Global Problems in the Sphere of the Systematic Approach

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Abstract

Research background: The economy is a complex socio-dynamic system its functioning and development depends on the periodization due to cyclicity. Transformations during the period of stable development of the economy have a stable character and are fixed in its structure. The shock conditions of the economy are characterized by the critical nature of the flow of processes. Over a transitional period these conditions often have contradictions in the social, economic and environmental subsystems which are becoming more acute. Despite the complexity of the processes taking place on a global scale for a long period of time, there are key problems at the global level in each subsystem of the economy that have a bright color and do not lose their relevance. This is the problem of population growth in the social sphere and the problem of global warming in the environmental sphere. Finally, there is the problem of limited economic resources, smoothed out by their interchangeability and complementarity, but still not having a complete solution. The delayed or incomplete solution of these problems predetermines both the problem of the greenhouse effect, and the problem of the coronavirus pandemic, as well as, the problem of sanctions. In this regard, it can be assumed that shock states caused by the presence of key socio-ecological and economic problems, despite their "obvious" unpredictability, obey certain forecasts. This means that even for a period of economic instability, it is possible to obtain a fairly reliable assessment of changes in economic growth, structural shifts and the quality of life of a single economy included in the processes of global interaction.
Purpose of the article: The goal set by the authors is to study the key global problems in relation to the processes of economic growth and development and shock states of the economy.
Methods: The methodological basis of the research was based on a systematic approach, the principles of dialectical logic, the use of cause-effect and functional-structural analysis, giving an opportunity to revise key global problems and their impact on modern economic

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development. The work was accompanied by the use of methods of analysis and synthesis, deduction and induction, detailing, comparison, analogy, scientific abstraction and logical laws..
Findings & Value added: In the course of the research, the identification of key problems of the world economy was carried out, the causal relationship of globalization, aggravation of key problems, shock states of the economy and their predictability were analyzed.

Keywords: *economy, global problems, economic growth, quality of life.*

JEL Classification: *R13; F01*

1 Introduction

Rapid economic development and an unprecedented burst of economic growth at the turn of the 20th and 21st centuries created the conditions for the transition of the economy to a new state. Experts attribute this state to the changing role of information in the economy, the emergence of its new resource function and, as a result, the modernization of technological production methods. In addition to the emergence and widespread introduction into production of a new, information technology, revolutionary discoveries and inventions have occurred in the field of nano- and biotechnologies, as well as cognitive science. Currently, these phenomena are qualitatively changing the sectoral structure of the economy, directing its development in a new direction. The foregoing is in good agreement with the theory of cyclical economics.

The idea of cyclicality as the fundamental principle of the world has been in the minds of great thinkers since the times of Ancient Greece and Ancient China. Economists drew attention to this phenomenon at the beginning of the 19th century, when studies of crisis phenomena in the economy began to be carried out. The result was the emergence of the theory of the economic cycle, aimed at determining the role of cyclicity in the development of the economy. The cyclicity of both natural and social processes is a factor that certainly affects the state of the economy, its growth and development.

The cycle in the economy is defined as the expansion and contraction of economic activity periodically repeated over a number of years. According to the well-known theory of cyclicity N.D. Kondratiev, the presence of upward and downward components in one cycle plays the role of non-random shocks: technological shifts are caused by a change in the demands of production, war and revolution - a consequence of economic, social and political instability. Too rapid evolutionary development increases the instability of the socio-ecological and economic system, leads to crises and exacerbates long-standing problems.

Moving further in line with the systemic approach, we will consider the single economic space of the country as a symbiosis of private spaces that reflect a certain sphere of activity of society and fill it completely. Being in interaction, each of the private spaces functions according to its own laws, has characteristic features and peculiarities. Common in such a system is the presence of social, economic and environmental subsystems.

Under the conditions of sustainable development, the transformations that take place in the system are accompanied by a progressive change in the content of its natural-ecological, socio-demographic, technological, geopolitical and socio-cultural components. The period in which the crisis situation is growing, which requires the creation of new, promising technologies, becomes problematic, which predetermines the transition to the next technological order and a better quality of life. The revealed pattern gave impetus to large-scale studies of the causes and consequences of economic growth. One of the well-known works devoted to this topic: "The Limits to Growth" (Medous, 2007), appeared exactly 50 years ago.

Over the past fifty years, close attention to the issues of depletion of natural resources and overpopulation on a planetary scale not only did not solve these problems, but also gave rise to new problems that became a source of socio-cultural differences.

2 Limited economic resources and sanctions

The driving force behind economic growth and development is rightly considered to be the problem of limited economic resources. It is clear and has the widest distribution among different segments of the population. The search for a solution to the problem of limited resources allowed in the second half of the last century billions of people to get out of poverty and improve their quality of life.

Vivid examples of demonstrating that despite the awareness of the problem of limited resources, it remains unresolved, can be observed in natural objects.

So, until 1960, the Aral Sea was one of the largest closed water bodies in the world, the fourth largest of the world's seas. Active economic activity and neglect of the laws of natural development of the sea ecosystem led to the fact that the Aral began to die rather quickly, if we think on a planetary scale (International Group, 2019).

Figure 1. Depletion of the resources of the Aral Sea.

Source: Satellite footage.

The consequences of the destruction of the ecosystem of the sea were large-scale and covered all the inhabitants of the coastal territories of the Aral Sea. Overexploitation has not only reduced the amount of water resources in the Aral Sea region, but also suppressed its environmental and climate-forming functions. Pesticides from factories and fertilizers that fell into the sea, after drying, spread over territories within a radius of 500 km and caused chronic, respiratory, cardiovascular and cancerous diseases. Abnormal mortality of infants and mothers was registered in the Aral Sea region. Salt dust settled on the fields, deforming the soil, thereby making agricultural work impossible (Chembarisov, 2019, World of Change, 2022).

Another example of overexploitation and destruction of an entire ecosystem is deforestation in the state of Rondônia in Brazil. Since the 1940s, for the sake of plantations and livestock farms, a large part of the tropical forests has been gradually cut down. Later, illegal logging began to develop in the forests near the Amazon.

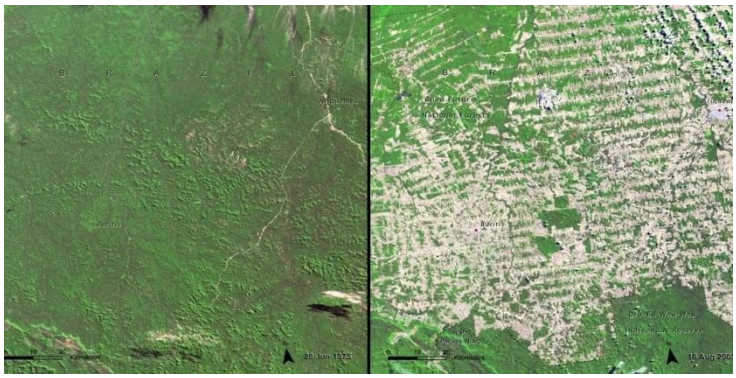

Figure 2. Tropical forest depletion in the state of Rondonia, Brazil

Source: Satellite footage.

According to NASA, 700,000 km^2 of forest has been cleared since the 1970s, and by 2018, the Amazon rainforest was only 80% of what it was before. It is predicted that if people do not take urgent action to save the rainforest ecosystem, by 2030, its size will be reduced to 40%, and in another 15 years, deforestation will occur in the region.

Given the contribution of the Amazon rainforest to global ecosystem balance, the BRL 1 billion allocated in Brazil to monitor illegal logging and wildfires clearly does not compensate for the overexploitation of the region's forest resources. Attempts to locally solve the problem of limited natural resources at the global level, for example, by replacing them with capital resources, can also provoke problems of the limited nature of the latter. This is one of the reasons why the problem of the disappearance of the Amazon rainforest has not yet been resolved, although at the present stage of technological development, forest resources in the economy have numerous substitutes for their economic use.

More specific, in comparison with the problem of limited natural resources, today is the problem of limited information resources. The limitation of information resources, which manifests itself in the introduction of legislative boundaries for their use, for example, in connection with intellectual property rights or in connection with state secrets or completely confidential knowledge, is considered relative.

In the conditions of the knowledge economy, when information is considered easily accessible, limitations are often associated not with the prohibition of its use, but with the peculiarities of its consumption. So, people can limit themselves in using this resource for some moral and ethical reasons, and some do not need to consume useful information resources at all. The other extreme is when the effect of the degrading influence of entertainment resources on the Internet arises. Scientists from the University of Amsterdam found that the degradation of people is due to their lifestyle, in which entertainment and the consumption of "empty" information pushed high-tech knowledge, which is the main element of information resources, into the background.

Despite the specificity of information as a resource, the principles of interchangeability and complementarity also work in relation to it. Thus, in order to solve the problem of limited information resources due to their degrading influence, it is necessary to agitate society to obtain useful knowledge in any form. Of the possible solutions to the problem, it is proposed to limit the consumption of "entertainment content" on the Internet, which, however, cannot be implemented in practice (Simanovich , 2017). In addition, the spread of digitalization will help reduce the cost of information resources through communication technologies, and will also help to implement the theory of cost internalization, in which all interaction and cooperation will be closely interconnected (Banalieva and Dhanaraj, 2019).

Thus, the complementarity and fungibility of resources, as before, are only a partial solution to the problem of limited resources. Moreover, at the present time, when the world in its development is entering the next technological order, there is a temptation to solve the problem of the limited resources of most resources by forceful methods. This quite clearly illustrates the process of imposing sanctions (Zhulega, Gagulina and Samoylov, 2018). Considered as an instrument of soft power, sanctions act as a counterbalance to sustainable development, reducing the quality of life not only in the country they affect, but also in many other countries.

The instability that has arisen in the economic subsystem becomes a serious source of instability in both the ecological and social subsystems. To demonstrate this, let's turn to another global issue, global warming.

3 Greenhouse effect, fight against global warming and pandemic

Despite the fact that the world is rapidly moving towards Industry 4.0, the basis of climate change today, as well as more than a century ago, is the intensive burning of fuel for human activities.

One of the main manifestations of climate change is the change in the temperature of the Earth's surface. Thus, according to NASA data, the average annual temperature of land and ocean, from 1880 to 2020, despite annual fluctuations in temperature indices, increased by 1°C (Data.GISS, 2022). However, the consequences of global warming are much more serious than just rising temperatures.

Warming changes the pattern of precipitation, increases coastal erosion, lengthens the growing season in some regions, changes the distribution area of some infectious diseases, and also causes glacier thawing. So, the NASA website contains a huge amount of materials on natural disasters that are the result of global warming. These include: sea level change - sea level has risen by 10.1 cm since 1993 (Sea Level, 2022), a significant increase in extreme weather events (floods, landslides, hurricanes, drought), which occurs everywhere (Extreme Weather, 2022).

Of course, such large-scale changes carry risks to ensure security, sustainable development and quality of life. Humanity has already faced the consequences of global warming: the fires in Siberia in 2019 are one of the largest fires in the last 20 years, forest fires in Australia in the 2019-2020 season. It is important to note that fires entail not only the depletion of forest flora, changes in the physical, chemical, and biological properties of soils, financial costs, and human losses, but also the loss of the Earth's vegetation cover, which prevents the greenhouse effect (Agbeshie, Abugre, Atta-Darkwa & Awuah 2022).

The relationship between climate change and human economic activity has already been identified, and there is a range of scientific evidence recognized by the international community. Global warming and climate change have occurred primarily as a result of the release of huge amounts of greenhouse gases into the Earth's atmosphere, which led to the development of the greenhouse effect, respectively. Therefore, since the moment the global nature of the problem of planetary warming was realized, since the end of the last century, actions have been actively taken, including by international organizations, including the UN, aimed at its joint solution by the countries of the world. A number of forums were convened and documents such as the Framework Convention on Climate Change (FCCC) (concluded in New York on May 9, 1992) (United Nations Framework Convention on Climate Change, 2022), the Kyoto Protocol of 1997 (Kyoto Protocol, 2022) and the Paris Agreement of 2015 (United Nations Paris Agreement, 2015) were adopted.

Countries participating in the Kyoto Protocol committed themselves between 2008 and 2012 to reduce the total amount of emissions into the atmosphere of six gases that accelerate the greenhouse effect. It was assumed that gas emissions should be reduced by 5.2%

compared to 1990 levels. However, the "Kyoto Protocol", which ended in 2020, is considered by most experts to be unsuccessful, since the results achieved within its framework did not allow any significant impact on the climate system.

Greenhouse gas emissions around the world as a whole by 2011 increased by about 41.9% (Global Energy Review, 2022), and according to the International Energy Agency (IEA), global carbon dioxide emissions in 2021 reached a record high level: 36.3 billion tons. The coincidence in 2021 of a 5.9% jump in global economic output from lockdowns in 2020, a 6% increase in carbon dioxide emissions and abnormal weather in many regions of the globe this year, some climate change experts believe, highlight the close link between growth and GDP and global warming.

According to data provided by the US Environmental Protection Agency, the sectors of the economy that generate the largest amount of greenhouse gases are: electricity generation (25%), agriculture, forestry and other land use (24%), industry (21%) and transportation (14%) (Global Greenhouse Gas Emissions Data, 2022). It is also important to take into account that the “dominant sectors” in terms of greenhouse gas emissions change depending on the economic situation at the international and regional levels. For example, during the pandemic, carbon emissions in the transport sector dropped sharply, but in 2021, emissions in the electricity sector reached their peak.

The crisis caused by the COVID-19 pandemic made it possible to obtain data on changes in world GDP production, greenhouse gas emissions and weather anomalies over a comparable time interval, which was almost never possible before. This once again confirms the hypothesis that man is a kind of “catalyst” and the cause of global warming, since it is due to human activity that such a colossal emission of greenhouse gases occurs, accelerating the process of the greenhouse effect. However, further we come to the conclusion that the coordinated adoption of a number of documents on a planetary scale and the fulfillment of the conditions prescribed by them is insufficient to achieve results that contribute to the prevention of climate change.

In addition, socio-economic problems and unforeseen changes at the political, economic and social levels, such as the pandemic in 2020, the global economic crisis in 2022, are exacerbating other urgent global problems. In this regard, the question arises: are there natural mechanisms that can affect the critical situation in the world? It is expedient to search for an answer to the question posed in line with the analysis of natural growth processes.

4 Natural growth and economic growth

Natural growth is a phenomenon that can be observed quite often in nature: in any combination of living beings, provided there is an abundance of food, a vast territory and the absence of enemies that threaten life. A characteristic feature of the processes of natural growth is the increase in the considered object in the same number of times for equal periods of time. Thus, from a plant called kuroslep, which produces 15,000 seeds three times a year, $15000^3 = 3375$ billion plants could be produced. From time to time, due to the formation of extremely favorable conditions for reproduction, disasters occur in one or another region of the planet, such as the invasion of locusts on the African continent, the reproduction of rabbits in Australia, etc.

The projection of natural growth processes onto the human population has forced us to take a fresh look at the demographic changes taking place on the globe. Thus, the problem of the growth of the Earth's population and the related problem of the depletion of resources necessary for existence was posed.

Despite the fact that the differential equation for predicting the growth of the Earth's population was proposed by Malthus T.R. in 1798, this problem was raised loudly in the 20th century, when, in a relatively short period of time, the growth rate of population increased

sharply from less than 1% to 2% or more. The doubling trend has been tracked since 1950, when the population was 2.5 billion, and in 1987 it was already 5 billion. Thus, it took about 37 years to double the population. Current data show that it took 48 years to jump from 4 billion (1974) to 8 billion (2022) (Countrymeters. Dannyye, 2022). According to the UN forecast, the next doubling of the population from 5 billion inhabitants of the planet (1987) to 10 billion people by 2050 will take more than 70 years (Fig. 3).

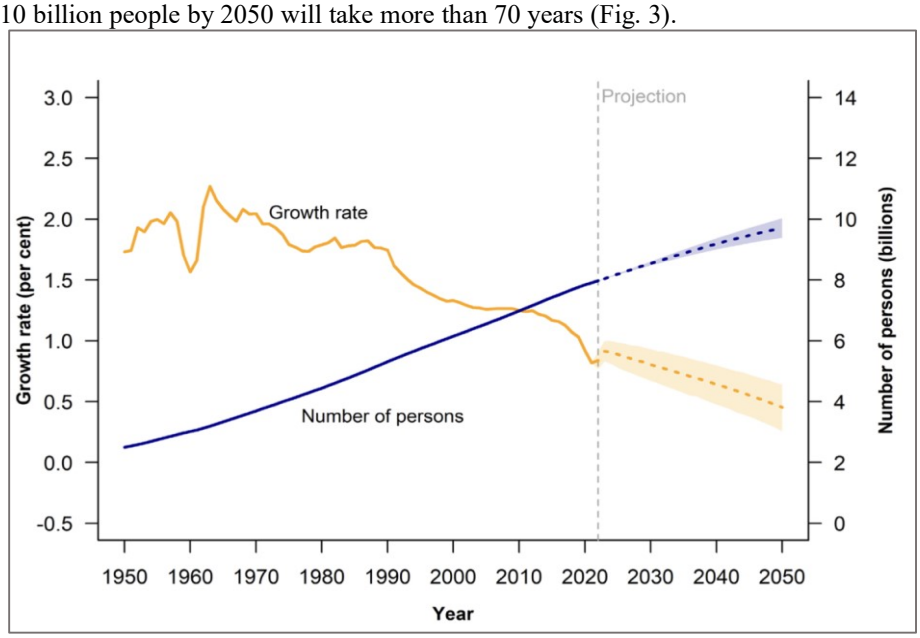

Figure 3. World population and annual growth 1950-2022, forecast up to 2050 (United Nations Department of Economic and Social Affairs, 2022)

Source: Own processing.

Over a hundred years: from 1950 to 2050, the world's population grew fastest between 1962 and 1965, when the growth rate averaged 2.1% per year. Gradually, the population growth rate slowed down, and eventually slowed down to 1% due to declining birth rates and economic crises. However, even with a critically low growth rate for our time: less than 0.5%, the mark of 10 billion people, according to experts, will be reached by 2050.

What threatens the overpopulation of the Earth and is it possible?

Thinking about the problem of overpopulation, scientists are divided into two camps. Some believe that the problem will lead to the collapse of the Earth, others argue that there is no problem, and the observed population growth is only a temporary phenomenon.

Indeed, if you look at the graphical representation of the dynamics of the growth of the Earth's population (Fig. 4), you can notice the similarity with a hyperbole and accept as true the problematic nature of the current situation.

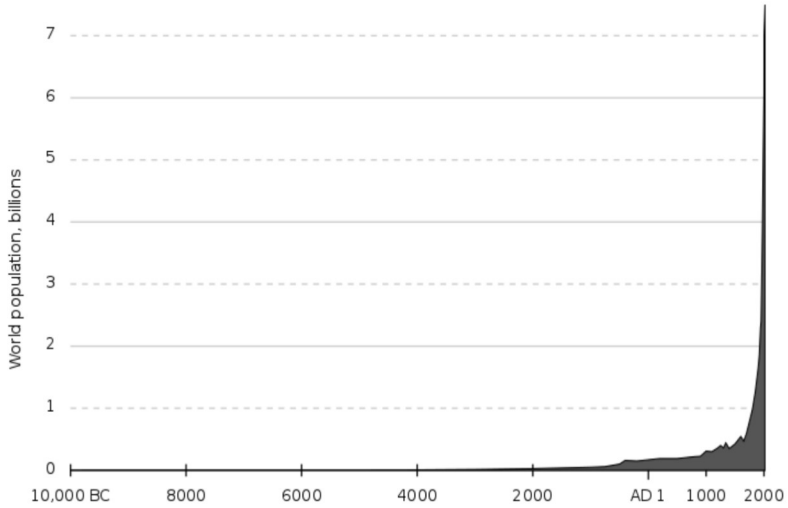

Figure 4. World population and annual growth 1950-2022, forecast up to 2050 (United Nations Department of Economic and Social Affairs, 2022)

Source: Own processing.

At the same time, keeping in mind the law of natural growth and considering that a person, like all living things on the planet, is subject to its action, one should not oversimplify the observed picture. Indeed, the growth rate, initially described by an exponential function, subsequently slows down and a period of saturation occurs, which is described by the P.F. Verhulst logistic curve. An "explosion" is thus not something inevitable due to the operation of natural limiting factors.

With the emergence of the problem of the spread of coronavirus infection in December 2019, more and more people began to think that the Earth was already overpopulated, because the virus was actively spreading and continues to spread by airborne and contact routes. In 2022, it is hard for us to believe that there are still people somewhere who have not been ill with the coronavirus.

The increase in mortality during the pandemic was not offset by an increase in the birth rate. A similar picture has developed throughout the world: by 2020, global population growth is falling from 1.1% to 1% (Fig. 5).

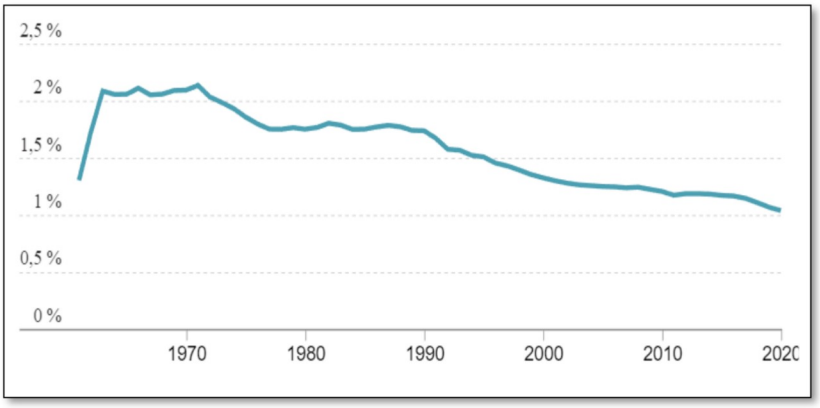

Figure 5. World population growth rate by 2020 (Russian Statistical Yearbook, 2022)

Source: Own processing.

In the Russian Federation, according to Rosstat, in 2020, population growth became negative and amounted to (-0.4)%. The birth rate in 2019 was 10.1, and in 2020 it dropped to 9.8. The death rate rose to a record 14.6. The lockdown, which had to be introduced to solve the problem, limited the population in social and family needs, because of which people did not get to know each other, they created fewer families.

The coronavirus pandemic thus showed humanity's vulnerability to threats that acted as natural mechanisms for limiting the planet's population. Against the background of the problem of limited economic resources and global warming, the pandemic has become a serious destabilizing factor for the entire global economy.

5 Results and discussion

Summing up, let's compare the obtained results.

The global socio-ecological-economic system is currently experiencing maximum stress in each of its subsystems. The consequence of this is not just the presence of urgent unresolved global problems, but also their aggravation due to the operation of the law of natural growth, which, in turn, limits the sustainability of economic growth.

Due to the crisis nature of modern economic development, the pressure of global problems is disproportionately large compared to the measures taken at the regional and global level. Therefore, measures to maintain the stability of the global socio-ecological and economic system do not bring the expected results.

We have considered only some of the limitations that impede economic development at the present stage of scientific and technological development. To overcome them, a technological breakthrough or a new resource niche is needed, which is in good agreement with the theory of cyclicity and the current phase of the economic cycle.

6 Conclusions

The identification and study of global problems of the socio-ecological and economic system in a single bundle made it possible to identify their relationship with the processes of modern economic growth and development, to look at the ideas of cyclicality from a new perspective.

The latest technologies, created on new principles of operating information as a resource, are already making the world unrecognizable today. This is most noticeable in the financial sector, which is the most globalized and virtualized of all sectors of the economy. The widespread use of the latest information technologies promises to radically change the role and functions of money in the very near future.

If we assume that information has become the very resource that provided a new resource niche, then this is the bifurcation point that can bring the economy out of the crisis. The resource potential of information is enormous. This includes saving many types of resources, and reducing the anthropogenic effect on the environment, and expanding the cognitive and other capabilities of people.

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