
Chi-sq=252,35, p= 0,000				
EQ-5D:Pain & discomfort				
no problems	86,46	55,95	23,04	61,4
some problems	13,54	44,05	*76,96*	38,6
Chi-sq=282,50, p= 0,000				
EQ-5D: Anxiety & Depression				
no problems	78,66	60,36	50,49	64,76
some problems	21,34	39,64	*49,51*	35,24
Chi-sq=72,68, p= 0,000				
Health status = "11111" (n=719)				
	51,46	46,18	**2,36**	100

According to the WG-SS methodology, it has been determined that individuals with disabilities face challenges related to mobility in 64% of cases, experience pain or discomfort in approximately 80% of cases, and encounter difficulties in their daily activities in half of all cases. In contrast, only slightly over 2% of respondents reported no problems in any of the EQ-

5D domains among individuals with disabilities, while this percentage was around 52% among those without functional limitations according to the WG-SS.

Multivariate linear regression models were performed to evaluate association between EQ-VAS and WG-SS status. WG-SS disability predictors, adjusted for socio-demographic and general health variables, were strongly associated with decrease in the VAS scores. The marginal effects predicted by the models with interactions of age and WG-SS predictors showed that disability (and functional constraints) acts as a hindrance in attaining a high HRQoL amongst the adults of all age groups. In this way, from self-reported perspective of HRQoL disability, chronic diseases, elderly group, income and employment status influence VAS scores significantly, but gender and education level do not appear to be significant determinants of EQ-VAS.

A 2-component adjusted limited dependent variable mixture model was selected as the optimal model for assess the relationship between EQ-index and functional limitations. Table 2 provides the coefficient values for each of the classes and marginal effects for quantitative interpretation.

From societal perspective (utilities) measures of HRQoL: only functional restrictions have (negatively) related to EQ-5D index. There is no strong association of the EQ-5D index with other socio-demographic characteristics, except the health-related conditions.

Table 2. Adjusted Limited Dependent Variable Mixture Models of EQ-5D Utilities

	Coefficients						Marginal effects	
	Comp1	Std. err.	Comp2	Std. err.	Prob_C1	Std. err.	Delta-method: dy/dx	Std. err.
Females	Ref		Ref		Ref		Ref	
Males	0,019	(0.040)	0,002	(0.009)	0,391+	(0.201)	0,004	.005
18-30	Ref						Ref	
31-45	- 0,073	(0.082)	0,009	(0.011)	0,209	(0.290)	-0,005	.009
46-60	- 0,012	(0.086)	0,004	(0.015)	0,435	(0.361)	0,000	.009
>61	0,096	(0.096)	-0,014	(0.019)	0,187	(0.433)	0,003	.009
No difficulty	Ref						Ref	
Some difficulty	-0,461***	(0.113)	-0,027*	(0.011)	-0,965***	(0.253)	**-0,052***	**.004**
Disability	-0,805***	(0.151)	-0,066**	(0.019)	-0,323	(0.399)	**-0,166***	**.015**
Control variables	*yes*		*yes*				*yes*	
Const	1,620*	(0.218)	0,938*	(0.026)	0,271	(0.512)		
lns_1					-1,366**	(0.107)		
lns_2					-2,647**	(0.093)		
N					1 785		1 785	

+ p<0.1, * p<0.05 , ** p<0.01, *** p<0.001

3. Conclusion

The findings of this study indicate a strong association between HRQoL and functional impairments. Specifically, the quantitative measures of EQ-5D-3L questionnaire was found to be a highly sensitive tool for detecting variations in quality of life related to differences in disability status and functional limitations as determined by the WG-SS. The World Health Organization's publication introducing the concept of disabled individuals being capable of living in a healthy state has significantly altered the understanding of the correlation between disability and overall health and HRQoL. It is important to recognize that having a disability does not necessarily equate to poor health or low HRQoL (WHO, 2007). In the context of Russia, functional limitations were found to reduce self-reported and societal perspective measures of HRQoL despite adjustment for sociodemographic variables. The regression model's strong association with both utility and VAS scores suggests its applicability in future studies involving diverse populations and patients. Therefore, healthcare provisions must prioritize individuals with disabilities and offer tailored geriatric services that meet the specific needs of

the aging population with disabilities. Such initiatives in the policy changes will not only advance health equity, reduce disparities, but also promote sustainable economy and create a supportive social environment for older adults.

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Lay Epidemiology and its Tools: the case of Vaccine Sceptics

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Abstract:
Increasing vaccine uptake became a national priority in many countries. Lack of public confidence in the vaccines is often being explained by the deficiency of knowledge about the vaccination or inadequate understanding of information. However, there is extensive evidence that vaccine sceptics have more knowledge about vaccination than people who are ready to be vaccinated. This paper seeks to explain this paradox by using the concept of lay epidemiology. The idea of lay epidemiology is based on the fact that individuals seek to make sense of the world around them, they make inference about the disease from personal observations and personal stories. In many respects lay epidemiology mirrors real epidemiology: lay epidemiologists also conduct their own research; they collect and evaluate evidence and they also engage in risk evaluation. However, unlike real epidemiologists they are focused not on populations, but individual cases, and their rules of evidence and risk evaluations are fundamentally different.

Keywords: *Vaccine hesitancy, Russia, COVID-19, Health behavior, vaccine sceptics.*

Introduction

The SAGE Working Group has defined vaccine hesitancy as the delay or refusal of vaccination despite its availability (MacDonald, 2015). While there is a significant amount of research on the factors associated with vaccine hesitancy, the root causes of anti-vaccination attitudes remain unclear. Researchers are still searching for theoretical frameworks that can help them identify not only the correlates of vaccination rejection but also the underlying reasons behind individuals' decisions.

Vaccine hesitancy has become a significant challenge for public health officials in many countries (Gangarosa et al., 1998, Oostvogel et al., 1994; van Spaendonck et al., 1996, Salama et al., 2021; Stein-Zamir et al., 2020, McDonald et al., 2019). Despite the overwhelming evidence demonstrating the safety and efficacy of vaccines, a growing number of people are expressing doubts about their use. The lack of public confidence in vaccines is often attributed to a lack of knowledge or understanding of vaccination. However, research has shown that vaccine sceptics often possess more knowledge about vaccination than those who are willing to be vaccinated. This paradox can be explained by the concept of lay epidemiology.

Lay epidemiology refers to the way in which individuals make sense of the world around them and form their own beliefs and opinions about health and disease. People draw on personal observations and experiences, as well as stories from friends and family members, to develop their understanding of health issues. In many ways, lay epidemiology mirrors the work of professional epidemiologists, who also collect and evaluate evidence to understand patterns of disease in populations. However, while professional epidemiologists focus on populations, lay epidemiologists are concerned with individual cases.

The rules of evidence and risk evaluation used by lay epidemiologists are fundamentally

different from those used by professionals. Lay epidemiologists rely heavily on personal experience and anecdotal evidence, rather than statistical data or scientific studies. They may also be influenced by factors such as cultural beliefs, social norms, and personal values. As a result, their understanding of health issues may differ significantly from that of professional experts.

Relevance of the paper to the track topic
Understanding the concept of lay epidemiology is crucial for policymakers and managers in the healthcare industry who are responsible for increasing vaccine uptake. By acknowledging the role of lay epidemiology in shaping people's attitudes towards vaccines, policymakers and managers can work to build trust and confidence in vaccination programs. This may involve addressing misconceptions and providing information that is tailored to people's individual beliefs and values. By taking a more nuanced approach to vaccine communication, policymakers and managers can help to overcome vaccine hesitancy and protect public health. Therefore, this paper is highly relevant to the conference track "The health care policy, management, and innovations."

The research question(s) and methods
To address this gap in knowledge, we will use grounded theory (Corbin, J., & Strauss, A., 2008), a qualitative research method in sociology, to explore the process by which individuals become interested in public health discussions about vaccination. Semi-structured interviews with vaccine sceptics of varying degrees of conviction from a target sample of 20 people are used as the main data collection method. There's a number of factors known from empirical literature that influence vaccine sceptics' beliefs in people from different settings. However, the mechanism of people becoming interested in vaccines is poorly understood. We study interviews with people of varying attitudes towards vaccination to conceptualise the process of them becoming interested in public health discussion revolving around the topic of vaccination.

The results to be reported
The results of this qualitative study suggest that the most typical trajectory for the emergence of anti-vaxxer views in an individual is a trigger - an emotional event that made a person become interested in the topic of vaccination. Before this event, people, as a rule, are not interested in the topic of vaccination, they take it for granted. The stance of actively accepting vaccination is quite rare. During the formation of anti-vaxxer beliefs, information plays a significant role, often perceived as a "revelation" - informants describe this moment as a "puzzle has been formed" - it becomes clear to them, for example, why they or their child gets sick so often. Subjective personal experience also plays an important role: observation of oneself, relatives and acquaintances, formation of conclusions, similar to "one's vaccinated child often gets sick, my unvaccinated child - less often". After the formation of stable beliefs, information ceases to play a significant role in the formation of such beliefs; as a rule, anti-vaxxers are looking for either confirmation of their position or arguments for controversy. According to the trigger hypothesis, the impact of the COVID-19 pandemic and the public campaign to vaccinate the population on attitudes towards vaccination as such is of significant interest. Several informants spoke about the formation of negative attitudes towards all vaccines after coercion to vaccinate against COVID-19. It is not possible to determine how large and long-term the described phenomenon is within the framework of a qualitative study, but it certainly requires attention from researchers and public health practitioners.
Among the rhetorical strategies used by opponents of vaccination, the most important role is played by the opposition of "help" to the body (taking vitamins, proper nutrition ...) and

"harming it" in the form of vaccination as a difficult and dangerous procedure for health. Vaccination is described as something "unnatural" and therefore harmful. Another significant argument is the accusation of the pharmaceutical industry and, to a lesser extent, medicine, of commercial interest, making money on illness, and not on health. Arguments of this kind are typical of opponents of vaccination and have been repeatedly described in foreign research literature. A feature of the Russian experience is the presence of a "golden age" when no pharmaceutical companies were working for profit - the Soviet period. Most of the informants spoke of trust in "Soviet vaccines". It may seem that the main reason for this trust is a long period of existence, the fact that they have passed the test of time, however, clarifying questions make it possible to understand that the main motivation for the declared trust in the Soviet system of vaccination is the absence of a commercial organization of medicine during this period.

Forming the research program, the authors proceeded from the idea of classifying opponents of vaccination into two groups: staunch opponents of vaccination as such, regardless of diseases and vaccines used, and moderate vaccine sceptics who oppose vaccination with individual vaccines or against individual diseases (for example, against COVID-19). or the flu). Informants, as a rule, proceeded from a different classification. They often contrasted themselves with other, more radical anti-vaxxers, describing themselves as moderates. Perhaps this is due to the stigmatization of anti-vaccinators, and the dominance of the public stereotype of them as aggressive supporters of conspiracy theories. However, informants did indeed often express conspiracy theories, the most popular of which was the idea that the World Health Organization deliberately supports the distribution of vaccines that provoke infertility in African countries, using them as a way to reduce the birth rate. However, informants tend to postulate their moderation and reasonableness.

The results obtained are largely consistent with the results of quantitative and qualitative studies on the refusal of vaccination. The rhetorical strategies used by the informants were close to the rhetorical strategies described in foreign studies. The results obtained once again testify to the naivety and fallacy of the idea of opponents of vaccination as lacking knowledge. Anti-vaccination people have substantially more knowledge about vaccination than the average person receiving vaccination. Except for a short period after the trigger, the information does not have a significant impact on the views of opponents of vaccination and is not an important factor in determining attitudes towards vaccination. It appears that the most promising public health approach to combat anti-vaccination is to isolate the most common trigger events and counsel people about vaccination issues in the relatively short period they can accept the counselling.

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The Role of Health-related Behaviors in the Relationship between Socioeconomic Status and Health Status

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Abstract:
The study aims to analyze the SES inequality in health-related outcomes and to explain these associations by health-related behaviors using mediation analysis approach. Respondents of the Russian National Health Telephone Survey held in 2022 among adult population were selected based on available socio-demographic, behavioral characteristics, and health-related outcomes. In addition to significant differences in health outcomes by SES groups, there were also found that health-related behaviors contributed to income inequality in health-related outcomes.

Keywords: *health outcomes, health-related behaviors, SES, public health survey.*

Introduction

Scientists have long studied various factors that affect the physical and mental health of adult population. According to empirical evidence based on the Grossman's model of demand for health, the human capital, lifestyle and working conditions, socioeconomic characteristics, environment, and medical health utilization among other factors can influence an individual's health (Contoyannis, Jones, 2004; Robone, Jones, Rice, 2011).

For centuries attention has been paid to socioeconomic status (SES) as a determinant of health (Glymour, Avendano, Kawachi, 2014). SES refers to the position of an individual or group in the social hierarchy, reflecting his or her social class, standing and status based on factors such as occupation, education, income, wealth, or other SES composite scores.

It has been well established in previous studies that people from lower socioeconomic backgrounds have poorer health status, a higher risk of illness, and a shorter life expectancy (Mackenbach et al., 2008; Hu et al., 2016). Numerous initiatives have been taken to lessen health disparities, including investments on healthcare and health services and putting health promotion policies in place (Cutler et al., 2011; Thornton et al., 2016). Despite this, there is strong evidence that socioeconomic status differences in health are present and vary across countries and over time (Marmot, 2017).

People's health maintenance is heavily influenced by income, which serves as a fundamental indicator of social class (Marmot, 2002). Better health and fewer adverse health conditions are associated with higher income, whereas higher exposure to risk factors is associated with lower income. One more issue facing public health is reducing educational disparities in health (Marmot et al., 2012). There is empirical evidence that the greater the difference in educational attainment is related to bigger disparities in health achievement (Case, Deaton, 2015).

While education and income are both significant factors related to health, not all their correlations with health outcomes are causal. Some of the relationship between SES and health reflects reverse causality and third-party confounding (Glymour, Avendano, Kawachi, 2014). By studying the mechanisms that account for the relationship between SES and health, several studies have revealed probable mediating elements for "SES – health outcomes" nexus (Marmot, 2002; Schram et al., 2021; Zhang et al., 2022).

Previous research has shown that low SES is correlated with higher levels of stress, negative emotions as well as adverse health behaviors such as smoking, excessive drinking, poor

diet, physical inactivity, etc. (Pampel, Krueger, Denney, 2010). In its turn, these behaviors are associated with poor health (Pampel, Krueger, Denney, 2010; Schram et al., 2021). According to a recent research, health-related behaviors accounted for around one-fifth of the socioeconomic disparities in self-rated health (Dieker et al., 2019). From this point of view, it is important to consider such factors in the relationship between SES and health outcomes.

This study uses mediation analysis to determine the extent to which SES disparities in health are mediated by health-related behaviors.

Relevance of the paper to the track topic

The relevance of the study can be explained in two ways. First, SES disparities in health status are identified to some extent due to health-related behaviors. The results of the study will broaden the knowledge base for creating and expanding existing prevention strategies to reduce SES-related health inequalities. Secondly, the study uses a unique Russian National Health Telephone Survey (RNHTS) conducted in 2022 to monitor public health in Russia (Russian National Health Telephone Survey, 2022). Considering modern medicine and the Russian healthcare system as a panacea that ensures health is not justified since it is more curative than preventive (Parfitt, 2009). In this regard, screening diagnostics and monitoring instruments for the prevention of health disorders and further creation of health promotion programs is of great importance.

The research question(s) and methods

In addition to identification of the mechanism by which SES affects the health of the adult Russian population, this study aims to examining the mediation effect of health-related behaviors. The hypotheses were as follows based on the findings of previous research.

Hypothesis 1: Higher SES is positively related to health status.
Hypothesis 2: Health-related behaviors mediate the effect of SES on health status.

The study is based on information from Russian National Health Telephone Survey (RNHTS), which covers a sociodemographic segment, general health indicators, health behaviors, and experience in seeking medical help. 2,150 adults over the age of 18 participated in the telephone survey performed in 2022 using a structured interviewing procedure. In order to acquire a representative sample of the adult population in Russia by sex, age, region of residence, and type of settlement, the survey used a multi-stage stratified probabilistic sample of the adult population.

Using information about health status, SES and health-related behaviors we obtained a sample of 1686 adults. The descriptive statistics of variables used in analysis is presented in Table 1.

Table 1. Descriptive statistics and definitions of variables

Variable	Definition	% or Mean ± SE
age	Age in year	43.93 ± 0.38
gender	=1 if female	53.6
married	=1 if married	53.7
rural	=1 if lives in rural area	22.8
Moskow & St. Petersburg	=1 if lives in Moskow or St. Petersburg	13.3
Far East Federal District	=2 if lives in Far East Federal District	4.7
Volga Federal District	=3 if lives in Volga Federal District	19.6
Northwestern Federal District	=4 if lives in Northwestern Federal District	6.6
North Caucasian Federal District	=5 if lives in North Caucasian Federal District	6
Siberian Federal District	=6 if lives in Siberian Federal District	10.8

Ural Federal District	=7 if lives in Ural Federal District	8.1
South Federal District	=8 if lives in South Federal District	10.3
Central Federal District	=9 if lives in Central Federal District (base category)	20.6
nonsmoker	=1 if does not smoke currently	66.3
nonalco	=1 if consumes alcohol without a risk for health of does not consume alcohol	55.6
nonobese	=1 if BMI is less than 25	48.9
pa	=1 if have frequent moderate and vigorous physical activity during last month	55.3
medvisits	=1 if visited a health care provider during last 12 months and never missed visits	39.4
education	=1 if has higher education	54.2
income	=1 if monthly income is less than 20 thousand rubles (base category)	38
	=2 if monthly income is 20 to 40 thousand rubles	32.7
	=3 if monthly income is 40 to 60 thousand rubles	14.8
	=4 if monthly income is greater than 60 thousand rubles	14.4
VAS	Visual Analogue Scale for current state of health, from 0 to 100	73.33 ± 0.47
SAH	Self-assessed health, =1 if has (very) good or excellent state of health currently	84
Number of observations		1686

Due to significant interactions between SES and health-related behaviors mediation analysis was used to estimate the natural direct effect (NDE), natural indirect effect (NIE), and total effect (TE). The TE of SES on health measured by visual analogue scale (VAS) from 0 to 100 was decomposed into the effect occurring through the mediators of interests (NIE) and the effect occurring through other pathways (NDE). We conducted sensitivity analyses to check the robustness of the results. For this, we used another measure for health status – self-assessed health (SAH) of individual.

The results to be reported

For brevity main results of the analysis are presented. Table 2 presents the educational inequalities in health and impact from health-related behaviors. Higher educated individuals reported higher VAS on average compared to respectively lower educated individuals. But there was not found any significant difference due to health-related behavior proposed.

Table 2. Total, natural direct and natural indirect effect of education on health range from 0 to 100 with health-related behaviors as mediators

mediator	nonsmoker	nonalco	nonobese	pa	medvisits
NIE					
Higher vs Not higher	0.152	-0.002	0.056	0.018	0.162
	(0.133)	(0.013)	(0.056)	(0.133)	(0.103)
NDE					
Higher vs Not higher	3.757***	3.914***	3.853***	3.892***	3.750***
	(0.927)	(0.919)	(0.918)	(0.909)	(0.917)
TE					
Higher vs Not higher	3.910***	3.912***	3.910***	3.911***	3.911***
	(0.919)	(0.919)	(0.919)	(0.918)	(0.919)
Number of observations	1686	1686	1686	1686	1686

Note: Standard errors in parentheses. Significance: * p<0.1, ** p<0.05, *** p<0.01. Adjusted for age, gender, marital status, settlement type, federal district.

Table 3 shows the income inequalities and the impact of health-related behaviors. If low income individuals (< 20 thousand rubles) were to have the same frequency of physical activity

as high income individuals (>60 thousand rubles), income inequalities in health would be reduced by 7.6 points (p<0.01), while low income individuals (< 20 thousand rubles) were to have the same visiting behavior of medical providers high income individuals (>60 thousand rubles), income inequalities in health would be reduced by 7.8 points (p<0.01).

Table 3. Total, natural direct and natural indirect effect of income on health range from 0 to 100 with health-related behaviors as mediators

mediator	nonsmoker	nonalco	nonobese	pa	medvisits
NIE					
20-40 th RUB vs < 20 th RUB	0.078	0.011	0.001	0.200	0.310**
	(0.065)	(0.032)	(0.053)	(0.157)	(0.129)
40-60 th RUB vs < 20 th RUB	-0.014	0.038	0.055	0.369*	0.159
	(0.055)	(0.104)	(0.082)	(0.214)	(0.147)
>60 th RUB vs < 20 th RUB	0.097	-0.000	0.058	0.480**	0.277*
	(0.084)	(0.014)	(0.087)	(0.235)	(0.167)
NDE					
20-40 th RUB vs < 20 th RUB	4.367***	4.430***	4.439***	4.240***	4.132***
	(1.106)	(1.105)	(1.104)	(1.097)	(1.108)
40-60 th RUB vs < 20 th RUB	5.957***	5.897***	5.880***	5.567***	5.777***
	(1.344)	(1.345)	(1.348)	(1.345)	(1.336)
>60 th RUB vs < 20 th RUB	7.969***	8.068***	8.006***	7.593***	7.791***
	(1.396)	(1.397)	(1.394)	(1.366)	(1.386)
TE					
20-40 th RUB vs < 20 th RUB	4.445***	4.442***	4.441***	4.440***	4.442***
	(1.106)	(1.106)	(1.106)	(1.106)	(1.106)
40-60 th RUB vs < 20 th RUB	5.943***	5.935***	5.936***	5.937***	5.937***
	(1.348)	(1.348)	(1.348)	(1.348)	(1.348)
>60 th RUB vs < 20 th RUB	8.066***	8.068***	8.065***	8.073***	8.069***
	(1.397)	(1.397)	(1.397)	(1.398)	(1.397)
Number of observations	1686	1686	1686	1686	1686

Note: Standard errors in parentheses. Significance: * p<0.1, ** p<0.05, *** p<0.01. Adjusted for age, gender, marital status, settlement type, federal district.

Our findings show the existence of health disparities due to SES, while health-related behaviors contribute to SES inequalities in health to a lesser extent. More pronounced is the health gradient by income: among the highest-income individuals (>60 thousand rubles) compared to the lowest-income individuals (< 20 thousand rubles) there are much larger differences in health estimates compared to other income groups.

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The Absenteeism-related Productivity Loss: a Case of Russia

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Abstract:
The health impairment of workers is associated with labour productivity loss which justifies the need for policy interventions aiming at an improvement of employees health. This study attempts to contribute the literature by estimated the illness-related absenteeism costs in Russian. In addition, we estimate the health-related labour-productivity loss if a person is employed in hazardous work or follows a negative health-related behavior. The results show that harmful working conditions are associated with a loss about 5136 rubles per individual per 12 month. This is higher than the labour productivity loss from smoking.

Keywords: *productivity loss, absenteeism, occupational health.*

Introduction

Health impairment of workers could result in lower productivity and associated economic loss because of high illness-related absenteeism. For example, the economic burden of sickness-related absenteeism reach 228 billion dollars in the United States or 1685 dollars per employee (CDC US, 2015). Premature deaths of economic active population accounts from 4% to 10% of GDP in Europe (Oliva-Moreno, 2012). These facts justify the need of policy measures aimed to reduce missed workdays because of health problems.

To our mind, only one study attempt to investigate the economic burden of stressful work (Brunner et al., 2019). This study examines the case of Switzerland and shows that absenteeism-related costs are 195 Swiss francs per person per month. Indeed, stress at work is an important determinant of workers' health in high-income countries and hazardous work has a negligible effect on health (Cottini & Ghinetti, 2017). However, in low- and middle-income economy both poor physical working conditions and stress could decrease health of workers. This fact justifies the need of absenteeism-related economic burden because of unsatisfactory quality of workplaces in middle- or low-income economies.

In this context, it could be interesting to study the case of Russia where working conditions are typically worse and overall state of health is lower than that in high-income economies. To our mind there are no estimations of the economic burden of illness-related absenteeism at the national level and costs of unsatisfactory working conditions for Russian or the other economies. Thus, this study aims to estimate the cost of illness-related absenteeism in Russia and to quantify the associated costs of unsatisfactory working conditions.

Theory review

In economic literature, absenteeism is treated as non-attendance at work because of sick leave, that is legal reasons or illegal cases in form of shirking (Suárez & Muñiz, 2018). The most common theory explaining absenteeism is a labour supply model where individuals maximize their utility consuming leisure time and other goods. In turn, absenteeism is a part of leisure time and to derive the desired level of utility, persons allocate their time between work and leisure activities taking into account the exogenous wage rate. In case of absent work schedule, the employees define their optimal level of working hours. At the same time, if a labour contract specifies working hours, the employee would prefer to be absent if their optimal working hours are below the schedule in accordance with the labour contract. The optimal level of absenteeism relies on the idea that marginal benefits of being absent are equal to marginal costs. Thus, if

work absences are associated with high loss of future earnings or higher probability of discharge, the absenteeism will be lower (Brown & Sessions, 1996; Suárez & Muñiz, 2018). This model implies that individuals can make a decision whether to be absent from work that is mostly related to voluntary absenteeism rather than involuntary one. The labour-supply model does not take into account health of employees that is an important determinant of the leisure's utility (Viscusi & Evans, 1990).

Grossman human capital model (Grossman, 1972, 2000) could offer an explanation of sickness-related absenteeism among employees. This model assumes an increase in the stock of health increases the number of illness-free days which results in higher earnings and the quantity of work days. The model implies that the wage rate determines the value of health time that coverts to the illness-free days. Therefore, the employee can earn more because of a greater amount of time spent on work and higher investments in health which, in turn, allows to maximise the utility. In addition, (Cottini & Ghinetti, 2017) rely on the Grossman model and show that bad working conditions could deteriorate health. Thus, one could imply that hazardous and stressful work could result in worse health and lower productivity of employees.

Thus, working conditions and as well as health problems could increase absenteeism and related economic burden. The estimation of costs related to absent days is dealt with two basic methods: human capital approach and frictional approach.

Method

The calculation of absenteeism-related economic costs consists of two steps.

First, the econometric model estimates the relationship between explanatory variables and absenteeism. The nature of the dependent variable implies the use of count models. Certain studies utilise Poisson or Negative binomial model (type II); however, these methods do not take into account the problem of excess zeroes and selection issues. To solve these problems, zero-inflated classes of models or hurdle or zero-truncated count models that are used interchangeably and there is no well-defined solution what method is better out of the two (Feng, 2021). The sample selection count models assume that some determinants predict if the person prefer to apply for sick leave and the other characteristics explain the length of this leave. However, as (Suárez & Muñiz, 2018) stress the sample selection model have a weak justification when the dependent variable reflects absenteeism that is involuntary in its nature. In Russian context, we suppose that there are two types of absenteeism: short- and long-run. If the former is an involuntary phenomenon because if implies serious health problems, the latter can be a voluntary one and related to minor health conditions. Thus, health is the primary determinant of both sick leave length and a decision to apply for sick leave. Thus, there are no selection variables and the same characteristics explain why a person chooses sick leave and how long this sick leave takes. In this study, we rely on zero-truncated Poisson model:

$$\Pr(Y = y_j \mid y_j > \tau_j, \, x_j) = \beta'x + \gamma'z + \varepsilon_i \tag{1}$$

Where x is a vector of explanatory variables, z shows control variables, and ε_i is an idiosyncratic component of the regression. The model estimates the probability that a person takes sick leave and predict the length of this leave. The estimates of this model show how workplace conditions and health-related behavior predict the decrease in productivity which is measured by using absenteeism. This model is estimated by using Russia Longitudinal Monitoring Survey, (RLMS HSE)1 data.

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[1] "Russia Longitudinal Monitoring survey, RLMS-HSE», conducted by National Research University "Higher School of Economics" and OOO "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology of the Federal Center of Theoretical and Applied Sociology of the Russian Academy of Sciences. (RLMS-HSE web sites: https://rlms-hse.cpc.unc.edu, https://www.hse.ru/org/hse/rlms)

Second, once there is an estimated econometric model, human capital approach is used to quantify economic costs of days lost. That is, this method implies the use of the average wage of 47867 rubles in 2019 year divided by the average number of working days per month (22 days). This gives the average daily wage that is multiplied by the predicted number of sick leave days for persons who work in unhealth jobs and do not work there.

Results and conclusions

Table 1 shows the estimates of the model (1) where the second column shows the estimated incidence rate ratios. The results revealed that voluntary health insurance has a negligible effect on absenteeism. At the same, self-reported hazardous working conditions are associated with higher rate of absenteeism and this effect is identical to the impact of smoking or at least one working condition. In addition, low or moderate physical activity implies lower illness-related days lost.

Table 1. The estimates of model (1)

	β	s.e.
Voluntary health insurance	1.072	(0.0451)
Hazardous conditions	1.096**	(0.0335)
Current smoker	1.107***	(0.0290)
At least one chronic condition	1.073**	(0.0262)
Light sports exercises at least 3 times per week	0.919**	(0.0290)
Moderate sports exercises at least 3 times per week	0.849***	(0.0361)
Intensive sports exercises at least 3 times per week	0.861*	(0.0590)
Daily sports exercises at least 30 minutes each	1.120*	(0.0540)
Socio-demographic characteristics	Yes	
Year Dummies	Yes	
Industry Dummies	Yes	
Access to healthcare variables	Yes	
Observations	12725	
Log-likelihood	-101321.4	
Chi-sq	2110.7	
Chi-sq p-value	0.0000	
N of clusters	6677	

Exponentiated coefficients; Clustered standard errors in parentheses; $^+ p < 0.1$, $^* p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

Next, we estimated the economic costs of hazardous working conditions and characteristics of health-related behavior (see Table 2). The second column of the table displays the costs incurred if an individual chooses not to report harmful workplace conditions or engage in smoking or sports exercises. These costs reflect the average number of days lost due to absenteeism (predicted absenteeism rate). The numbers in square brackets represent the 95% confidence interval of the predicted absenteeism. Additionally, the last number in each cell represents the economic costs associated with absenteeism. The third column of the table illustrates the economic costs when a person is involved in a hazardous job, smokes, or engages in certain sports exercises. Similarly, it includes the average number of days lost, the confidence interval, and the corresponding absenteeism-related economic costs. The last column of the table provides a "premium" for individuals working in hazardous environments. This premium indicates the additional compensation or benefits provided to those who work in such conditions.

Table 2. The economic costs of working conditions and health-related behavior

Variable	No	Yes	Difference
Hazardous conditions	16.817	18.516	***
95% CI	[16.402; 17.232]	[17.537; 19.495]	**5136.47**
Individual economic loss, rubles	**50 841.28**	**55 977.75**	
Smoking	16.720	17.842	**
95% CI	[16.255; 17.186]	[17.177; 18.507]	**3391.42**
Individual economic loss, rubles	**50 549.41**	**53 940.83**	
Light sports	17.462	14.929	***
95% CI	[17.039; 17.885]	[14.113; 15.745]	**-7657.78**
Individual economic loss, rubles	**52 790.31**	**45 132.53**	
Moderate sports	17.378	12.368	***
95% CI	[16.976; 17.779]	[11.426; 13.311]	**-15144.42**
Individual economic loss, rubles	**52 536.79**	**37 392.37**	
Intensive sports	17.178	12.478	***
95% CI	[16.789; 17.566]	[10.863; 14.092]	**-14209.408**
Individual economic loss, rubles	**51 931.68**	**37 722.272**	

$^+ p < 0.1$, $^* p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

The average cost of absenteeism is estimated to be approximately 50,000 rubles. However, when considering specific factors, such as hazardous work conditions, the cost varies. Individuals working in hazardous jobs experience a productivity loss of 5,136 rubles over a 12-month period. This indicates a substantial impact on individual labour productivity.

In addition, our study reveals that the productivity loss from smoking is lower. Individuals who smoke experience a productivity loss of around 3,391 rubles, which is significantly smaller than the cost associated with hazardous work. Moreover, there is a positive impact of engaging in sports exercises on labor productivity. Individuals who participate in physical activities experience lower absenteeism rates, leading to a significant increase in productivity. This finding suggests that interventions promoting sports or fitness could potentially reduce illness-related absenteeism costs and enhance overall labor productivity.

In sum, this study stresses the importance of addressing hazardous work conditions and promoting healthy behaviors to mitigate productivity losses and improve economic outcomes in Russia.

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Whether Economic Recessions Motivate Employees to Underreport Occupational Injuries? The Case of Russia

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Abstract:
Certain studies show a pro-cyclical behavior of occupational injuries in high-income countries. However, there is a gap in studies on this topic in low- and middle-income countries. This study examines the relationship between the unemployment rate and occupational accidents using regional data from 2009 to 2021 in Russia. The findings reveal that during economic slowdowns, employees underreport non-fatal injuries because they are afraid to lose their jobs. At the same time, there is no pro-cyclical behavior in case of fatal accidents.

Keywords: *unemployment, injuries, accidents, occupational safety, regions of Russia.*

Introduction

Employers and governments develop measures and take actions to protect health and safety of workers that allow them to reduce costs associated with disability of employees (Biddle, 2004; Leigh, 2011; Tompa et al., 2021). As a result, there is a decreasing trend in workplace injuries in most countries (World Health Organization, 2021). In Russia, the quantity of fatal and non-fatal occupational accidents decreased from 40.4 thousand people in 2011 to 21.6 thousand people in 2021[1]. In addition, fatal injuries per 1000 employees decreased from 2.1 people in 2011 to 1.1 in 2021. While there is a decreasing trend in workplace accidents, the number of incidents is still high in Russia and worldwide.

A macroeconomic environment could determine the abilities of employers to improve workplace safety. In a period of economic slowdown many firms reduce their costs that could result in worse safety and monitoring of it. Theoretical and empirical studies show that there is a relationship between economic cycles and occupational injuries statistics. For example, Kerndler (2023) has shown that individuals may agree for unsafe working conditions in the period of high unemployment. As a result, this results in an increase of occupational deaths. At the same time, when unemployment is rising, workers can underreport non-fatal occupational accidents to decrease risk to be dismissed (Boone & Van Ours, 2006). Therefore, one could observe a pro-cyclical pattern of occupational injuries. However, there is a gap in knowledge about pro-cyclical behavior of accidents in low- and middle-income countries. This study aims to examine how growth or decline in the rate of unemployment determines occupational injuries in Russia.

Theory review

The pioneering study of (Kossoris, 1938) has shown the relationship between occupational injuries and economic cycles and found pro-cyclical behavior of workplace accidents. Afterwards, (Fairris, 1998) estimated the time series for 1949-1970 and showed if the unemployment increases, the frequency of accidents at work decreases.

One of the first attempts to explain the relationship between economic cycles and occupational injuries was made in (Steele, 1974). The author assumed that in periods of economic growth we observe stronger competition in the labour market. Therefore, firms could lose more if they lose

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[1] Ministry of Labor and Social Protection of the Russian Federation. (2023). Unified All-Russian Reference and Information System for Labor Protection. 2023. (2023). Mode of access: https://eisot.rosmintrud.ru/monitoring-uslovij-i-okhrany-truda

staff and hire new employees. This fact motivates employers to protect their workers from injuries. Thus, if employment increases, occupational injuries decrease. However, empirical findings of (Steele, 1974) were partly consistent with the theory.

The problem with contradictory findings was solved when certain studies tried to understand the economic nature of absenteeism (absence from the workplace). Leigh (1985) showed that if the unemployment increases, employees prefer to reduce their absenteeism. If otherwise, they could lose their jobs. Therefore, as (Johansson & Palme, 1996) stress in the period of economic slowdown, employees would like to hide information about health problems and not to apply for a sick leave. Thus, economic cycles influence employees' decision on whether or not to report health problems to the employer.

At the same time, some empirical findings revealed that the relationship between unemployment and occupational injuries depends on institutional conditions. Studies have found if there are high unemployment benefits or sickness benefits, there is a higher rates of absenteeism among employees (Johansson & Palme, 1996) or occupational injuries (Kniesner & Leeth, 1989; Meyer et al., 1990).

The above-mentioned works and the emergence of the (Mortensen & Pissarides, 1999) labor market search model have created a framework for the theory explaining the relationship between economic cycles and occupational accidents. The authors of this theory, (Boone & Van Ours, 2006) assumed that the statistics of non-fatal occupational accidents reflects the frequency of reports on injuries rather their real quantity. In addition, they assumed if an employee reports that he or she got an occupational injury, the employer has to pay compensation. At the same time, those employees who inform their supervisors about injuries are at higher risk of being laid off in the period of economic recession. This is because they have shown their inability to work in accordance with safety standards. In this context, the rational behavior of employees implies that they would like to hide information about injuries when the unemployment rate is high. In addition, when employment increases, there is a growing number of people without professional experience who find jobs. This results in an increase in volume of fatal and non-fatal injuries (Boone & Van Ours, 2006).

The model of (Boone & Van Ours, 2006) is a base for the further empirical research on this topic. Leombruni et al. (2019) found if persons are employed during recessions they will tend to hide information about work-related injuries to reduce risks of being laid off. Palali & van Ours (2017) revealed that employees who work in accordance with fixed-term labour contracts are more likely to underreport their injuries. If previous studies relied on static econometric models, a recently published work of (Castaldo et al., 2023) by using linear and dynamic panel data models confirms the cyclical nature of occupational injuries – with increasing unemployment, the number of injuries decreases.

At the same time, the existing studies mostly discuss cases of high-income economies. At the same time, there is insufficient information about middle- or low-income countries, where labour protection institutions are less developed and fluctuations in unemployment can be higher.

Method
This study employs a panel data analysis to examine the relationship between occupational injuries and unemployment that covers 2009-2020 years. First, we use Russian regional data to replicate the results of (Boone & Van Ours, 2006). To do this, the following model is estimated.

$$\ln(inj_{it}) = \mu_i + \nu_t + \beta_{1i}t + \beta_2 u_{it} + \varepsilon_{it} \tag{1}$$

where, inj is a quantity of non-fatal or fatal workplace accidents, u is the rate of unemployment, μ are regional fixed-effects, ν are time fixed-effects, t is a vector of region-specific time trends.

In order to take into account, the heteroscedastic nature of data we estimate robust standard errors.

Second, we investigate the effects of cause-specific unemployment rates on occupational injuries. For example, this stage examines the impact of unemployment related to laid off on occupational injuries. Table 1 has a description of variables in this study:

Table 1. Variable description

Variable	Description
$ln(a)$	Log(Quantity of non-fatal injuries per 10000 workforce+0.0001)
$ln(d)$	Log(Quantity of fatal injuries per 10000 workforce+0.0001)
u	Unemployment rate, %
$uexp$	Уровень безработицы для лиц с опытом работы, %
$ufired$	Involuntary unemployment rate (unemployment rate attributed to workers who were laid off), %
$uleft$	Voluntary unemployment rate (unemployment rate attributed to workers who voluntary left their jobs), %
$ugrad$	Unemployment rate among persons with professional experience, %
h	Average number of working hours per week
s	Proportion of employees in agriculture, mining, manufacturing, construction, %

Results

Table 2 shows the results of the estimated models. The first column shows the results of the model where there is a single explanatory variable implying that various fixed effects take into account both observed and unobserved heterogeneity. Estimations revealed that if the rate of unemployment increases, the rate of non-fatal occupational injuries decreases. At the same time, there is no significant effect on fatal accidents.

Notice, when the dependent variable shows fatal accidents, it is assumed that this information reflects the real information about injuries. The quantity of non-fatal cases shows decisions of workers to report about accidents rather than their real number. Therefore, the estimated models show that economic cycles determine motivation of workers to inform supervisors about accidents rather than their real number.

In addition, the estimates show that the reasons for being unemployed impact occupational injuries in different ways. The results showed that the unemployment rate attributable to layoffs has a negative and statistically significant effect in all models where the dependent variable is non-fatal injuries at work. Moreover, the value of the coefficient is significantly higher than in models where the overall unemployment rate is used. In line with prior studies, fatal injuries are not related to this type of unemployment.

Table 2. The estimated relationship between the rate of unemployment and fatal or non-fatal occupational injuries per 10000 workforce

	ln(a)	ln(a)	ln(a)	ln(d)	ln(d)	ln(d)
Unemployment rate						
u	–0,020[**]	–0,020[**]	–0,018[**]	–0,087	–0,087	–0,083
	(0,007)	(0,007)	(0,007)	(0,053)	(0,053)	(0,050)
h		0,004			–0,019	
		(0,013)			(0,072)	
s			0,019[**]			0,029
			(0,006)			(0,055)
R^2	0,870	0,870	0,872	0,255	0,255	0,256
Unemployment rate among persons with professional experience						
uexp	–0,025[**]	–0,025[**]	–0,023[**]	–0,077	–0,078	–0,074
	(0,008)	(0,008)	(0,008)	(0,059)	(0,059)	(0,057)
h		0,004			–0,019	
		(0,013)			(0,073)	
s			0,019[***]			0,030
			(0,006)			(0,056)
R^2	0,870	0,870	0,872	0,254	0,254	0,254
Unemployment rate among persons who were laid off (involuntary unemployment)						
ufired	–0,087[***]	–0,087[***]	–0,084[***]	–0,085	–0,086	–0,080
	(0,019)	(0,019)	(0,018)	(0,118)	(0,116)	(0,118)
h		0,002			–0,017	
		(0,012)			(0,073)	
s			0,019[***]			0,033
			(0,006)			(0,058)
R^2	0,874	0,874	0,876	0,252	0,252	0,253
Unemployment rate among persons who voluntary left their jobs						
uleft	–0,006	–0,006	–0,004	–0,265	–0,267	–0,261
	(0,016)	(0,016)	(0,015)	(0,184)	(0,187)	(0,181)
h		0,005			–0,026	
		(0,013)			(0,074)	
s			0,021[***]			0,030
			(0,006)			(0,055)
R^2	0,868	0,868	0,871	0,259	0,260	0,260
Unemployment rate among persons without professional experience						
ugrad	0,001	0,001	0,003	–0,103	–0,102	–0,099
	(0,021)	(0,021)	(0,020)	(0,098)	(0,098)	(0,095)
h		0,005			–0,014	
		(0,013)			(0,074)	
s			0,021[***]			0,033
			(0,006)			(0,056)
R^2	0,868	0,868	0,871	0,252	0,253	0,253
N	1001	1001	1001	1001	1001	1001

Notes. 1. Robust standard errors are in parentheses. 2. Significance levels: [*] $p < 0,1$, [**] $p < 0,05$, [***] $p < 0,001$. 3. The models have fixed-effects, time fixed-effects, region-specific time trends. 4. Data is from 2009 to 2021. 5. The models do not take into account Crimea, Sevastopol, Chechen, Ingushetia and Dagestan Republics.

Conclusions

The econometric results could serve as a framework for the policy implications. First, in regions where the unemployment rate is associated with layoffs, one expects the underreporting of workplace accidents. In this regard, it is important to take measures to protect the interests of employees through increased unemployment benefits or compensation for damage to health, as follows from theoretical models (Boone et al., 2011; Boone & Van Ours, 2006). Secondly, once

we observe a pro-cyclical behavior of occupational injuries, it is important to motivate employees not to underreport the injuries.

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The Latest Trends in Public Procurement and Public-Private Partnership

The Role of Reputation in Interregional Buyer-supplier Cooperation in Public Procurement

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Abstract:
Reputation is an important factor in solving the principal-agent problem, which is typical for contractual relations. As part of public procurement management in many countries, the emphasis is shifting from the price indicator to ensuring procurement quality, more attention is paid to the supplier reputation factor. Although the suppliers' reputation factor is a topic of current interest, both in research and in public procurement practice, the specifics of public procurement impose restrictions on the suppliers' reputation assessment. Literature reviews show various positive effects of considering suppliers' reputations in public procurement. Reputation accounting helps to ensure procurement efficiency in terms of timing and quality of contract execution, reduces the risks of uncertainty and opportunistic behaviour, and increases the level of trust between market players. This study, based on the example of public procurement in Russia, shows that reputation is especially important in the interregional context - when public buyers contract with suppliers from other regions. Based on a survey of public buyers in Russia, we can see that a suppliers' reputation is of particular importance when more than half of the buyers' purchases are delivered by suppliers from other regions. With the help of open data from the official procurement website, a grouping of Russian regions by the share of suppliers from other regions is proposed. The combination of open data analysis and survey results confirms that suppliers' reputations are of major significance for public buyers in regions that are more involved in contracting with suppliers from other regions. Thus, the importance of the supplier reputation factor, in terms of interregional cooperation, is confirmed both at the micro level of procurers' purchases and at the regional level.

Introduction

The principal-agent problem, characteristic to contractual relationships both in private and public procurement, can be managed with help of reputation considerations. Reputation as a signal of counterparty's reliability allows procurers to form expectations of supplier's future behavior (Khalfan et al., 2007).

The ability of public buyer to consider supplier's reputation stands within procurement regulations and is quite limited in many countries (Spagnolo, 2012). In the literature there is no clear assessment, whether reputation considerations should be expanded or limited. On the one hand, there is evidence of the positive effects of reputation-based supplier selection (Decarolis et al., 2016; Spagnolo, 2012). On the other hand, there is a concern whether reputation criteria can form entry barriers (Kachour et al., 2016).

The areas of procurement differ, and reputation is important to varying degrees depending on the specifics of procurement. Public procurement literature identifies certain conditions in which reputation considerations are more significant (Beausoleil, 2010; Board, 2011; Calzolari & Spagnolo, 2009; Mamavi et al., 2015). These are, for instance, long-term projects, procurements with strict specifications and deadlines. Still, some specific aspects of supplier's reputation considerations in public procurement are little studied. This study focuses on one of them – the role of reputation in cross-regional, buyer-supplier cooperation in public procurement.

Relevance

The interregional aspect of consideration for reputation in public procurement is still not supported by empirical evidence in the literature. Spagnolo (2014) refers to EU regulators, claiming that reputation considerations will affect cross-border procurement negatively. It is argued that reputation can be used as an instrument of favoritism to local suppliers, so the usage of the reputation criterion should be limited.

However, reputation is an important tool to overcame uncertainty in contractual relations. Chiou and Pate (2018) highlight the role of reputation in procurements characterized with higher uncertainty. Geographic range between procurers and suppliers is a factor rising the level of uncertainty (Blum & Goldfarb 2006). From this point of view, the ability to consider suppliers' reputation, on the contrary, should help in the cooperation of public buyers and suppliers from different regions. This assumption is supported by private sector studies in Chinese (Chintagunta & Chu, 2021) and United States markets (Elfenbein et al., 2019), but not public procurement literature.

Studying the role of reputation in cross-regional cooperation in public procurement is of particular importance for countries with high regional differentiation. The case of public procurement in Russia is, therefore, representative.

Research question and methods

The study focuses on the following research question: What is the role of reputation in cross-regional, buyer-supplier cooperation in public procurement? The empirical basis of the study is an online survey of Russian public buyers conducted in 2020. Overall, 611 answers of public buyers from 74 Russian regions are obtained.

The orientation of procurers on the supplier reputation factor was measured with help of the following question: "Please rate the role of the good business reputation factor in the public procurement market for suppliers (in their relations with procurers)." A 7-point Likert scale was proposed, where 1 is very insignificant and 7 is very significant.

Procurers were also asked to identify the level of interregional cooperation in their purchases: "Please indicate the approximate share of suppliers from outside your region of the total number of suppliers of your organization between 2018-2019".

The analysis of these two questions with help of descriptive statistics and a regression model is aimed at identifying the role of reputation in cross-regional, buyer-supplier cooperation on the micro level. The micro level in the study refers to the purchases of a particular customer.

The second part of the study is devoted to the analysis of the same research question at the regional level. Thus, it is studied whether the customer's focus on the supplier reputation factor is related to the extent to which public procurement in the customer's region includes suppliers from other regions. To reach this aim, the open data on public procurement in Russia between 2018-2019 (zakupki.gov.ru) was aggregated to supplement the survey data.

Two regional indexes were calculated - share of contracts with suppliers from another region in quantitative and in value terms. The index, in quantitative terms, is calculated as the share of contracts concluded with suppliers from another region out of the total number of contracts in the region. The index, in value terms, is calculated as the ratio of the monetary volume of contracts concluded with suppliers from another region and the total monetary volume of all contracts in the region. The assessments of the importance of reputation given by customers in the survey are compared with the level of interregional interaction in the regions. The statistical significance of the results of descriptive statistics is tested using a regression model.

The results to be reported

Survey results confirm that a large share of public buyers takes into account suppliers' reputation. The average assessment of suppliers' good business reputation significance is 5.1.

Almost a third of procurers gave the highest rating to the importance of supplier reputation - 7 points.

Only 6.5% of the respondents did not contract with suppliers from other regions. The biggest share of procurers (38.9%) interacts with a small number of suppliers from other regions - up to 10% of the total number of suppliers of the organization. 12.7% of respondents have the majority (more than a half) of suppliers from other regions. It is this category that gives noticeably higher marks for the importance of suppliers' reputation - an average of 5.6 points.

The statistical significance of these differences is confirmed using a regression model. This allows us to draw a conclusion at the micro level - at the level of procurement of a particular organization: a state customer with the majority of suppliers from other regions is more focused on the supplier reputation factor.

Research question is further investigated at the regional level with help of the regional indexes. Although the share of contracts with suppliers from another region in quantitative and in value terms are correlated, these two indices are not interchangeable. Thus, there are regions in which a large number of contracts are concluded with suppliers from other regions, but they occupy a relatively small share in the total value of contracts in the region. An example is the Republic of Tyva. In other cases, the region may not have many contracts with suppliers from other regions in quantitative terms, but these contracts are very large in value terms and their share is significant (ex.: Magadan region). Further analysis therefore includes both quantitative and value index.

The regions were divided into 4 groups according to the average values for the indices (for quantitative index – 36%, for value index – 43%). Then average reputation assessment in each group of regions was calculated. Based on the descriptive statistics, it is shown that only the index in quantitative terms affects reputation importance. Statistical significance of this conclusion is tested and confirmed with help of the regression model. It is concluded that suppliers' reputation importance from procurers' point of view increases in the regions, where many public contracts are concluded with suppliers from other regions.

The research question was investigated both on the micro and regional level. At both levels, the growing role of reputation in interregional interaction between customers and suppliers is confirmed. Since the role of reputation was measured through the responses of specific customers, it can be concluded that their assessments are influenced not only by their own experience, but also by regional specificity. The practical importance of the results is determined by the specifics of the country. For Russia, with its heterogeneous regional economic structure, interregional public procurements occupy a significant share. Understanding the role of reputation in this interaction is important for both market participants and regulators.

It is worth noting that the conducted study gave primary results on the role of reputation in interregional interaction, since this issue for public procurement has not been empirically studied before. However, there remains a large number of areas for further research. It is of interest to study other factors that determine the role of reputation in interregional interaction. In addition, the study was not focused on specific areas of procurement, although this factor makes the reputation factor more or less important. Conducting separate studies for areas of procurement, in which the reputation criterion is most popular, will be a good development of this line of research.

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The Practice of a Totalitarian Corruption: out-patient Hospitals' Case

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Abstract

Among the models which form a typology of agency models of corruption, based on the conformity of principal and agent's preferences to the "ideal" preferences of Society, there is a model of a totalitarian corruption. The model assumes that the agents have to act in accordance with the inefficient regulation, being deprived of the possibility to violate it. The paper deals with the solution of the problem of choosing between organizing the cleaning of public outpatient hospitals in one of the of St. Petersburg districts on their own or through outsourcing and proves that this case can be classified as the case of totalitarian corruption since all assumptions of the model are true.

1. Introduction

St. Petersburg is divided into 18 districts, and each of them has authority to manage outpatient hospitals located on its territory that are subordinated to the City Health Committee too. However, it is the district head who is an employer for the hospital chief medical officer (hereafter – CMO).

In the September of 2022 law enforcement authorities arrested the depute-head of district N and the head of district's healthcare department in the framework of an investigation into the legality of determining the winners of auctions for cleaning of district outpatient hospitals #3 and #4. According to media reports[1], district authorities decided to outsource the cleaning of the hospitals and made great efforts to ensure that a preselected bidder (hereafter – Favorite) won the relevant auctions at the inflated price that was just equal or slightly different from the Initial Contract Price (hereafter – ICP). There were three such tenders in 2021 according to the results of each of which the Favorite won (Table 1).

Table 1. The Analysis of cleaning services procurement in out-patient hospitals of District N in 2021 (before the criminal investigation started)

#	Hospital	Award minute date	ICP	The number of Suppliers that			ICP decrease (%)
				submitted bids	approved bids	decreased price in the auction	
1.	3	09.12.2021	7 318 642.56	5	2	0	0
2.	3	26.07.2021	1 347 269.40	2	1	-	0
3.	4	01.04.2021	26 294 437.79	3	2	1	0.5

Source: Russian unified information procurement system (tender code numbers: 0172200002321000165, 0372200140121000058, 0172200002321000026)

Due to the tenders' results:

the cleaning expenses became higher: according to one of CMOs, they became about four times more than before;

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[1] Here and below: https://www.fontanka.ru/2022/09/06/71633330/

the cleaning quality became lower: subcontractors that actually cleaned the hospitals received from the Favorite less than fifth part of the contracting price.

According to the Russian public procurement legislation, the contracting authority in the case of healthcare institutions' procurement is not the public authorities that they are subordinated to, but they are itself. Respectively, the CMOs had to signed cleaning contracts with the preselected bidder significantly increasing hospitals' cleaning costs and decreasing the quality of cleaning.

In the paper, the analysis of the above case is carried out by classifying the behavior of its participants within the framework of one of the agency models of corrupt behavior.

2. Methodology

It is the principal-agent (or agency) model that is most often used as a methodological framework for modelling corrupt behavior. In the case we'll consider the district administration as a principal whilst the outpatient hospital as an agent.

We will assume that the principal and the agent have the preference relations, defined on the set of potential contracts $\Omega = \{w \mid w=(q, p)\}$, where q is a parameter reflecting cleaning quality (the more q the more quality) and p is a contract price, and denote them, respectively, as $\succeq_P$ and $\succeq_A$.

Since a principal is, in some sense, hired by the Society to obtain the social significant goals, we have definite reasons to consider Society as a third *dramatis personae* of principal-agent model and call it a Basic Principal. We will assume that there is an "ideal" Basic Principal's preference relation $\succeq_{BP}$ defined on the same set Ω.

Definition 1. We call that the principal (agent) is *mala fide* if its preference relation is different from basic principal's one: $\succeq_P \neq \succeq_{BP}$ ($\succeq_A \neq \succeq_{BP}$), and *bona fide* if otherwise.

If we construct the different models on the base of *Def.* 1, we will find that theoretically, five models can be created, depending on the combination of the *bona/mala fides* of the principal and the agent (Berezinets, Ivanov, 2021).

Table 2. The Typology of Agency Models of Corruption

Models Actors	Corruption-free	Bureaucratic corruption	Efficient Corruption	Totalitarian Corruption	Quasi-Corruption
Principal	Bona Fide $\succeq_P = \succeq_{BP}$	Bona Fide $\succeq_P = \succeq_{BP}$	Mala Fide $\succeq_P \neq \succeq_{BP}$	Mala Fide $\succeq_P \neq \succeq_{BP}$	Mala Fide $\succeq_P \neq \succeq_{BP}$
Agent	Bona Fide $\succeq_A = \succeq_{BP}$	Mala Fide $\succeq_A \neq \succeq_{BP}$	Mala Fide $\succeq_A \neq \succeq_{BP}$ ($\succeq_A \neq \succeq_P$)	Mala Fide $\succeq_A \neq \succeq_{BP}$ ($\succeq_A = \succeq_P$)	Bona Fide $\succeq_A = \succeq_{BP}$

Further, we'll examine which assumptions are true in the case and what type of corruption takes place.

3. The model type identification

According to media reports, the district administration directly pointed the hospitals to the supplier that must be future winner of the auctions. Thus, for the Principal the Favorite's bid (q_F, p_F) is preferable than any other bid (q_B, p_B):

$$(q_F, p_F) \succeq_P (q_B, p_B),$$

where q_F is a parameter reflecting Favorite's cleaning quality and p_F is its contract price.

Definition 2. We call that bid $x^1=(q_1, p_1)$ dominates bid $x^2=(q_2, p_2)$ $(x^1 \neq x^2)$ if $q_1 \geq q_2$ and $p_1 \leq p_2$.

Since for the Society bids of more quality and less price are clear preferrable, for Basic Principal the Favorite's bid (q_F, p_F) is strictly less preferable than any other bid (q_B, p_B) that dominates it:

$$(q_B, p_B) \succ_{BP} (q_F, p_F).$$

Thus, the Principal is *mala fide* since its preferences are different from the Basic Principal's one, and the considered case can be formalized in the framework one of three possible models of six, presented in Table 2: Quasi-Corruption, Efficient or Totalitarian Corruption.

During tender specification development healthcare institutions were coordinating it with Favorite's representatives, established inflated ICP, i.e., were acting against social interests. That is not coincides with the assumptions of Quasi-corruption model under which the Agent acts in the public interests.

On the other hand, a year after the first news about the case no investigative actions have been taken against hospitals' CMOs. Thus, we cannot identify the case in the framework of Efficient Corruption model since the latter assumes agent's involvement into corruption interactions.

Respectively, we conclude that the CMOs had been had to signed cleaning contracts with the preselected bidder significantly increasing hospitals' cleaning costs and decreasing the quality of cleaning since when comparing alternatives, the CMOs (Agent) determine their preference in the same way as the district administration (Principal): $\succeq_A = \succeq_P$. Thus, the behavior of the parties in the case can be considered within the framework of the totalitarian corruption model since both assumptions underlying it are true.

4. Policy implications

In order to assess the amount of loss from the *mala fide* behavior of the principal in considered case, we'll compare the *mala fide* purchases of cleaning services (Table 1) and similar purchases made during the course of investigative actions (Table 3).

Table 3. The Analysis of cleaning services procurement in out-patient hospitals of District N in 2022 (after the criminal investigation started)

#	Hospital	Award minute date	ICP	The number of Suppliers that			ICP decrease (%)
				submitted bids	approved bids	decreased price in the auction	
4.	3	12.01.2023	7 422 134.76	6	6	6	22.5
5.	4	22.12.2022	9 045 378.36	10	10	6	26

Source: Russian unified information procurement system (tender code numbers: 0172200002322000239, 0172200002322000217)

Comparison of tables 1 and 3 shows that in *bona fide* tenders more bids are submitted, fewer suppliers are not allowed to bid, more bidders lower the price during the auction, resulting in a significant decrease in ICP in contrast to its practical absence in *mala fide* tenders[2].

Since, in the case of totalitarian corruption, the actions of the agent are completely controlled by the principal, let us consider what measures to combat totalitarian corruption could be taken by the regulatory and healthcare authorities.

1. In St. Petersburg, for many years there has been a discussion about the reassignment of outpatient hospitals, first of all, to the Health Committee. The case under consideration gives additional arguments in favor of such a decision.

2. In some cases, *mala fide* behavior of procurement sides can be discovered by analyzing the behavior of bidders in the course of the auction.

Table 3 shows that Saint-Petersburg cleaning market is highly competitive. Thus, on the one hand, the public procurement monitor has to carefully control tenders with a small number of submitted or selected bids (case 2 in the Table 1), and, on the one hand, *mala fide* principal and/or favorite should create a visibility of competition at the auction. They can do it involving a dummy supplier (or suppliers) to the tender.

In general, it is quite challenging to prove suppliers' collusion based on the information on their auction bidding behavior. However, when at the auction the price decrease is small, it can be easily done.

Let's consider the case 1 from the Table 1. Even though five bids were submitted, only two participants were admitted to the auction. It was easy to do, because, according to media reports, the representatives of the favorite took an active part in the development of the tender documentation.

During the auction, nobody of bidders decreased the ICP. According to the current legislation, this case is possible – if there were not bidding in the auction, the contract is signed with the supplier whose application was the first to be submitted and then approved. Since the approvement minute published *before* the bidding contains information about the anonymous bidders submitting time this implies that at the auction there was one bidder who: (1) spent resources (money/time) to prepare for participation in the auction; (2) had information that it was impossible to win the contract without an ICP decrease; (3) actually, didn't bid. Such irrational behavior cannot be explained anyhow else but by presence of suppliers' collusion.

Therefore, auctions that did not have price cuts should automatically be considered by the monitor as collusive ones. In international practice, unlike Russian legislation, the right to cancel such procedures is granted directly to the contracting authority (Guide, 2014).

Next, consider the case 3 from the Table 1. Like case 1, only two participants (of three) were admitted to the auction, and the single bid in the auction was submitted by the favorite three minutes after the auction beginning. In Russian auctions, the price consecutively falls by the step that is legislatively allowed to vary from 0.5% to 5% of the ICP, and the auction's winner, favorite, decreased the price by 0.5% of ICP – the minimum level allowed by legislation.

Assume that second auction participant, we'll call he/she the Looser, is *bona fide*. Since Looser didn't decrease price by 1% of ICP, it means that their reserve price is more than 99% of ICP, so, Looser knows that it is impossible to win a contract if the other supplier submit a bid first.

It means that Looser: (1) spent resources to participate in the auction; (2) knew that he/she must be the first to submit a bid; (3) didn't submit a bid for three minutes. Such irrational Looser's behavior cannot be explained anyhow else but by presence of suppliers' collusion.

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[2] It should be noted that the in the case #5 (Table 3) auction's winner refused to sign the contract and it was awarded to the supplier that offered the next largest ICP reduction: 25.5%.

The considered two cases illustrate the practice of applying of sufficient collusion conditions that were formulated in (Ivanov et al., 2021).

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Set-Asides: The Not-So-Clear Side of Public Procurement

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Abstract

This paper reveals the factors influencing the decisions of contracting authorities to conduct purchases with small and medium enterprises (set-asides). Mechanisms for small and medium enterprises (SMEs) support are heavily regulated by the Russian procurement legislation, and all contracting authorities need to comply with them equally. However, analytical reports and open data indicate that some procuring entities make purchases from SMEs in the volumes, exceeding the given quota, while other contracting authorities do not reach the established threshold. What are the reasons for these differences when conducting set-aside procedures? What motivates contracting authorities to make purchases from SMEs in the volumes, exceeding the quota? Based on the results of a large-scale survey of contracting authorities, the authors show that the expected sanctions for violating the norms and standards to a greater extent than other factors, affect the decision to procure from SMEs. More than a half of the respondents believe that an increase in the quota for set-asides will contribute to more frequent use of them. The results of research show that excessive regulation of public procurement can both motivate organizations to conduct set-aside purchases on a wide scale and also may demotivate some contracting authorities due to rigidity of legal requirements.

Keywords: *small and medium enterprises, priorities of the state policy, support of SMEs, procurement and SMEs, decision-making process.*

Introduction

State, municipal and state-corporate procurement is a significant part of budget expenditures in many countries, estimated on average at 30% of gross domestic product [Kashin, 2021]. The state, being the largest customer in many sectors, can create demand for certain types of products, support subsidized industries, regulate employment, and stimulate innovative development. One of the peculiarities of public procurement system in Russia is its detailed regulation by various rules and norms, and sometimes the requirements for certain types of procurement procedures can be redundant [Yakovlev et al., 2020]. On the one hand, excessive regulation is necessary to reduce the risks of opportunistic behavior of market participants [Yakovlev et al., 2018]. On the other hand, it may be perceived by contracting authorities and suppliers as a barrier to certain types of procurement, imposing additional requirements and restrictions on them. What if the state establishes priority for the certain types of procurement and obliges some contracting authorities to conduct such purchases according to the specified quantitative standards (for example, the quota on the volume of such purchases)? Will contracting authorities comply with such standards in the minimum established volumes or will they fulfill these standards above the given threshold? Based on the example of set-aside procurement in Russia, for which there are quantitative quotas in the laws, the authors analyze the factors that determine decisions of contracting authorities to conduct such purchases in excess of the established standards.

In Russia, there are several mechanisms to support SMEs in public procurement: set-aside procurement, the participants can only be the SMEs (mandatory for all contracting authorities), the subcontracting of a part of large contracts to SMEs (not mandatory), as well as

limiting the maximum size of the contract [Kashin, Shadrina, 2019]. The paper analyses mandatory preferences for SMEs, namely the implementation of procurement, the participants of which can only be the SMEs (set-asides, special procurement procedures). The quota on these procedures in the laws implies that all contracting authorities will equally fulfill these requirements. However, according to the Report of the Ministry of Finance, contracting authorities in previous years exceeded the quota for such purchases by two times on average. In turn, open data from the Unified Information System of the Russian Federation indicate that some contracting authorities do not fulfill the quota at all. And the legislation provides administrative liability for such behavior. The purpose of this research is to explain the reasons for such heterogeneity in the behavior of Russian procuring organizations when conducting set-aside procedures.

Nowadays not too much attention in the literature is paid to the assessment of certain aspects of the functioning of the public procurement system – many papers are based on the analysis of open data, for example, by machine search for procurement documentation obtained from the Unified Information System [Balsevich, Podkolzina, 2014, Mironov, Zhuravskaya, 2016, Kashin, Shadrina, 2019, Kashin, 2021]. Several papers are devoted to the analysis of the opinions of the direct market participants through surveys of contracting authorities and suppliers [Yakovlev et al. 2018, Yakovlev et al., 2020, Shadrina et al. 2021]. These papers analyze the problems of the functioning of the public procurement system, the effectiveness and efficiency of procurement, the practices of giving contracts to predetermined suppliers, but the authors do not analyze the specifics of certain types of procurement (mainly the state priorities), for example, purchases of innovative products, support for local producers or small and medium enterprises. All in one, this study is quite new for the Russian practice and the authors for the first time analyze the incentives and barriers that drive Russian contracting authorities to procure from SMEs, analyzing the opinions of the direct market participants in these issues.

Data & Methodology

The survey of contracting authorities included 16 questions and consisted of two parts – the general part (for example, questions about the form of ownership of the organization, the presence of a procurement department, etc.) and a cluster of questions about SME support (frequency of procurement from SMEs, incentives and barriers to such procurement). Mass mailings were used to invite respondents to participate in the survey. Mailings were made using the Unisender service. Since the population is all organizations in Russia that conduct procurement under 44-FL and 223-FL (and under two laws together), a suitable and representative sample was required for the analysis. To obtain such sample, more than 1 million procurement notices were downloaded from the Kontur.Zakupki system. The data was uploaded for the period from the beginning of 2020 to autumn 2021 and contained the characteristics of procurement procedures, information about the customers, including contact details of employees placing purchases. After processing the uploaded data, removing duplicates, and missing values, 78,846 email addresses were received (one email belonged to one respondent from one organization, organizations were not repeated in the sample). In the first wave of the survey, the mailing was made to 41,961 emails. The second wave was a re-mailing to all respondents who did not complete the survey in the first wave. To increase the number of responses to the questionnaire and to increase the validity of the data, as well as to check the potential self-selection bias, in the third wave e-mail addresses for new respondents (representatives of 36,885 organizations) were additionally collected and mailing was made to them. In the fourth wave, a reminder was sent to all respondents from the first and third waves who did not complete the survey. A total of 78,846 organizations were reached, most of them received two emails each. Since the answers to the questionnaire were collected through Google forms (a more familiar service for collecting responses, compared to SurveyMonkey,

Qualtrics and others), a fairly large number of respondents was expected. Moreover, in the second and fourth waves, all questions were created as optional, which potentially contributed to an increase in the total number of answers. A total of 1,395 responses were received, and 1,130 were fully completed and in 265 were partially missing one or more answers to the questions (also 153 respondents completed the survey for less than 90% of the total number of questions). The conversion rate during all series of mailings (from sending to filling the survey form) was 1.7%, which is quite good indicator compared to other surveys, where direct participants in the public procurement market also act as respondents [Yakovlev et al., 2018, Yakovlev et al. 2020].

The design of the survey made it possible to obtain a sample of respondents who are representatives of organizations of different forms of ownership, of different sizes, subject to the regulation of 44-FL and 223-FL (and also to the regulation of the two laws at the same time). Most of the responses were received from employees of procurement departments directly involved in procurement process (41%), as well as from the heads of procurement departments (23%) or persons responsible for conducting procurement (28%), which indicates the respondents' awareness of the procurement process of their organization. A fifth of the sample (22%) is made up of federal, regional, and municipal authorities regulated exclusively by 44-FL, while every fourth respondent was from the budgetary institution. State and municipal institutions, as well as autonomous organizations, accounted for a quarter of the sample (24%). More than half of all organizations (56%) are registered in three federal districts: CFO, PFO, SZFO. The DFO, SFO and UFO are represented in the sample in equal proportions, while the SKFO is represented to a lesser extent (3%). Many respondents said that they believe the organization is well versed in procurement and employees are experts from whom others may learn. However, 12% of respondents answered that there are sometimes situations in which they do not know how to act, and there is no one to ask. Three-quarters of all respondents in the sample estimate the annual volume of purchases at less than 100 million rubles, while 8% of organizations indicated the volume of purchases over 0.5 billion rubles.

To answer the question – what motivates contracting authorities to exceed the quota for SMEs purchases, in the study we evaluated several regression models. Three variables were selected as dependent variables in the models, which show how the priority of SME support is implemented in the procurement of the studied organizations: "SME" – procurement from SMEs in volumes exceeding 15% of the quota for such purchases, "SME_mean" – procurement from SMEs in volumes exceeding 30% of the quota for such purchases, "SME_order" – the share of purchases from SMEs in the annual volume of the customer. The explanatory variables derived from the survey are divided into three groups. The first is institutional factors. This group includes the law according to which the customer places purchases, the level of subordination of the customer (only for organizations placing orders under 44-FL), the form of ownership of the customer (only for organizations placing purchases under 223-FL). The second group of factors simulates behavioral effects, to be precise, the caution effect – the effect of fears to violate the law when conducting purchases from SMEs and the effect of internal incentives for contracting authorities to conduct such purchases. The caution effect is constructed based on three questions: the first is a direct question to respondents about the presence of fears of violating the law when purchasing from SMEs, the second is a question about increasing the quota for purchases from SMEs, and the third is a question about additional control by the Federal Antimonopoly Service. The effect of internal incentives is constructed mainly from the questions about the desire to support SMEs, about the benefits of procurement from SMEs and about the information about such purchases and about how to conduct them. The third group of variables is other control characteristics included in regression models to demonstrate the robustness of the results (among them – the location of the customer, the role of the respondent in the organization, etc.). Probit models were evaluated (binary and ordinal) to estimate the aforementioned effects. In the next section we show only aggregated results of the study and the main findings.

Results and conclusions

The results of the survey showed that more than 25% of organizations make purchases from SMEs in the amount of 16% to 30%, with a procurement quota of 15% for SMEs in 2021. Approximately 1/5 of all contracting authorities make almost all their purchases from small and medium enterprises. Almost 80% of all surveyed organizations exceed the quota of 15% purchasing from SMEs, while 5% of contracting authorities do not make such purchases at all. In terms of incentives to procure more than the given quota, in the first place, according to the views of contracting authorities, there is a factor associated with fears of possible penalties in case of non-fulfillment of this quota. The second most important factor for Russian contracting authorities is awareness of the benefits of procurement from SMEs (2/3 of all contracting authorities indicated this factor as dominant in the issue of the number of procedures from SMEs while preparing the procurement schedules). More than a half of contracting authorities also note that an increase in the quota for purchases from SMEs will contribute to their more frequent implementation. This question was used in the survey as a control question to the factor, that implies the impact of sanctions and fines, and further confirms the impact of legislative regulation on the frequency of purchases from SMEs. The desire to support SMEs by placing orders is in fourth place, however, almost 60% of all organizations note that this is a significant factor in choosing the number of procedures for SMEs.

In terms of barriers to procurement from SMEs, more than a half of the contracting authorities note the quality of products supplied by SMEs, considering it worse in comparison with the products from the large companies. However, only 61% of all surveyed organizations answered this question (851 contracting authorities from 1,395 in the sample), and this factor requires additional verification by product groups. Approximately a third of all respondents believe that additional control by the FAS, as well as non-execution of contracts by SMEs (in comparison with large suppliers), are significant barriers to set-aside procurement. A fifth of all contracting authorities believe that excessive regulation of procurement significantly affects the motivation of contracting authorities to support SMEs.

Based on the results obtained, the authors conclude that the main incentives for frequent procurement from SMEs are the expectations of an increase in the quota for these purchases in subsequent years and the fear of violating these standards in the future, as well as the information factor that contributes to increasing the organization's awareness of the benefits of SME procurement. Increasing the awareness of organizations, in turn, can reduce potential caution of contracting authorities and further encourage set-aside procurement. The next studies can be devoted to assessing the synergistic effect of these two factors (caution and information).

The results are consistent with studies demonstrating how mandatory legislative regulations affect the activities of organizations. For example, Raza (2020), Sparrevik et al. (2018), and Yuen et al. (2017) also show how rules and regulations exert coercive institutional pressure on companies. These papers describe the impact of explicit incentives that are created by the norms and rules governing the activities of organizations (in these papers authors analyze environmental procurement in European countries, where this priority is enshrined in the legislation). The mentioned authors show that excessive legislative norms forces organizations to adhere to them. In turn, in this paper, we show that special attention should be paid not only to explicit incentives, but also to implicit (internal) incentives of direct market participants.

The systematic set-aside purchasing from SMEs by Russian contracting authorities may be a signal to maintain the current policy governing public procurement in these issues. Future policies may be aimed at developing the guidelines on the benefits of procurement from SMEs, as well as on additional explanations on the methodology of such procurement for contracting authorities, which will increase confidence and reduce the perception of risk among buyers.

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Public Private Partnership as the tool for the Transition to a Circular Economy and Sustainable Development (on the example of St. Petersburg)[1]

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Abstract:
The transition to a circular economy is one of the key tasks of public administration. It is interconnected with ensuring sustainable production and consumption, the development of industrial sectors, construction, waste management, as well as environmental protection. Addressing these challenges faces many barriers, including budget and innovation gaps. Public-private partnership allows to use private investments to finance the creation of waste management infrastructure even in conditions of limited budgetary resources, to improve its quality, to use advanced competencies and innovative technologies for handling secondary material resources, which lays the foundation for a faster and more effective transition to a circular economy. Using the example of St. Petersburg, a number of areas of public administration are proposed for scaling up PPP projects that contribute to the transition to the circular economy and SDGs.

Keywords: *Public Private Partnerships; Sustainable Development Goals; waste management; circular economy; waste-to-energy*

1. Introduction

Achievement of the national development goal "Creating a comfortable and safe living environment" affects various spheres of public administration. With regard to waste management, the following is required: creation of a sustainable waste management system that ensures 100% waste sorting and halves the amount of waste sent to landfills. This requires a high-tech infrastructure for waste treatment and utilization, an infrastructure for handling secondary material resources, as well as a step-by-step increase in the share of waste sent for treatment and utilization and the share of secondary material resources used in raw materials.

According to the Russian Environmental Operator, it is possible to attract up to RUR 350 billion out of the RUR 500 billion required for the construction of waste management infrastructure through PPP mechanisms. PPP is considered not only as an investment mechanism, but also as a means to ensure the achievement of environmental and social indicators of the SDGs and the transition to a circular economy (hereinafter – CE).

2. Basic theoretical concepts and relationships

The circular economy is presented as a transition from a linear model of economy ("take – make – use – discard") to a cyclical model ("reduce – reuse – recycle – recover"). In the scientific literature there is a predominance of two main approaches to the definition of CE. The first one emphasizes the regenerative nature of the system (Alexandrova, 2017) and the second one emphasizes the effective management of waste (Blomsma F., Brennan G., 2017).

The essence of circular economy in both cases is inextricably linked to the achievement of the SDGs: directly with SDG-12 "Ensure sustainable consumption and production patterns", and

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indirectly with SDG-3 "Ensure healthy lives and promote well-being for all at", SDG-8 "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all", SDG-9 "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation", SDG-11 "Make cities and human settlements inclusive, safe, resilient and sustainable", SDG-13 "Take urgent action to combat climate change and its impacts".

3. Practical directions of transition to the circular economy

National projects as well as federal and regional programs are aimed at achieving practical results of the transition to CE:

1.1. National project "Ecology":

    1.1.1. Creation of a sustainable waste management system that ensures 100% sorting of waste and a two-fold reduction in the volume of waste sent to landfills,

    1.1.2. Increase in the share of processed waste in the total volume of generated waste,

    1.1.3. Growth of the index of the use of secondary material resources from waste;

1.2. Federal project "Circular Economy":

    1.2.1. Creation of infrastructure for the circulation of secondary material resources,

    1.2.2. Creation of ecotechnoparks;

    1.3. Federal program "Integrated Waste Management System":

    1.3.1. Formation of a waste management system,

    1.3.2. Creation of conditions for the processing of waste prohibited for disposal.

4. PPPs in the context of the circular economy transition and the achievement of the SDGs

A new approach to PPPs as a means of achieving the SDGs was initiated by the United Nations Economic Commission for Europe (hereinafter referred to as the UNECE). The UNECE documents note that in order to realize their environmental and social value in addition to the economic one, PPPs must to fit the SDGs. "PPPs for the SDGs" is important as a mechanism to ensure the resilience of infrastructure, mitigate risks and adapt to climate change, reduce CO_2 emissions and develop more sustainable production and consumption patterns, as well as human well-being by expanding access to basic services. For the practical implementation of the new approach to PPP as a means of achieving the SDGs, the UNECE has developed the "Guiding Principles on PPPs in support of the SDGs" (Guiding Principles, 2022) and "PPPs and Infrastructure Evaluation and Rating System (PIERS): An Evaluation Methodology for the SDGs" (PIERS, 2023); and for PPPs in the context of the transition to CE – "Guidelines on promoting Circular Economy in PPPs for the SDGs" (Guidelines, 2023).

Examples of PPP projects contributing to the promotion of CE are no longer isolated; they are being implemented in various industries. PPP projects in the field of waste management seem to be the most promising for the promotion of CE. Especially in PPP projects involving the conversion of non–recyclable waste into energy (Table 1).

Table 1

PPP projects in the field of waste management and waste-to-energy

PPP Projects	Effect of transition to CE			Achieving SDGs
	Share of waste sent to landfills	Use of energy produced from waste	Environmental and Social Effects	
Waste-to-Energy PPP project in Dharan, Nepal	Decrease by 75%	Public transport	Zero CO2 emissions Ensuring the country's energy security by replacing fossil fuel imports	SDGs 7, 9, 10, 12, 13, 17
Waste-to-Energy PPP project in Glasgow, United Kingdom	Recycling 90 %	Electricity supply for 26,500 households and heat supply for 8000 residential buildings	Reduction of 90,000 tons of CO_2 equivalent per year Restoration of 20,000 m2 of land used for landfills Improving Glasgow's energy Security	SDGs 7, 10, 12, 13, 17
Waste-to-Energy PPP project in Maardu, Estonia	Decrease by 82 %	Heat supply of 20% of residential buildings	Reduction of the cost of thermal energy for the population of Tallinn and Maardu by 25%	SDGs 3, 7, 10, 11, 12, 13, 17

Source: compiled by the author

5. Formation of an integrated system of solid municipal waste management in St. Petersburg

The regional project "Formation of an integrated system of solid waste management" ensures the achievement of goals, indicators and results of the corresponding federal project, which is part of the national project "Ecology". Since May 2021, the Committee for Natural Resources Management, Environmental Protection and Environmental Safety is the responsible executor for the implementation of the regional project.

In the first half of 2023, the following value of the target indicators of the Regional Project was achieved:

- "Share of wastes directed for utilization, separated as a result of separate accumulation and treatment of solid wastes, in the total mass of generated solid wastes" - 4.8% (planned value 3.4%);
- "Share of solid waste allocated for treatment in the total mass of solid waste generated" - 56.3% (planned value 33.8%);
- "Share of solid waste directed for disposal, including treated waste, in the total mass of generated solid waste" - 94.9% (planned value is 96.6%).

The following activities are planned:

- Ensuring uninterrupted operation of 23 environmental hazardous waste collection points and realization of environmental education of the population of St. Petersburg.
- ensuring the functioning of the system of hazardous waste collection from solid municipal waste through specialized ecological containers in the amount of 505 units.
- Provision of services for uninterrupted operation of 2 eco-mobiles.
- Achievement of the values of indicators and results established in the Regional Project passport:
  - a) The share of wastes allocated for utilization as a result of separate accumulation and treatment of TKO in the total mass of generated TKO is not less than 3.4 %;

b) the share of TKOs sent for treatment in the total mass of generated TKOs is not less than 33.8 %;

c) the share of waste sent for disposal, including treated (sorted) waste, in the total mass of generated TCO not more than 96.6 %;

d) the share of imported equipment for utilization and treatment of TKO is not more than 37 %;

e) share of developed electronic models -100 %;

f) commissioning of facilities for disposal of solid waste - 0.36 million tons:

g) commissioning of treatment capacities - 0.2 million tons.

The St. Petersburg Waste Management Framework for the transition to a circular economy emphasizes the importance of private investment and PPPs. However, PPP projects in waste management as a mechanism for transition to CE and achievement of SDGs are more complex than traditional PPP projects. Their viability and feasibility require special legal, institutional, financial tools. It can be ensured by including in PPP project decisions, financial models the principles and elements of CE, indicators of environmental and social dimension of SDGs, and in PPP contracts – special rights and obligations of public and private partners, as well as creditors. Changes are needed in legislation on PPPs, urban planning, state support for investment activities, protection of social and environmental rights within the framework of legislative regulation powers at the regional level. It is also necessary to develop an ESG-strategy for the development of St. Petersburg.

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Factors of Industrial Enterprises' Access to Public Procurement in 2019-2022

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Abstract:
This paper, based on the surveys of manufacturing enterprises in 2022, analyzed the influence of formal state-business connections on enterprises' chances of winning public contracts, and the dynamics of changes in firms access to public procurement in 2019-2022. We use information on state ownership, the firms' membership in business associations, and assistance provided to local and regional governments in the social development of the region, and the support provided by federal, regional, and local authorities to firms as the main indicators of such connections. The analysis showed that in 2019-2022, procurement contracts were more often received by small enterprises - members of business associations. Medium and large enterprises with state participation in ownership more often received procurement contracts in 2019-2022, while small enterprises only in 2019-2020, and in 2021-2022 the factor of state participation ceased to be significant. At the same time, the presence of foreign participation in ownership turned out to be a significant factor that negatively correlates with the receipt of procurement contracts only for medium and large enterprises. Firms providing assistance to authorities in the social development of the region in 2019-2022 more often received procurement contracts. Therefore, we can speak of the maintaining of the "model of exchange" between small firms and regional authorities. However, firms receiving direct financial or organizational support did not provide additional advantages.

Keywords: *public procurement; manufacturing industry; international sanctions; small business.*

1. Introduction

In any economy, the state makes a demand for the goods, works and services it needs, and this demand is important for enterprises in the real sector, including industry. International sanctions against Russia were imposed in 2014 as a reaction to Russia's annexation of Crimea and the conflict in Ukraine. The economic situation worsened with the sharp decline in oil prices starting in summer 2014. Both external and internal factors caused a slowdown in all economic indicators, a significant depreciation of the ruble, an increase in inflation, a decrease in consumer demand and real incomes among the population, a decline in exports and imports, and an economic recession. The growth rates of Russian industry were significantly reduced. However, under the conditions of the private sector's contraction, the scale of public procurement did not decrease. The overall value of public procurement, including purchases made by state-owned firms, totaled RUB 24.1 trillion in 2014 (31% of GDP), and in 2016 reached RUB 28.7 trillion (34% of GDP). By 2020 the volume of procurement in Russia corresponded to the average value that was formed in 2014-2019, and amounted to 27% of GDP. The head of the Federal Antimonopoly Service of Russia, Igor Artemyev, still noted that public procurement remained the most important tool to support the domestic economy during the crisis.

In this paper, based on a survey of manufacturing enterprises conducted by the HSE Institute for Industrial and Market Studies in 2022, we analyzed the impact of state–business connections on the likelihood of receiving public procurement contracts after the tightening of external conditions for the Russian economy against the backdrop of international sanctions. During the survey, respondents were asked about the main parameters of the activities of their

firms, including participation in public procurement in 2019-2022. As the main indicators of state–business connections, we used information on state participation in ownership, membership of business associations, assistance provided by firms to local and regional governments in the social development of the region, and the support provided by federal, regional, and local authorities to firms. Additionally, in the analysis, we used data on the sectoral and regional affiliation of the respondent enterprises, the administrative status of settlements and the characteristics of the regions, as well as the personal characteristics of the respondents (gender, age, and position). For small firms and medium and large enterprises, separate models were evaluated, as the Russian government, within the framework of the public procurement system, pursues a policy of providing special preferences for small businesses.

A large body of papers has analyzed the factors that influence access to public procurement contracts, focusing mainly on various indicators of state–business connections. In particular, the literature has analyzed characteristics such as personal connections with officials, government participation in ownership, and contributions to the funds of political parties, consistently showing that these lead to greater access to public procurement contracts all over the world (see, for example, Auriol et al., 2016; Baltrunaite, 2020; Boas et al., 2014; Brugués et al., 2018; Gnip, 2022; Palanský, 2018; Schoenherr, 2019; Titl and Geys, 2019). In Russia, using data on banking transactions in a sample including practically all major companies for 1999 to 2004, Mironov and Zhuravskaya (2016) uncovered a relationship between political cycles in Russian regional elections and corruption in the procurement sphere. Szakonyi (2018) used information on the deputies of legislative assemblies of the Russian regions and the ownership structure and financial performance results of Russian firms to demonstrate that businessmen gaining the status of deputy had a favorable effect on their companies' performance indicators and increased the chances of their companies' access to public procurement by approximately 40%. The closest work to the present study (Demidova and Yakovlev, 2012) used the returns of two surveys of firms in 2005 and 2009 to demonstrate that large and old firms, as well as firms with state participation in ownership, win public contracts more often. Their paper also revealed that firms receiving direct support from the federal authorities had preferential access to public contracts.

With regard to survey data in general, the question of political connections can be sensitive for respondents. Furthermore, in Russia, contributions to the funds of political parties cannot be used as an indicator of the existence of formal state–business connections since there is no real political competition in Russia. The Russian political system is characterized by the existence of the one pro-presidential party United Russia (Edinaya Rossia) that dominates national elections and regional politics. Therefore, in Russian conditions, it is appropriate to look at other indicators, such as state participation in ownership, membership of business associations, assistance provided by firms to local and regional governments in the social development of the region, and the support provided by federal, regional, and local authorities to firms.

Several studies have shown that business associations in Russia act as a communication mechanism between the state and business that companies can leverage to lobby their interests (Duvanova, 2013; Pyle, 2006; Yakovlev and Govorun, 2011). The assistance provided by firms to the government in the social development of the region is an element of the "model of exchange" between firms and regional authorities (Haaparanta et al., 2003; Juurikkala and Lazareva, 2006; Solanko, 2007), which was first described in the Russian setting by Frye (2002). This author demonstrated that Russian firms that had received subsidies, tax relief, and other types of government support also had to bear additional costs and obligations, such as price regulations, more frequent inspections, and time lost in communication with the bureaucrats. However, recent studies have uncovered changes in the "model of exchange" in relations between the state and manufacturing firms. After the crisis of 2014–2015, regional government support was granted to medium and large firms that made major investments and assisted the government in the social development of the region, while the factor of state participation in ownership lost its significance (Yakovlev et al., 2020).

Based on previous research, we also assume that firms' access to public procurement will be influenced by previously indicated firms' state–business connections, such as state participation in ownership, membership of business associations, assistance provided by firms to the government in the social development of the region, and support from the government. However, the characteristics of their influence will vary for different sizes of firms. Previous studies have shown that, in Russia, the mechanisms of interaction between business and the state are different for large and small firms. Several empirical studies have confirmed the presence of the "state capture" model formulated by Stigler (1971) in relation to large businesses in Russia (Frye and Zhuravskaya, 2000; Hellman et al., 2000, Slinko et al., 2005). In contrast to larger firms, small firms in Russia have suffered from the "grabbing hand" of the state (Frye and Shleifer, 1997; Shleifer and Vishny, 1998; Yakovlev, 2011). They have lacked the resources to engage in the "capture" and "exchange" models of business–state ties that characterize interactions at higher levels of the politico-economic hierarchy (Aitchison, 2014).

2. Data & Methodology

This study uses data from a survey of manufacturing enterprises "Russian enterprises in value chains", which was conducted by the HSE Institute for Industrial and Market Studies in 2022. The survey was mainly focused on studying the changes that occurred after 2018 - identifying new trends in the development and behavior of industrial enterprises in the context of maintaining and strengthening the sanctions regime, and the consequences of force majeure circumstances of the COVID-19 pandemic. A large-scale survey was conducted in the format of interviews with managers of more than 1,800 manufacturing enterprises to identify problems in the transformation of cooperation chains in the domestic and international markets. Representatives of more than 18 thousand enterprises with more than 10 employees from different industries in more than 70 regions of Russia took part in the survey, and the resulting survey sample was representative of industries and size groups.

To test the hypotheses, we used the respondents' answer regarding whether they had public contracts as the binary dependent variable in the models. This equaled 1 if the manufacturing firm received public procurement contracts in 2019–2022, and 0 if it did not. For the robustness check we additionally modified the dependent binary variable by highlighting the group of firms for which procurement contracts generate more than 5% of their revenue from the sale of products/services. Thus, the new dependent variable equaled 1 if the public procurement contracts accounted for more than 5% of the company's revenue from the sale of products/services, and 0 otherwise. As the variable was binominal in all models, we assessed the probit models using the maximum likelihood procedure. To solve the problem of heteroscedasticity, we used the White estimator, which is more robust and consistent.

3. Results and conclusions

The analysis showed that, on average in 2019–2022, in the manufacturing industry, about 30% of medium and large firms that took part in the survey received public procurement contracts. As for small businesses, in 2019-2021 around 26-27% of small firms received procurement contracts and 24% of small firms in 2022. The empirical analysis showed that in 2019-2022 public procurement contracts were more often received by small enterprises-members of business associations. Thus, the participation in business associations increased the likelihood of small firms receiving procurement contracts by about 12–14% compared to firms not members of business associations. At the same time, unlike small firms, participation in business associations did not provide medium and large firms any additional advantages in receiving public procurement contracts. All coefficients for the corresponding variables turned out to be insignificant.

The survey results also showed that medium and large firms with state participation more often received public procurement contracts in 2019-2022, while small firms only in 2019-2020, and in 2021-2022 the state participation factor ceased to be significant. The presence of foreign ownership turned out to be a significant factor, negatively correlated with the reception of public procurement contracts only for medium and large enterprises. For small enterprises, the coefficients also turned out to be negative, but insignificant in all specifications. At the same time, both small and medium-sized and large enterprises that provide assistance to regional and local authorities in the social development of the region in 2019-2022 more often receive public procurement contracts. Thus, we can talk about the preservation of the "exchange model" between government and business (Haaparanta et al., 2003; Juurikkala and Lazareva, 2006; Solanko, 2006), first described in the Russian context by Frye (2002). However, firms receiving direct financial or organizational support did not provide additional benefits in access to public procurement contracts.

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Infrastructure as Forming Factor of Travel Behavior: the Role of PPP Projects

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Abstract:
Public transportation (PT) service quality encloses a set of urban travel behavior determinants. Public-private partnerships (PPPs) are considered to increase service quality (Estache & Serebrisky, 2004). Therefore, PPPs in urban public transport might affect citizens' transportation behavior. The aim of this paper is to study the effect of PPP implementation in PT on travel behavior of people, who live close to newly constructed infrastructure, as well as the rest of the citizens. We find a positive effect on PT ridership and trip time significance as well as users' expectations of PT service quality. Thus, we contribute to the theory on PPPs in transportation sphere.

Keywords: *public transportation, travel behavior, PPP, urban transport infrastructure*

1. Introduction

PPP is an instrument that connects public and private interests in delivering public value. It allows to draw private funding in public-oriented projects and is often used in capital-intensive areas, particularly in infrastructure development. As of 2022, the top-5 areas of PPP use in Russia were: utilities' infrastructure, social infrastructure, transportation infrastructure, land improvement, and information systems (PPP Center, 2022).

Transportation is one of the key areas of urban environment. However, its development is associated with high capital costs, and public sector is not always ready to cover them. Therefore, public-private partnership (PPP) has become a seductive instrument for urban transportation infrastructure development. The use of PPP not only speeds up project implementation but is also assumed to diminish operation (Raegan & Smith, 2011; Verweij & Meerkerk, 2021) as well as administrative (Mak & Mo, 2005) costs, to increase service quality (Estache & Serebrisky, 2004), and to enhance innovation (Verweij et al., 2020). Given that service quality is one of transportation behavior determinants, implementation of PPP projects in public transport might affect transportation mode choice.

The aim of this paper is to compare travel behavior of people, who live close to a realized PPP project, and the rest of the citizens. The data stem from St. Petersburg (Russia) where Chizhik tramway system was built as PPP project. We thus contribute to the theory on PPPs in transportation.

2. Chizhik tram system and recent changes in St. Petersburg transportation system

The PT system in St. Petersburg has undergone significant changes in the last few years. In 2018, Chizhik tram system was launched as implementation of a concession agreement between the city and LLC "TKK". Also, in 2022, the new model of transportation services (NMTO) was gradually launched by the city administration and the paid parking zone in the city center has been substantially extended.

These two measures, both of stimulating and restrictive character, are aimed at increasing PT ridership on the expense of car drivers. The success of these changes to a larger extent depends on PT service quality that has remained low in the last years (Rodionov et al., 2021). Hence, Chizhik tram system that is based on PPP becomes an interesting research object that allows to assess how higher quality of PT service affects travel behavior of citizens.

Chizhik tram system was built upon BOMT model (build-operate-maintain-transfer). The concessionaire owns the system until 2046, when it has to transfer it to the city. The latter ought

to provide the concessionaire with a set minimal profit. The system is located in the Krasnogvardeyskiy district of St. Petersburg and accounts for 11% of the total tram passengers in the city. The system is featured by new comfortable low-floor rolling stock, enhanced stop platforms, as well as dedicated lines and traffic priority, which leads to a significantly higher average speed of the system — 23 km/h in contrast to 14 km/h average tram speed in the city (Chizhik, n.d.). Dedicated lines also provide higher reliability since there are less intersections with the entire urban traffic. All tram stops are equipped with electronic schedules which enhances user awareness of the timetable. The corporate branding of the operator company is green that differs from red color of other trams in the city.

3. Theoretical model

Development of PT infrastructure is particularly important since it contributes to traffic congestion reduction (Vuchic, 1999). One of the key aspects of travel behavior is transportation mode choice that is determined by a set of factors. Among commonly defined in the literature are trip time, trip cost, reliability, convenience, and comfort. Traveler might have various subjective preferences but basically prefer to get to the destination point the fastest and cheapest while the most convenient, reliable, and comfortable are among various alternatives. Hence, PT development aims to alter the characteristics of this set of modes to make them more attractive.

The use of PPP in PT development is considered to improve PT service quality, which can reveal itself in higher quality of infrastructure building, maintenance, and operation (Estache & Serebrisky, 2004). Therefore, we hypothesize that use of PPP-based PT enhances PT service quality satisfaction:

Hypotheses 1: Residents living close to the Chizhik tram system are, on average, more satisfied with the quality of public transport.

The perceived higher quality of the tram system service may attract more users, hence:

Hypothesis 2: Residents living close to the Chizhik tram system, use the tram on average more often than residents from other areas of the city.

In addition, people might get a more positive image of the PT system in general and thus be more acceptive towards PT system changes:

Hypothesis 3: Residents living close to the Chizhik tram system, on average, have a better attitude towards public transport reform in St. Petersburg.

Travelers who use PPP-based PT may compare its service with the service of non-PPP-based PT and adjust their expectations. Therefore, the use of PPP in PT may affect travel behavior in a way that travelers are ready to pay more for better service. This might be hypothesized:

Hypothesis 4a: For residents living close to the Chizhik tram system, the significance of trip cost as a mode choice determinant is, on average, lower.

Given that Chizhik tram system is featured with comparatively high average speed, comfortable rolling stock and higher reliability, the following hypotheses are set:

Hypothesis 4b: For residents living close to the Chizhik tram system, the significance of reliability as a mode choice determinant is, on average, higher.

Hypothesis 4c: For residents living close to the Chizhik tram system, the significance of comfort as a mode choice determinant is, on average, higher.

Hypothesis 4d: For residents living close to the Chizhik tram system, the significance of trip time as a mode choice determinant is, on average, lower.

Concerning factors that stimulate the use of PT, we consider all that enhance comfort, reliability, and trip time, is more important for people who live close to Chizhik tram system. Simultaneously, trip cost might become less important factor. Therefore, we set:

Hypothesis 5a: For residents living close to the Chizhik tram system, the significance of better information availability as a factor of a more frequent PT use is, on average, higher.

Hypothesis 5b: For residents living close to the Chizhik tram system, the significance of lower trip cost as a factor of a more frequent PT use is, on average, lower.

Hypothesis 5c: For residents living close to the Chizhik tram system, the significance of lower trip time as a factor of a more frequent PT use is, on average, higher.

Hypothesis 5d: For residents living close to the Chizhik tram system, the significance of cleaner rolling stock as a factor of a more frequent PT use is, on average, higher.

Hypothesis 5e: For residents living close to the Chizhik tram system, the significance of cleaner stops as a factor of a more frequent PT use is, on average, higher.

Hypothesis 5f: For residents living close to the Chizhik tram system, the significance of lower passenger congestion as a factor of a more frequent PT use is, on average, higher.

Hypothesis 5g: For residents living close to the Chizhik tram system, the significance of increase in reliability as a factor of a more frequent PT use is, on average, higher.

Hypothesis 5g: For residents living close to the Chizhik tram system, the significance of increase in convenience as a factor of a more frequent PT use is, on average, higher.

These hypotheses constitute the theoretical model of the study and are given in a graphical form in fig. 1.
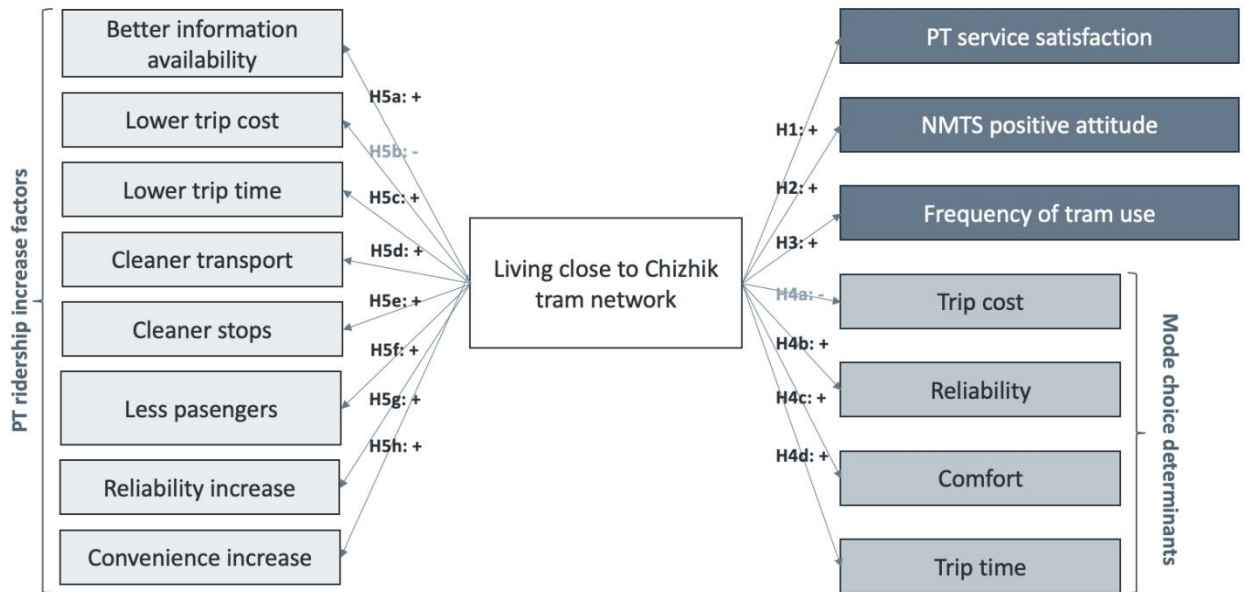
Fig 1. Theoretical model of the study

4. Data and method

The data for this study was collected in April 2023, a year after the first changes of NMTS were implemented. By using CAWI-approach, a sample of 1361 respondents was collected. Among them 56 people live close to Chizhik tram system. This could be drawn upon the closest metro station that they chose. Chizhik tram system connects the residential areas of Krasnogvardeyskiy district with Ladozhskaya metro station. However, this station was closed as of the dates of the survey. There for, we also considered Novocherkasskaya metro station, which is the closest when moving to the city center.

We resorted to descriptive statistics for the analysis of our sample. To test the hypotheses, Chi-square two sample mean test was used due to qualitative nature of the data.

5. Results

The results of hypotheses testing are given in fig. 2, where rejected hypotheses are colored white.
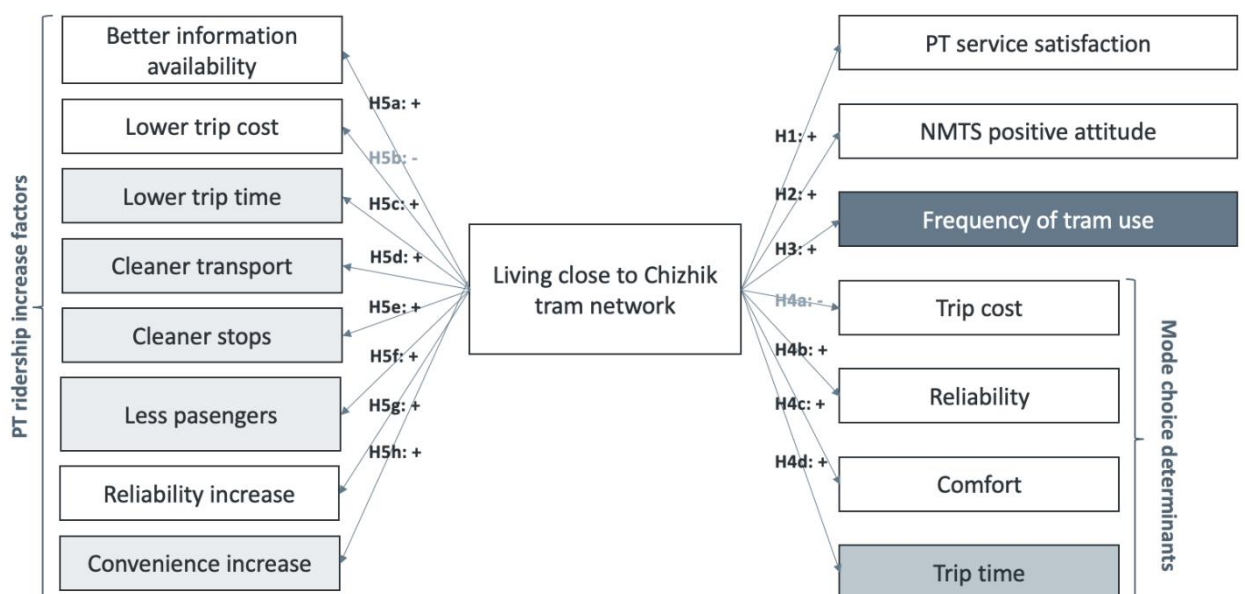

Fig.2. Results of hypotheses testing

5.1. PT Service quality satisfaction

As shown in fig. 3., a higher share of people, who live close to the Chizhik tram system, have average satisfaction level of PT service quality in St. Petersburg (46% vs. 37%). The Chi-square mean comparison test shows no statistically significant difference of the two groups. Therefore, hypothesis 1 is rejected. This result might be explained by the fact that Ladozhskaya metro station has been closed since January 2023. Given that Ladozhskaya is a major transportation node, PT users had to use other metro stations. This is fraught with inconvenience and longer trip time required that might have affected the response.
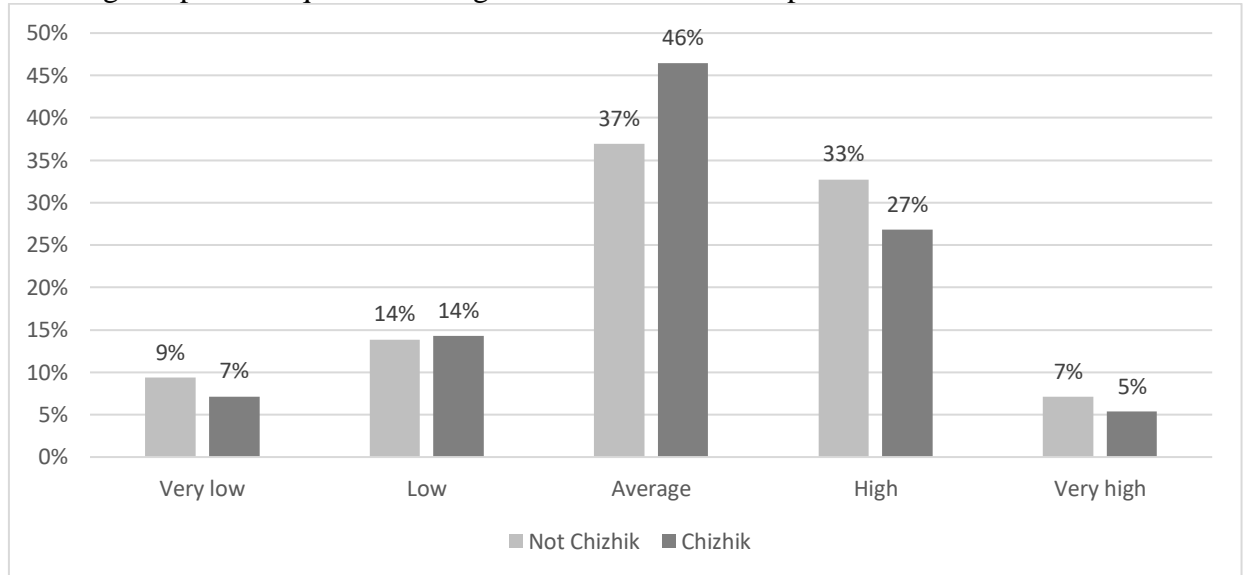
Fig. 3. PT service quality satisfaction in St. Petersburg

5.2. Attitude towards NMTS

Despite higher share of people with mediocre PT service quality satisfaction, people, who live close to Chizhik, have, on average, better attitude towards NMTS, as shown in fig. 4. 6% more respondents have a very good (14% vs 8%) and good (46% vs. 40%) attitude towards NMTS. The shares of people who have negative and indifferent attitude are correspondingly lower. However, this difference does not occur to be statistically significant.

Given that PPP projects in PT are characterized by higher service quality and information provision, there is a potential avenue of future research.

Fig. 4. Attitude towards NMTS

5.3. Frequency of tram use

The descriptive statistics on tram use of respondents living close to the Chizhik tram system and others is provided in fig. 5. The share of respondents using the tr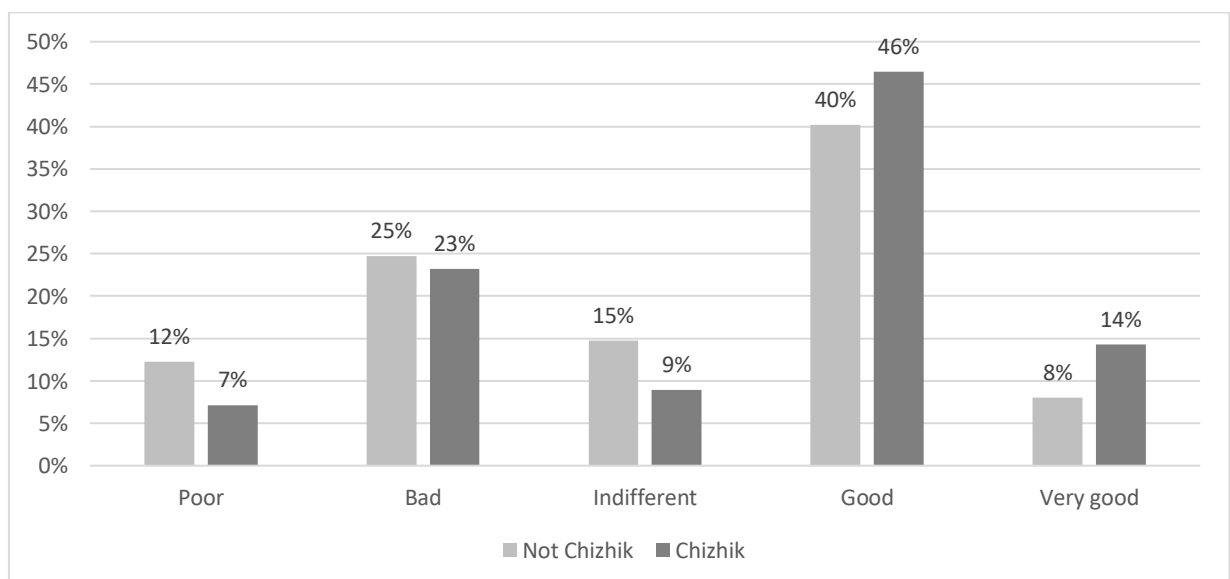am every day and almost every day is three times higher (29% vs. 10%). At the same time, the share of respondents living close to the Chizhik tram system who use the tram once a year or even less frequently is almost 5 times lower (5% vs. 23%). These differences are highly statistically significant (p-value is less that 1%). Therefore, PPP projects in PT might significantly affect the travel behavior in a way that they make PT a more attractive alternative.
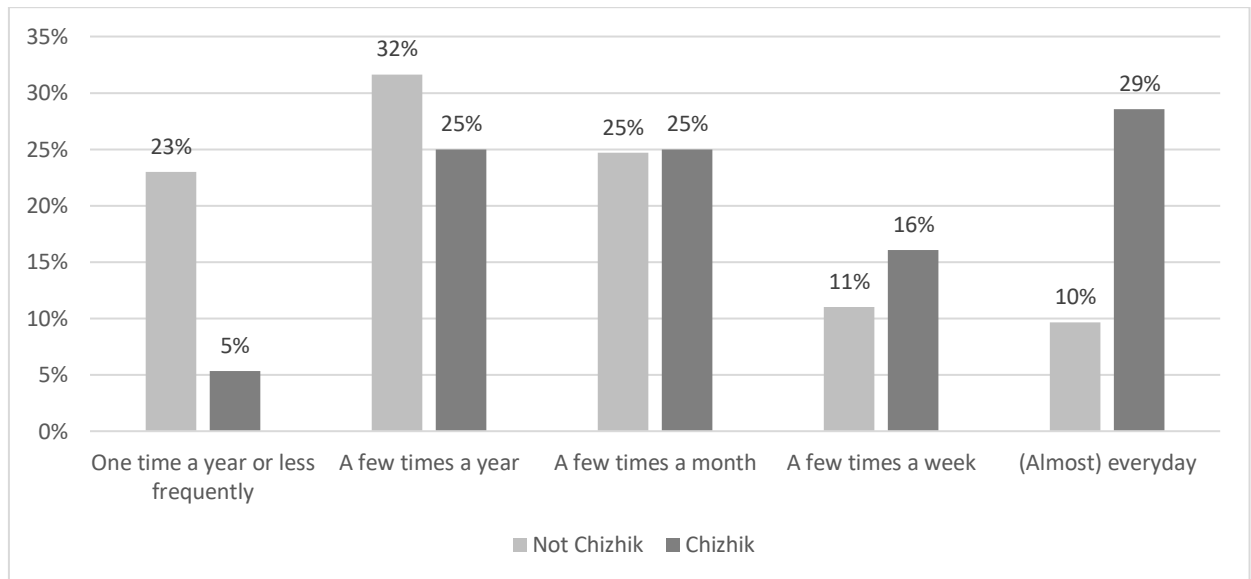
Fig. 5. Frequency of tram use

5.4. Mode choice determinants

Among mode choice determinants, four were chosen for the analysis: trip cost, reliability, comfort, and trip time. The descriptive statistics for two samples are given in fig. 6. Trip cost and reliability do not differ much, but Chizhik area residents are more propense to consider comfort (43% vs. 37%) and trip time (93% vs. 83%). Yet only the difference in trip time assessment proved to be statistically significant (at 10% significance level). Therefore, PPP projects in PT make trip time a more important mode choice determinant. Since PT is not always competitive with private car in comfort and convenience, its higher speed that can make it an attractive alternative for car users.
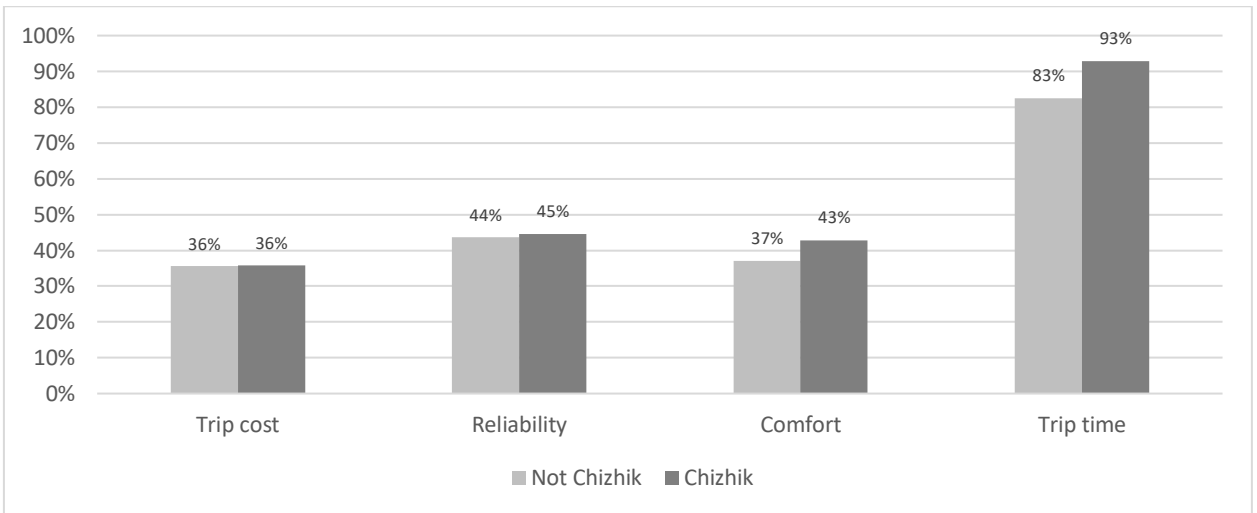
Fig. 6. Mode choice determinants

5.5. Modal shift factors

The descriptive statistics on modal shift factors (fig. 7) shows that the expectations from Chizhik tram system area are generally higher towards all considered factors. However, only five of them occurred to be statistically significant. These are: higher speed (p-value less than 5%), cleaner rolling stock (p-value less than 1%), cleaner stops (p-value less than 10%), less passengers in vehicles (p-value less than 10%), and higher convenience (p-value less than 10%).

This probably indicates that people living in the Chizhik tram system area have opportunity to compare the service quality of PPP-based Chizhik and other PT operators in the city. The effect of higher expectations might be twofold. On the one hand, the image of PT might improve, which increases its chances against private car. On the other hand, people might be accommodated to higher PT service quality and be disappointed when interacting with other PT operators.

In addition, Chizhik tram system area residents already use trams more often. Therefore, another interpretation of the results might be that they would like Chizhik trams and tram stops to be even cleaner, the speed to be higher and the trip to be more comfortable and convenient.

Fig. 7. Modal shift factors

6. Conclusion

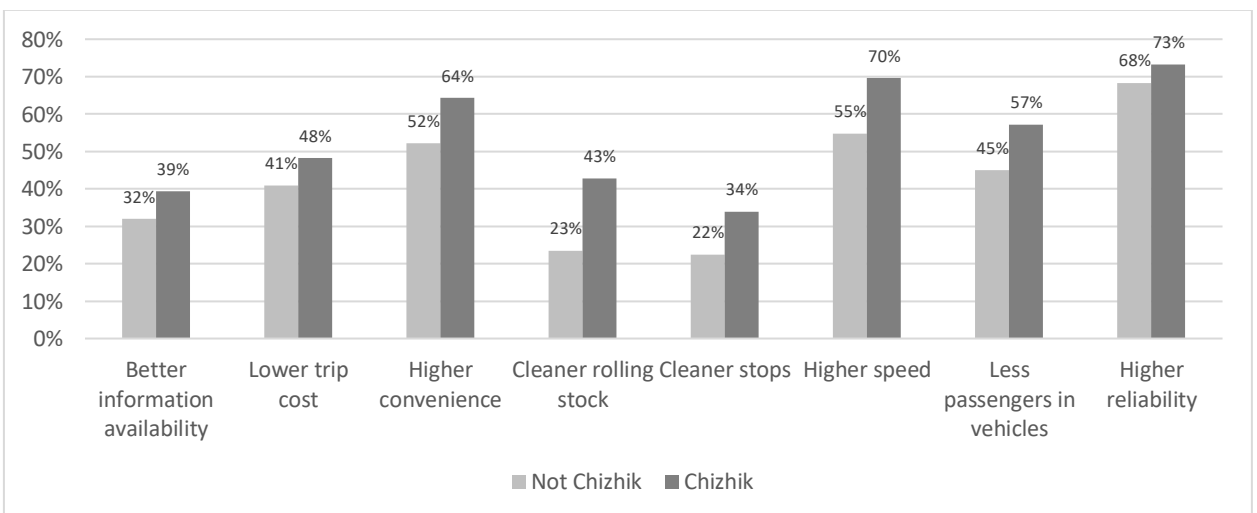The aim of this study was to compare travel behavior of two population groups: people living in the area of operating PPP project in PT and people living in other areas of the city. The results of our analysis indicate that the use of PPP in PT development affects travel behavior.

First, people use PT more frequently, which is evidenced in the Chizhik tram system area, where people use trams three times more often than in other parts of the city. However, such drastic difference of tram use can be stipulated by a set of other factors. First, trams might have been a popular mode in the Krasnogvardeyskiy district before Chizhik tram system launch since they had dedicated lines and allowed to overpass traffic congestions. Also, higher tram ridership might be not result but reason of PPP-based project. To overcome these limitations, modal split in the area as of 2015-2016 could be taken for further analysis. Also, tram line number 30 that connects Ladozhskaya and Novocherkasskaya metro stations is free of charge, which might stimulate residents of the area to use it.

Second, trip time becomes more significant as a mode choice determinant. This may indicate that Chizhik users are accommodated to high speed and may value this feature. Also, given that Chizhik tram system operates on dedicated lines, car drivers might opt for trams in order to overcome traffic congestions. Therefore, PT speed increase may surpass comfort and convenience of car use and bring car drivers to use PT.

Third, the use of PPP in PT affects the factors of modal shift. Better service quality result in the increase of significance of speed, cleanliness of rolling stock and stops as well as less passengers and transfers. These factors correspond such mode choice determinants as trip time, comfort, and convenience.

One of the limitations of this study is cross-sectional character of the data. A longitudinal analysis would allow to compare the treatment effect (erection of a PPP tram network) on travel behavior. Future research might resort to this approach when studying new PPP projects in PT.

The results of this study allow to conclude that the use of PPP in PT increase the attractiveness of PT and facilitate modal shift. Future research might consider the PPP effect on travel behavior in the long-term by adopting longitudinal analysis. In addition, future researchers could focus on how PPP projects in PT affect travel behavior of two groups — car drivers and PT users.

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Russian Public Procurement: For Innovation or Not

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Abstract:
The concept of national innovation systems assumes an active role of government in creating innovations. With such consideration, public procurement becomes one of the essential tools of government innovation policy. The effectiveness of this policy can be assessed using the methodology of narrative economics. Based on a broad empirical base containing more than 2,000 media narratives, 27 interviews with actors of the Russian innovations system, an analysis of legal acts and an examination of recent institutional changes in public procurement regulation, the authors conclude that the Russian public procurement system needs to be more consistent to deal with innovative development issues.

Keywords: *Public procurement; innovation policy; narrative economics; national innovation system; innovation.*

Introduction

The concept of national innovation systems arose at the end of the 20th century due to understanding the role of institutions in organising the interaction of three main actors - the government, the academic community and business (Metcalfe, 1995). Further development of this scientific concept took place mainly within the framework of evolutionary and institutional economic theories (Dezhina, Kiseleva, 2007; Carayannis, Campbell, 2012). The government's role in building the innovation system is key and can be considered from two points of view. Firstly, as a source of formal institutions, regulatory mechanisms and various development programs are implemented through public procurement; secondly, as a set of institutions and organisations designed to regulate, support and control the implementation of innovation policy.

In this paper, the authors examine Russian public procurement within the framework of the government innovation policy from the methodology of narrative economics, which involves a combination of quantitative and qualitative methods. The quantitative approach involves the analysis of the virality of narratives in relation to economic dynamics. The qualitative approach aims to identify ideas and proto-models by which actors explain cause-and-effect relationships and to analyse the social context (see Volchik, 2022).

Latest trends of the government innovation policy

Recently, there has been a devolution[1] of formalised rules aimed at implementing innovation policy in the Russian public procurement system. So, at the beginning of 2022, restricted tendering in electronic form was excluded from the available procurement methods in the contract system. Previously it was used for procuring innovative and high-tech products by

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[1] reverse institutionalisation process

procuring entities, which was approved by Government Decree No. 99[2]. Due to the exclusion of the competition with limited participation in electronic form from the provisions of Law No. 44-FZ[3], Government Decree No. 99 was cancelled as well. As we noted earlier, this Decree was not aimed at the development of government innovation policy and pursued the only goal - to enable procuring entities to conduct a restricted tendering in electronic form instead of an electronic auction (Tsygankov et al., 2021), so that the procurement contract could be awarded not based on the lowest price only.

In addition, at the beginning of 2022, the two-stage tendering in electronic form was also excluded from the available procurement methods, which was the least popular among all competitive ones. We negatively assess this measure because instead of analysing the reasons for the lack of popularity of this method and adjusting its design to increase its significance, it was decided to take the easy path, which additionally reduced the variability of choice among procuring entities.

Another problem regarding the analysis of the implementation of government innovation policy by procuring entities is the decrease in transparency caused by the "anti-sanction" measures established by Government Decree No. 301[4]. It allowed procuring entities under these sanctions to refrain from publishing procurement information in the Unified Procurement Information System publicly since April 1, 2022. Besides, we found that most organisations in a specialised list of 90 procuring entities required to report annually on procuring innovative and high-tech products are under sanctions and do not publish this information.

Thus, there is a tendency to reduce transparency and increase privacy in the public procurement system. It significantly raises transaction costs by decreasing the available information necessary for making economic decisions. Public control also becomes problematic, which, on the one hand, leads to the destruction of legitimacy and trust in government institutions (Grimmelikhuijsen et al., 2017), and on the other hand, increases the risks of opportunistic behaviour of agents at the public procurement market.

Narrative and content analysis

We also analysed public procurement and innovation narratives as part of the study. The empirical basis of the study is the narratives about the Russian innovation system (RIS) obtained from various sources. First, as a result of media analysis using the Integrum system, 2122 narratives were obtained (1149 narratives published in the federal media and 973 narratives in the media specialising in covering the activities of the education and science system). Secondly, these are 27 in-depth interviews with actors of the Russian innovation system representing the academic community. Thirdly, these are specialised narratives about public procurement and innovation (Tsygankov, 2021). Fourth, the authors analysed the Russian federal legislation in the field of innovation (including the public procurement field).

A qualitative analysis of narratives made it possible to identify a fundamental problem in managing RIS: the lack of a unified, systemic policy to develop innovations (Volchik et al., 2022a; Volchik et al., 2022b). The content analysis of legal acts confirms this. For example, as of April 1, 2022, the ConsultantPlus legal reference system contained 245 federal laws in force and 1,537 other regulatory legal acts: presidential decrees, resolutions and orders of the Russian government, as well as other federal authorities containing the word "innovation" in different parts of speech and different grammatical forms in Russian language (Volchik et al.; 2022a).

The lack of consistency in the government policy for the development of innovative activity, in turn, reduces the effectiveness of regulation. Since there is still no full-fledged law on

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[2] Federal Law of April 05, 2013 'On the contract system in the field of procurement of goods, works, services for state and municipal needs' No 44-FZ

[3] Decree of the Government of the Russian Federation of February 04, 2015 No. 99

[4] Decree of the Government of the Russian Federation of March 06, 2022 No. 301

innovation activity, the current policy begins to have a contradictory, selective character at the federal and regional levels. This dysfunction of the RIS creates sectoral and regional imbalances, demotivates the RIS actors and disrupts the interaction of all participants at various levels (Shiriaev, Maskaev, Tsygankov, 2022). Participants begin to compensate for the dysfunctions of formal institutions by creating informal institutions, such as personal connections and acquaintances, which compensate for the institutional environment and infrastructure failures. Furthermore, the decrease in the transparency of the public procurement system only encourages establishing such links.

Conclusion

The conclusions of this study correlate with previous results of our research that government regulation has institutional failures. As a consequence, Russian public procurement does not charge for the development of innovations. Recently, the situation has only worsened due to the exclusion of procurement methods (restricted tendering in electronic form and two-stage tendering) intended to procure innovative goods and a decrease in transparency.

The existing system of government regulation of innovation activities is practically not focused on expanding cooperation processes and attracting new partners. In addition, studies show that, unfortunately, there is no significant correlation between government incentives and high-tech cooperation between business and science (Interaction of Science…, 2017).

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Marketing in the Era of Turbulence: Additional

Hospitality Index: a Study of Regional Tourism Portal

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Abstract:
Domestic tourism is in process of shaping its economic influence. This study is designed to analyze current varieties of domestic tourism in Russia, and to explain consumer behavior in the tourism field by determining key factors. The study is based on the empirical analysis of public tourism web portals of 85 Russian regions: 22 Republics, 9 Territories, 46 Regions, 3 Cities, 4 Autonomous Areas, 1 Autonomous Region. The main tourism types have been identified. This study has a descriptive nature and adopts a mixed research methodology, with both quantitative and qualitative research methods. The paper generates a possible taxonomy of domestic tourism and a comprehensive tourism guide of Russian regions. A hospitality index is developed. The results could be used by the authorities to promote regional tourism programs.

Keywords: *place branding, domestic tourism, regional economy, tourism cashback, hospitality index*

Introduction

The concepts «national brand», «national branding», «nation brand», «nation reputation» and «nation image» are identical, but their connotations could be different (Kusraeva, 2021). Regional brands are usually not given much academic attention. Regions are studied via income inequality (Surinov, Luppov, 2022) or digital maturity (Abramov, Andreev, 2023). Being multifaceted (promotion, sustainability, migration, stakeholder management), place branding is gaining ground (Makarov, Chub, 2022). In response to sustainable development agenda, ESG branding of territories (environment, social issues, governance) gained momentum in Russia in 2021. ESG paradigm is generally attributed to large corporations, but it happened to be useful in Russia for interregional comparisons. The Expert Rating Agency issued the first ESG rating of Russian regions. In 2022 the National Rating Agency issued another ESG rating of territories. The main challenge for such ratings is measurement problems (Berg, Koelbel, Rigobon, 2019). Indices could not coincide in time. Thus, new approach is needed. Regional Index of Tourist Attractiveness based on AI calculations could be a relevant example (KB Strelka, 2021).

Economic processes in geographic space are studied by spatial economics (Zakharova, Davydov, Zemtsova, 2023). Regional spatial development is important for Russia in the context of sustainable spatial development (Fomin, Smirnov, 2022) and regional heterogeneity (Demidova, Kamalova, 2021). The introduction of green agenda changes the boundaries of a "region"; the regional peculiarities gain importance (Efimova, Maltsev, Chupina, 2023).

The main challenge of ESG Transformation is to reduce carbon emissions to comply with Paris Agreement. The reduction represents a social issue as GDP growth directly correlates emissions. The reverse relationship is found for developed economies owing to the advanced service sector (Efimova, Maltsev, Chupina, 2023). The service sector helps mitigate climate change.

Tourism plays an important role in transition from mining and manufacturing to Post-Fordism (Plisetsky, Leonard, Ilyina, 2022). Tourism could be also treated as simple services,

with tourism jobs being unqualified (Lyubimov, 2021). Sustainable development is not limited only to tourism development, the concept is human-centric, with new jobs being opened (Shakhov V.A., 2022). The complex economic and geopolitical situation hinders international tourism, but it provides new opportunities for domestic tourism. Tourists refocus on Russian resorts (Plisetsky, Leonard, Ilyina, 2022). Domestic tourism mitigated risks in resort areas under sanction pressure.

(Zubarevich, 2022). In 2021 the National project "Tourism and hospitality" was introduced to promote domestic tourism in Russia (Ministry of Economic Development, 2022). The National project was based on the national development goal "Opportunities for promotion and development of talented people". It means that domestic tourism and national agenda of sustainable development are interconnected. In 2016-2020 place branding was highly specialized and dedicated to tourism (Makarov, Chub, 2022).

In a BANI world (brittle, anxious, nonlinear, incomprehensible) state and municipal platforms are playing an important role as a channel of communication between state, business and society, enhancing network effects (Styrin, Rodionova, 2020). Network effects could attract end users and producers on a platform building a digital ecosystem (Amazon, Netflix, Airbnb, Booking.com, LinkedIn, HeadHunter) (Vikhansky, Katalevsky, 2022). The problem of digital divide arises between regions as only rich regions could afford digital solutions based on big data (Scherbak, Shmeleva, 2022). Geo Big data analysis provides new opportunities for tourism industry (Radchenko, Bannikova, Kochetkova, 2022), but regional tourist portals, being universal, provide opportunity for interregional comparisons (Table 7).

Data

Research is based on the empirical analysis of tourist web portals of 85 Russian regions: 22 Republics, 9 Territories, 46 Regions, 3 Cities, 1 Autonomous region, 4 Autonomous areas. New

Regions were not analyzed.

Method

Qualitative and quantitative methods are applied. Portals were searched in the Internet via Yandex using the framework "Region + tourist portal". The first result was used. Open information was analyzed to identify tourism varieties for all regions. Hospitality index was developed.

Limitations

Information on a portal about the particular type of tourism is the cornerstone of the analysis as a tourist portal is a useful source of that type of information. But the absence of a particular type of tourism on the portal does not necessarily mean that this kind of tourism could not be applied to this particular region. Consumer behavior is not always based on the analysis of tourist portals, it could be connected with a simplified search (sea, mountains), word of mouth, resort fame and other factors.

Results

Regional tourist portals are heterogeneous in terms of design and content. Direct brand information could be found at the portals of Kostroma Region and Krasnodar Territory. Regions affiliate to large projects. For instance, Komi Republic use the affiliation with the route Silver Necklace. Ingushetia and Udmurtia affiliate to the brand of Switzerland – Switzerland close, own Switzerland. Tver Region affiliate to the brand of Venice – "Tver Venice". Another strategy is to use same linguistic structures: open Udmurtia, open Khakassia for yourself, open the beauty of Chuvashia Republic, open extraordinary Orel for yourself, Open Tyumen Region, inspire by Chechen Republic; 9 reasons to visit Orenburg, 10 reasons to visit Sverdlovsk region, 10 reasons

to visit KMAO–Yugra, 13 reasons to visit Mordovia, 1000 reasons to visit Yamal. Portals publish information about glampings (Bashkortostan, Lipetsk, Moscow, Murmansk, Saratov, Tver and Tula regions). The portal of Bashkortostan republic publishes information about glamping co-financing program.

Promising area is loyalty tourist cards. 6 regions have such programs. In Chuvashia the program is called "Guest Card. Chuvashia". The card is free and it works indefinitely. The program has bonus offers form partners. Similar product is developed in Khakassia region. In Kaliningrad region the program is called Tourist Passport (a travel guide) and the special guest card (loyalty program). In Tambov region in 2023 the loyalty card for children was launched. In Novosibirsk region the guest card provides discounts for museums and hotels. In Nizhny Novgorod region the card is loyalty program, travel guide and bonuses (free ride, museums) at the same time. The card costs from 700 rubles (1 day) to 1900 rubles (7 days). In Yaroslav region the program is called   CityPass – tourist ticket (museum and tour).

19 types of tourism are available in Russia: event, cuisine, active, ecological, religion, ethnic, health, industrial, business, rural, educational/scientific, medical, inclusive, student, literature, wedding, children, wellness, patriotic.

All tourism types could be classified into 4 groups: classic, specific, special, innovational. Some types are more common, others are rare. Rarity means higher quality of governance as authorities are trying to innovate. Innovations are increasing the tourist allure.

Classic tourism (table 1) encompasses event tourism (56 regions) and active tourism (47 regions). Event tourism is built around certain events. Active tourism is about various leisure types, such as skiing, strolls, rafting and so on.

Specific tourism is less common: ecological tourism (29 regions), health (28 regions), cuisine (26 regions), children (24 regions). Ecological tourism means some activities at national parks and reserves. Health tourism is linked with vacation at sanatoria. Children tourism is about vacations of children and vacations with children.

Special tourism types are religion tourism (20 regions), industrial tourism (20 regions), ethnic (19 regions), rural tourism (16 regions). Special tourism types are relatively new, it is a niche product.

Innovational tourism is tourism activities that are introduced only be a small fraction of regions (table 4). These types could be developed in other Russian regions. Business tourism (7 regions), education/science (4 regions), patriotic tourism (4 regions), wellness tourism (4 regions). Some tourism types are extremely rare: medical (Kirov Region, Smolensk Region), inclusive (Volgograd Region, Pskov Region), student tourism (Penza Region), literature tourism (Orlov Region), wedding tourism (St. Petersburg).

Regional profile

Not only varieties of domestic tourism in Russia could be interesting, but also regional master planning (combinations of tourism types in a particular region). Only 20 regions have the same tourist profiles (table 5). It means that domestic tourism destinations are unique, with regions trying to find a market niche. But the same profile does not necessarily mean that regions are competitors in the long run. For example, Dagestan and Mari El have the same tourism types, but owing to ethnic diversity the service content is different. In short-term the regions are competing, but in the long run a rational tourist is to choose new destinations.

Heterogeneity of event tourism regions is worthwhile to mention. Moscow is the indisputable leader thanks to developed infrastructure and transport availability. As tourist portals were analyzed, Moscow is represented only in one category. The tourism development in Novosibirsk and Omsk regions is complex because of geographical reasons. The full potential of

the Chechen Republic, Belgorod region and Sevastopol is not achieved because of political factors. Murmansk and Yaroslav regions are highly specialized (Northern lights, Golden Ring).

The majority of regions promote 1-3 varieties of tourism (60%), they are highly specialized (Table 6). Leningrad region is the most diverse in terms of tourism varieties. Leningrad region joins the group of regions with innovational types of tourism (Vologda region, Orel region, Kirov region, Stavropol Territory). 12 Regions are focused on a particular type of tourism: event tourism (8 regions, Chechen Republic, Belgorod region, Murmansk region, Novosibirsk region, Omsk region, Yaroslavl region, Moscow, Sevastopol), active tourism (2 regions, Smolensk region, Tambov region); Nenets Autonomous Area promotes ethnical tourism, Trans-Baikal Territory focuses on health tourism.

Hospitality index

ESG Agenda in Russian regions could be illustrated via hospitality index (table 8). This index is to estimate tourist attractiveness of Russian regions. The index is calculated the following way:

$$I_{esg} = k_i * \sqrt[3]{e_i * s_i * g_i},$$
$$I_{esg} - hospitality\ index,$$
$$k_i - digital\ coefficient,$$
$$e_i - tourism\ diversity,$$
$$s_i - accomodation\ score,$$
$$g_i - management\ score.$$

The index is based on data, collected before summer holidays (2023). Each coefficient represents characteristic of hospitality. Digital coefficient evaluates regional portals from aesthetic point of view. Tourism diversity stands for environment. The greater the diversity, the better the environment is. Accommodation represents the idea of social score. The coefficient is calculated as a share of hotels in this region to the overall number of hotels. The higher the number of hotels, the better the infrastructure is developed. Hotel search was produced via Ostrovok platform. Management score is calculated on the grounds of tourism type innovational combination in a particular region. The less common the combination, the higher the score is.

Hospitality index has several advantages in comparison with KB Strelka index. Firstly, it provides a comparison of 85 Regions. Secondly, it takes into account four important dimensions (environment, infrastructure, management quality, digitalization). Thirdly, it provides regional tourism profiles.

Correlation between hospitality index and tourism flows in Russia (January-February 2023) is 0,688. Index could play a role of an alternative ESG rating (Table 10). Correlation is found between three ratings (Table 11).

Conclusion

Domestic tourism gains momentum in Russia. VAT for hotels was cancelled in June 2022. In 2023 it is planned to cancel VAT for tour operators. On the 6th of September 2022 Primorye Territory Governor outlined the importance of establishing the single vertical management structure in tourism as that day different agencies were responsible for tourism development (Ministry of Construction, Ministry of Agriculture, Ministry of Environment, Tourism.RF, Kavkaz.RF).

Rostourism introduced four priority areas for domestic tourism development: Kamchatka, Baikal, Bolshoi Altai, Volga regions. National program "Volga River revitalization" was launched. The key challenge is to fight shadow economy practices. Business suggested, tourist objects should be registered to be able to advertise at digital platforms.

Supply-side support measures are aimed at establishing new federal resorts (Black Sea, Caspian Sea, Azov Sea, Baltic Sea, Far East region). The program of special grants for hotels under 120 rooms is under consideration. Regions are to introduce Resort fee. New umbrella tourist brands are developed to redistribute tourist flows (Silver Necklace) as well as new resort areas (New Anapa, New Yevpatoria, Kayakent). The Road between Lagonaki resort (Adygea), Sochi and Arhyz resort is under consideration. Private capital is participating in tourism development (Arhyz resort was sold to private investor). Cruise tourism could gain ground (river, railroad) as well as automobile tourism. Another dimension is niche type tourism development (snow scooters, yachts).

Demand was supported via tourist cash back program. The lack of finance does mean the end of program. In November 2022 the industry waited for the next round (Ministry of Economic Development, 2022). Experts suggested, the program could be applied for least popular destinations in Far East (Izvestia, 2023). The program could be applied for particular tourism types (ethnical, ecological, patriotic). Another program is cashback for children – partial reimbursement for vacations at camps. Higher cashback for newlyweds during honeymoon was also under discussion in 2023. Student tourism was supported via the project of free trips to Far East for winners of national competitions under the title «More than Travel».

State support is aimed at supply rather than demand. It could be reasonable to support demand and to redistribute tourist flows.

Spatial development is relevant not only for Siberian and Far East Federal Districts (Fomin, Smirnov, 2022), but also for North Caucasian Federal District (Starodubrovskaya, Sitkievich, 2022) and Arctics (Zemskov, 2022). Priority tourism types could be stimulated as an alternative to current policies (children, student, inclusive, ecological). Cashback program could be applied to ecological tourism regions owing to the rising importance of ecological issues. The program would be applied to the following regions in this case: NFD (Komi Republic, Republic of Karelia, Archangelsk Region, Vologda Region, Leningrad Region, Kaliningrad Region), CFD (Orel Region, Tver Region), VFO (Penza Region, Kirov Region, Ulyanovsk Region), SFD (Republic of Adygea, Republic of Kalmykia, Astrakhan Region), NCFD (Republic of Ingushetia, Karachayevo-Circassian Republic, Stavropol Territory), UFD (Kurgan Region, Yamal-Nenets Autonomous Area), SFD (Republic of Altai, Krasnoyarsk Territory, Altai Territory, Irkutsk Region, Kemerovo Region), FFD (Republic of Buryatia, Primorye Territory, Kamchatka Territory, Amur Region, Chukotka Autonomous Area). Cashback could be a stimulus for ecological volunteers.

Student tourism could be developed on the model of Penza Region. During vacations students from other regions could be accommodated in dormitories. On the one hand, it could provide funds to repair the existing facilities, on the other hand it would be an economical way of travelling for low-income students. Another option is to develop seasonal student volunteering.

Tourism with children development is based on building new theme parks for families. Sochi Park and Island of Dream (Moscow) are examples of such parks. Tourism with children is more advanced in European part of Russia. New parks could be built in other Federal Districts (Chelyabinsk Region, Sakhalin Region, Kaliningrad Region).

Travel for new families is a promising area. New cluster of wedding tourism could be built in Amur Region. Wedding cashback could be an impetus for the region.

Inclusive tourism is underdeveloped today. Tourism portals do not provide information about rehabilitation opportunities.

Russian regions have great recreational potential. But investment is needed to develop infrastructure. The key challenge is to redistribute tourist flows. New place branding techniques could be applied. New interesting solutions with governmental support could be elaborated.

Table 1 Classic tourism

Tourism types	Regions
Event	Adygea, Republic of Buryatia, Republic of Dagestan, Republic of Mari El, Republic of Mordovia, Republic of Tatarstan, Republic of Udmurtia, Republic of Khakassia, Chechen Republic, Republic of Sakha, Perm Territory, Altai Territory, Kamchatka Territory, Krasnoyarsk Territory, Krasnodar Territory, Stavropol Territory, Khabarovsk Territory, Amur Reg, Arkhangelsk Reg, Astrakhan Reg, Belgorod Reg, Bryansk Reg, Vladimir Reg, Volgograd Reg, Vologda Reg, Voronezh Reg, Ivanovo Reg, Kaliningrad Reg, Kaluga Reg, Kemerovo Reg, Kirov Reg, Kurgan Reg, Kursk Reg, Leningrad Reg, Lipetsk Reg, Moscow Reg, Murmansk Reg, Nizhny Novgorod Reg, Novgorod Reg, Novosibirsk Reg, Omsk Reg, Orenburg Reg, Orel Reg, Rostov Reg, Ryazan Reg, Tver Reg, Tomsk Reg, Tula Reg, Ulyanovsk Reg, Chelyabinsk Reg, Yaroslavl Reg, Moscow, City of St Petersburg, City of Sevastopol, Jewish Aut. Area, Yugra.
Active	Adygea, Republic of Bashkortostan, Altai Republic, Republic of Ingushetia, Kabardino-Balkarian Republic, Republic of North Ossetia-Alania, Republic of Tatarstan, Republic of Udmurtia, Republic of Khakassia, Chuvashia, Republic of Crimea, Republic of Sakha, Primorye Territory, Kamchatka Territory, Krasnodar Territory, Stavropol Territory, Bryansk Reg, Vladimir Reg, Volgograd Reg, Vologda Reg, Voronezh Reg, Irkutsk Reg, Kaliningrad Reg, Kaluga Reg, Kemerovo Reg, Kirov Reg, Kostroma Reg, Leningrad Reg, Magadan Reg, Moscow Reg, Nizhny Novgorod Reg, Orel Reg, Rostov Reg, Ryazan Reg, Samara Reg, Saratov Reg, Sakhalin Reg, Sverdlovsk Reg, Smolensk Reg, Tambov Reg, Tula Reg, Tyumen Reg, Chelyabinsk Reg, Jewish Aut. Area, Yugra, Yamal, Chukotka Aut. Area.

Source: Made by author

Table 2 Specific tourism

Tourism type	Regions
Ecological	Adygea, Republic of Buryatia, Altai Republic, Republic of Ingushetia, Republic of Kalmykia, Karachayevo-Circassian Republic, Republic of Karelia, Komi, Primorye Territory, Altai Territory, Kamchatka Territory, Krasnoyarsk Territory, Stavropol Territory, Amur Reg, Arkhangelsk Reg, Astrakhan Reg, Vologda Reg, Voronezh Reg, Irkutsk Reg, Kaliningrad Reg, Kemerovo Reg, Kirov Reg, Kurgan Reg, Leningrad Reg, Orel Reg, Penza Reg, Tver Reg, Ulyanovsk Reg, Yamal, Chukotka Aut. Area.
Health	Adygea, Kabardino-Balkarian Republic, Karachayevo-Circassian

	Republic, Komi, Republic of North Ossetia-Alania, Republic of Tatarstan, Republic of Tyva, Republic of Udmurtia, Republic of Crimea, Trans-Baikal Territory, Kamchatka Territory, Krasnodar Territory, Stavropol Territory, Khabarovsk Territory, Astrakhan Reg, Bryansk Reg, Vladimir Reg, Volgograd Reg, Vologda Reg, Voronezh Reg, Ivanovo Reg, Kostroma Reg, Kurgan Reg, Novgorod Reg, Pskov Reg, Saratov Reg, Tula Reg, Tyumen Reg
Cuisine	Adygea, Republic of Bashkortostan, Republic of Dagestan, Komi, Republic of Mari El, Republic of Tatarstan, Republic of Tyva, Republic of Udmurtia, Republic of Khakassia, Republic of Crimea, Perm Territory, Primorye Territory, Krasnodar Territory, Astrakhan Reg, Vologda Reg, Kaluga Reg, Kirov Reg, Kostroma Reg, Leningrad Reg, Moscow Reg, Novgorod Reg, Orel Reg, Pskov Reg, Sverdlovsk Reg, Tomsk Reg, Tyumen Reg
Children	Bashkiria, Republic of Crimea, Republic of Khakassia, Chuvashia, Republic of Sakha, Krasnodar Territory, Krasnoyarsk Territory, Astrakhan Reg, Volgograd Reg, Vologda Reg, Voronezh Reg, Kirov Reg, Kostroma Reg, Kurgan Reg, Leningrad Reg, Moscow Reg, Novgorod Reg, Rostov Reg, Ryazan Reg, Samara Reg, Tambov Reg, Tula Reg, Tyumen Reg, Chelyabinsk Reg

Source: Made by author

Table 3 Special tourism

Tourism type	Regions
Religion	Adygea, Republic of Buryatia, Republic of Kalmykia, Republic of North Ossetia-Alania, Republic of Tatarstan, Republic of Tyva, Republic of Udmurtia, Chuvashia, Republic of Crimea, Stavropol Territory, Bryansk Reg, Vladimir Reg, Vologda Reg, Ivanovo Reg, Leningrad Reg, Novgorod Reg, Orel Reg, Pskov Reg, Samara Reg, Jewish Aut. Area
Ethnic	Republic of Bashkortostan, Republic of Dagestan, Republic of Kalmykia, Republic of Karelia, Republic of Mari El, Republic of Mordovia, Chuvashia, Kamchatka Territory, Stavropol Territory, Ivanovo Reg, Leningrad Reg, Lipetsk Reg, Magadan Reg, Moscow Reg, Nizhny Novgorod Reg, Novgorod Reg, Saratov Reg, Yamal, Nenets Aut. Area.
Industrial	Republic of Bashkortostan, Republic of Sakha, Amur Reg, Bryansk Reg, Vologda Reg, Ivanovo Reg, Kaluga Reg, Kemerovo Reg, Kirov Reg, Kostroma Reg, Kurgan Reg, Kursk Reg, Leningrad Reg, Orenburg Reg, Pskov Reg, Sakhalin Reg, Sverdlovsk Reg, Tula Reg, Chelyabinsk Reg, City of St Petersburg.
Rural	Republic of Sakha, Krasnodar Territory, Stavropol Territory, Astrakhan Reg, Bryansk Reg, Vologda Reg, Voronezh Reg, Ivanovo Reg, Kaliningrad Reg, Kaluga Reg, Kirov Reg, Kostroma Reg, Leningrad Reg, Orel Reg, Pskov Reg, Tomsk Reg, Tula Reg

Source: Made by author

Table 4 Innovational tourism

Вид туризма	Субъекты
Business	Republic of Crimea, Krasnodar Territory, Stavropol Territory, Voronezh Reg, Kaluga Reg, Leningrad Reg, Pskov Reg
Patriotic	Bryansk Reg, Kurgan Reg, Leningrad Reg, Novgorod Reg
Wellness	Republic of Buryatia, Republic of Tatarstan, Republic of Sakha, Irkutsk Reg
Education/Science	Kirov Reg, Orel Reg, Rostov Reg, City of St Petersburg.
Medical	Kirov Reg, Smolensk Reg
Inclusive	Volgograd Reg, Pskov Reg
Student	Penza Reg
Literature	Orel Reg
Wedding	City of St Petersburg.

Source: Made by author

Table 5 Same tourism profile

Субъекты	Виды туризма
Republic of Dagestan, Republic of Mari El	Event, cuisine, ethnic
Arkhangelsk Reg, Ulyanovsk Reg, Tver Reg	Event, ecological
Republic of Mordovia, Lipetsk Reg	Event, ethnical
Kursk Reg, Orenburg Reg	Event, industrial
Chechen Republic, Belgorod Reg, Murmansk Reg, Novosibirsk Reg, Omsk Reg, Yaroslavl Reg, Moscow, City of Sevastopol	Event
Altai, Republic of Ingushetia, Chukotka Aut. Area	Active, ecological

Source: Made by author

Table 6 Variety of leasure activities

Varieties of leasure activities	Quantity of regions (%)	Regions
1	10 (11,8%)	Chechen Republic, Belgorod Reg, Murmansk Reg, Novosibirsk Reg, Omsk Reg, Yaroslavl Reg, Moscow, City of Sevastopol, Nenets Autonomous Area, Trans-Baikal Territory,
2	23 (27%)	Altai, Republic of Ingushetia, Kabardino-Balkarian Republic, Karachayevo-Circassian Republic, Republic of Karelia, Republic of Mordovia, Perm Territory, Khabarovsk Territory, Arkhangelsk Reg, Irkutsk Reg, Kursk Reg, Lipetsk Reg, Magadan Reg, Orenburg Reg, Penza Reg, Ryazan Reg,

		Sakhalin Reg, Smolensk Reg, Tambov Reg, Tver Reg, Ulyanovsk Reg, Khanty-Mansi Autonomous Area, Chukotka Autonomous Area
3	18 (21,2%)	Republic of North Ossetia-Alania, Republic of Dagestan, Republic of Mari El, Republic of Kalmykia, Komi, Republic of Tyva, Tomsk Reg, Altaiский Territory, Krasnoyarsk Territory, Primorye Territory, Nizhny Novgorod Reg, Amur Reg, Samara Reg, Sverdlovsk Reg, Tyumen Reg, Saratov Reg, Jewish Aut. Reg, Yamal-Nenets Autonomous Area.
4-5	14 (16,5%)	Republic of Buryatia, Republic of Khakassia, Chuvashia, Republic of Udmurtia, Kamchatka Territory, Vladimir Reg, Ivanovo Reg, Kaliningrad Reg, Kemerovo Reg, Moscow Reg, Pskov Reg, Rostov Reg, Chelyabinsk Reg, City of St Petersburg.
6	12 (14,1%)	Адыгея, Republic of Bashkortostan, Republic of Crimea, Republic of Tatarstan, Republic of Sakha, Astrakhan Reg, Bryansk Reg, Volgograd Reg, Kaluga Reg, Kostroma Reg, Kurgan Reg, Tula Reg
7 и more	8 (9,4%)	Krasnodar Territory, Stavropol Territory, Vologda Reg, Voronezh Reg, Leningrad Reg, Novgorod Reg Orel Reg, Kirov Reg,

Source: Made by author

Table 7 Regional profiles

№	Regions	Tourism types
1	Leningrad Region	Event, cuisine, active, ecological, religion, ethnic, industrial, business, rural, children, patriotic
2	Vologda Region	event, cuisine, active, ecological, religion, health, industrial, rural, children
3	Adygea	event, cuisine, active, ecological, religion, health
4	Orel Region	event, cuisine, active, ecological, religion, rural, education, literature
5	Kirov Region	event, cuisine, active, ecological, industrial, rural, education, medical, children
6	Republic of Tatarstan	event, cuisine, active, religion, health, wellness
7	Republic of Udmurtia	event, cuisine, active, religion, health
8	Moscow Region	event, cuisine, active, ethnical, children
9	Krasnodar Territory	event, cuisine, active, health, business, rural, children
10	Kaluga Region	event, cuisine, active, industrial, business, rural
11	Republic of Khakassia	event, cuisine, active, children
12	Astrakhan Region	event, cuisine, ecological, health, rural, children
13	Novgorod Region	event, cuisine, religion, ethnical, health, children, patriotic
14	Republic of Dagestan	event, cuisine, ethnical

15	Republic of Mari El	event, cuisine, ethnical
16	Tomsk Region	event, cuisine, rural
17	Perm Territory	event, cuisine
18	Stavropol Territory	event, active, ecological, religion, ethnical, health, business, rural
19	Kamchatka Territory	event, active, ecological, ethnical, health
20	Voronezh Region	event, active, ecological, health, rural, business, children
21	Kemerovo Region	event, active, ecological, industrial
22	Kaliningrad Region	event, active, ecological, rural
23	Bryansk Region	event, active, religion, health, rural, patriotic
24	Vladimir Region	event, active, religion, health
25	ewish Autonomous Region	event, active, religion
26	Nizhny Novgorod Region	event, active, ethnical
27	Tula Region	event, active, health, industrial, rural, children
28	Volgograd Region	event, active, health, , children
29	Republic of Sakha	event, active, industrial, rural, children, wellness
30	Chelyabinsk Region	event, active, industrial, children
31	Rostov Region	event, active, education, children
32	Ryazan Reg	event, active, children
33	Khanty-Mansi Autonomous Area	event, active
34	Republic of Buryatia	event, ecological, religion, wellness
35	Kurgan Region	event, ecological, health, industrial, children, patriotic
36	Altai Territory	event, ecological, health
37	Amur Region	event, ecological, industrial
38	Krasnoyarsk Territory	event, ecological, children
39	Arkhangelsk Reg	event, ecological
40	Ulyanovsk Reg	event, ecological
41	Tver Region	event, ecological
42	Ivanovo Region	event, religion, health, industrial, rural
43	Republic of Mordovia	event, ethnical
44	Lipetsk Reg	event, ethnical
45	Khabarovsk Territory	event, health
46	City of St Petersburg	event, industrial, science, wedding
47	Kursk Reg	event, industrial
48	Orenburg Reg	event, industrial
49	Chechen Republic	event
50	Belgorod Reg	event
51	Murmansk Reg	event
52	Novosibirsk Reg	event
53	Omsk Reg	event
54	Yaroslavl Reg	event
55	Moscow	event
56	City of Sevastopol	event
57	Primorye Territory	Cuisine, active, ecological
58	Republic of Crimea	cuisine, active, religion, health, business, children

9	Republic of Bashkortostan	cuisine, active, ethnical, health, industrial, children
50	Kostroma Region	cuisine, active, health, industrial, rural, children
51	Sverdlovsk Region	cuisine, active, industrial
52	Tyumen Region	cuisine, active, children
53	Komi Republic	cuisine, ecological, health
54	Pskov Region	cuisine, religion, health, industrial, business
55	Republic of Tyva	cuisine, religion, health
56	Chuvash Republic	Active, religion, ethnical, children
57	Republic of North Ossetia-Alania	active, religion, health
58	Kabardino-Balkarian Republic	active, health
59	Chukotka Autonomous Area	active, ecological
70	Altai Republic	active, ecological
71	Republic of Ingushetia	active, ecological
72	Yamal-Nenets Autonomous Area	active, ecological, ethnical
73	Irkutsk Region	active, ecological, wellness
74	Samara Region	active, religion, children
75	Magadan Region	active, ethnical
76	Saratov Region	active, ethnical, health
77	Sakhalin Region	active, industrial
78	Smolensk Reg	active, medical
79	Tambov Reg	active, children
80	Republic of Kalmykia	Ecological, religion, ethnical
81	Karachayevo-Circassian Republic	ecological, health
82	Republic of Karelia	ecological, ethnical
83	Penza Region	ecological, student
84	Nenets Autonomous Area	Ethnical
85	Trans-Baikal Territory	Health

Source: Made by author

Table 8 Hospitality Index 2023

City of St Petersburg	0,2579	Voronezh Region	0,0931
Krasnodar Territory	0,2347	Volgograd Region	0,0926
Moscow Region	0,1470	Kaliningrad Region	0,0917
Republic of Tatarstan	0,1339	Sverdlovsk Region	0,0907
Republic of Bashkortostan	0,1123	Chelyabinsk Region	0,0887
Orel Region	0,1082	Tula Region	0,0850
Leningrad Region	0,1074	Nizhny Novgorod Region	0,0826
Rostov Region	0,1049	Vologda Region	0,0817
Moscow	0,0982	Stavropol Territory	0,0798
Republic of Crimea	0,0976	Astrakhan Region	0,0773

Irkutsk Region	0,0761	Ryazan Region	0,0378
Tyumen Region	0,0697	Bryansk Region	0,0372
Novgorod Region	0,0652	Khabarovsk Territory	0,0371
Kaluga Region	0,0641	Yaroslavl Region	0,0364
Primorye Territory	0,0623	Khanty-Mansi Autonomous Area	0,0356
Samara Region	0,0616	Sakhalin Region	0,0353
Kamchatka Territory	0,0615	Amur Region	0,0348
Kemerovo Region	0,0614	Kurgan Region	0,0339
Penza Region	0,0601	Republic of Mordovia	0,0338
Krasnoyarsk Territory	0,0588	City of Sevastopol	0,0323
Vladimir Region	0,0581	Lipetsk Region	0,0322
Republic of Udmurtia	0,0581	Novosibirsk Region	0,0322
Republic of Karelia	0,0548	Ulyanovsk Region	0,0318
Republic of Buryatia	0,0547	Murmansk Region	0,0317
Ivanovo Region	0,0546	Omsk Region	0,0313
Pskov Region	0,0539	Kursk Region	0,0311
Smolensk Region	0,0536	Republic of North Ossetia-Alania	0,0310
Yamal-Nenets Autonomous Area	0,0527	Republic of Khakassia	0,0302
Altai Republic	0,0527	Republic of Mari El	0,0293
Kirov Region	0,0526	Republic of Adygea	0,0289
Komi Republic	0,0520	Tambov Region	0,0271
Altai Territory	0,0502	Karachayevo-Circassian Republic	0,0250
Tomsk Region	0,0500	Trans-Baikal Territory	0,0194
Saratov Region	0,0479	Republic of Ingushetia	0,0191
Republic of Dagestan	0,0466	Belgorod Region	0,0182
Kostroma Region	0,0459	Magadan Region	0,0171
Republic of Sakha	0,0452	Republic of Kalmykia	0,0167
Kabardino-Balkarian Republic	0,0436	Chechen Republic	0,0144
Orenburg Region	0,0412	Jewish Autonomous Region	0,0142
Tver Region	0,0410	Republic of Tyva	0,0121
Perm Territory	0,0402	Chukotka Autonomous Area	0,0115
Chuvash Republic	0,0399	Nenets Autononomous Area	0,0088
Arkhangelsk Region	0,0395		

Source: Made by author

Regions	Digital Coefficient
Moscow, Moscow Region, Republic of Tatarstan, Republic of Bashkortostan, Rostov Region, Volgograd Region, Chelyabinsk Region, Tula Region, Orel Region, Nizhny Novgorod Region, Astrakhan Region, Republic of Udmurtia, Kamchatka Territory, Komi Republic, Kabardino-Balkarian Republic, Altai Republic	2
City of St Petersburg, Krasnodar Territory, Sverdlovsk Region, Voronezh Region, Tyumen Region, Primorye Territory, Republic of Buryatia, Yamal-Nenets Autonomous Area, Sakhalin Region, Ivanovo Region,	1,75

Khanty-Mansi Autonomous Area, Altai Territory, Orenburg Region, Arkhangelsk Region, Kursk Region, Ulyanovsk Region, Murmansk Region, Omsk Region, Yaroslavl Region, Magadan Region, Jewish Autonomous Region, Chechen Republic, City of Sevastopol, Chukotka Autonomous Area	
Leningrad Region, Republic of Crimea, Republic of Sakha, Irkutsk Region, Vologda Region, Penza Region, Republic of Dagestan, Krasnoyarsk Territory, Kaluga Region, Samara Region, Kemerovo Region, Kaliningrad Region, Novgorod Region, Saratov Region, Vladimir Region, Smolensk Region, Kostroma Region, Tomsk Region, Chubash Republic, Perm Territory, Khabarovsk Territory, Amur Region, Republic of Karelia, Ryazan Region, Republic of North Ossetia-Alania, Tver Region, Lipetsk Region, Republic of Khakassia, Republic of Mari El, Republic of Tyva, Nenets Autonomous Area, Republic of Ingushetia	1,5
Stavropol Territory, Kirov Region, Bryansk Region, Pskov Region, Kurgan Region, Novosibirsk Region, Tambov Region, Trans-Baikal Territory, Republic of Mordovia, Belgorod Region, Republic of Kalmykia	1,25
Republic of Adygea, Karachayevo-Circassian Republic	1

Table 9 Digital coefficient

Source: Made by author

Table 10 Result sustainability

	HIndex	Tourist flow Jan-Feb 2023	NRA	Expert RA
City of St Petersburg	1	5	5	2
Krasnodar Territory	2	4	7	37
Moscow Region	3	2	9	10
Republic of Tatarstan	4	6	2	4
Republic of Bashkortostan	5	9	29	48
Orel Region	6	63	36	32
Leningrad Region	7	3	22	1
Rostov Region	8	18	37	27
Moscow	9	1	1	3
Republic of Crimea	10	12	77	29
Voronezh Region	11	25	20	16
Volgograd Region	12	45	71	63
Kaliningrad Region	13	49	14	65
Sverdlovsk Region	14	7	15	9
Chelyabinsk Region	15	15	38	35
Tula Region	16	39	26	19
Nizhny Novgorod Region	17	8	33	31

Vologda Region	18	20	39	26
Stavropol Territory	19	10	70	56
Astrakhan Region	20	68	57	62
Irkutsk Region	21	19	49	49
Tyumen Region	22	16	3	8
Novgorod Region	23	36	51	30
Kaluga Region	24	34	17	11
Primorye Territory	25	17	31,5	52
Samara Region	26	24	23	24
Kamchatka Territory	27	58	58	76
Kemerovo Region	28	13	44	82
Penza Region	29	54	73,5	23
Krasnoyarsk Territory	30	14	18	47
Vladimir Region	31	31	63	36
Republic of Udmurtia	32	43	40	39
Republic of Karelia	33	38	83	78
Republic of Buryatia	34	44	56	64
Ivanovo Region	35	64	76	54
Pskov Region	36	46	84	74
Smolensk Region	37	48	64	43
Yamal-Nenets Autonomous Area	38	56	6	22
Altai Republic	39	75	62	81
Kirov Region	40	33	43	46
Komi Republic	41	62	72	67
Altai Territory	42	11	65	53
Tomsk Region	43	61	21	66
Saratov Region	44	37	66	14
Republic of Dagestan	45	73	82	45
Kostroma Region	46	65	53	58
Republic of Sakha	47	76	12	12
Kabardino-Balkarian Republic	48	57	69	73
Orenburg Region	49	52	54	50
Tver Region	50	22	75	13
Perm Territory	51	26	47	51
Chuvash Republic	52	40	42	28
Arkhangelsk Region	53	27	31,5	60
Ryazan Region	54	42	50	17
Bryansk Region	55	50	41	57
Khabarovsk Territory	56	47	11	34
Yaroslavl Region	57	23	45	38
Khanty-Mansi Autonomous Area	58	29	13	5
Sakhalin Region	59	30	8	20
Amur Region	60	69	61	61
Kurgan Region	61	41	67	79
Republic of Mordovia	62	66	25	41
City of Sevastopol	63	67	24	40
Lipetsk Region	64	53	28	6
Novosibirsk Region	65	21	16	44

Ulyanovsk Region	66	51	34	18
Murmansk Region	67	32	55	42
Omsk Region	68	35	48	59
Kursk Region	69	60	19	7
Republic of North Ossetia-Alania-	70	77	79	68
Republic of Khakassia	71	59	85	75
Republic of Mari El	72	55	73,5	33
Republic of Adygea	73	74	60	15
Tambov Region	74	72	30	71
Karachayevo-Circassian Republic	75	71	68	72
Trans-Baikal Territory	76	70	35	80
Republic of Ingushetia	77	82	81	70
Belgorod Region	78	28	4	21
Magadan Region	79	80	10	83
Republic of Kalmykia	80	78	80	84
Chechen Republic	81	79	52	77
Jewish Aut. Region	82	83	59	55
Republic of Tyva	83	84	78	85
Chukotka Aut. Area	84	81	27	69
Nenets Aut. Area	85	85	46	25

Source: Rosstat, Expert RA, National rating agency

Table 11 Correlation matrix

	Hospitality index	Expert RA	National rating agency
Hospitality index	1	0,36	0,25
Expert RA	0,36	1	0,53
National rating agency	0,25	0,53	1

Source: Made by author

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