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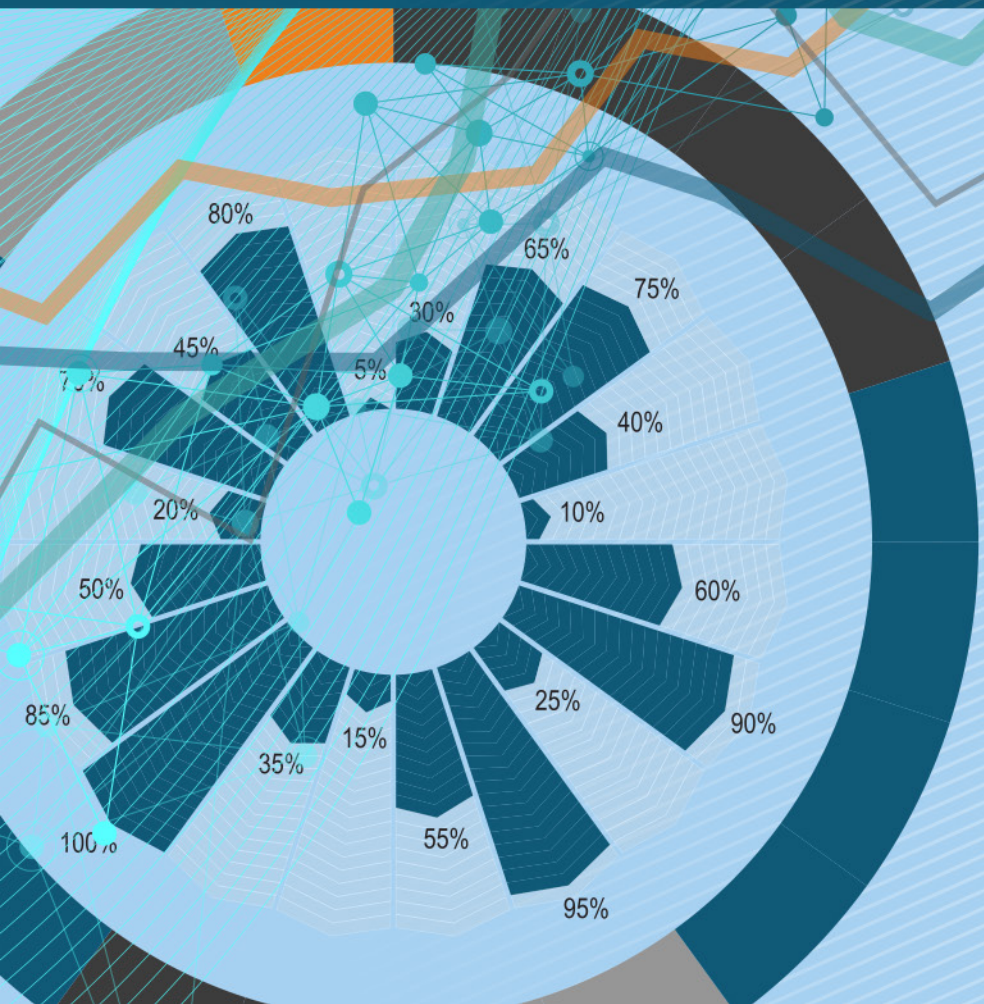

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Contents

Import substitution in the global economy: historical experience and theoretical approaches

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ORIGINAL ARTICLE

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Abstract. The article examines import substitution in the global economy in terms of the historical experience of various countries and theoretical approaches to its implementation. The research analyses the historical stages of the formation of import substitution as an economic phenomenon. It considers the industrialisation of the 19th – early 20th centuries in developed countries and the policy of post-war reconstruction in Latin America and Asia. Indeed, the paper draws a special attention to comparing the Latin American model, focused on the domestic market, with the East Asian approach, combining protectionism with an export-oriented strategy. Moreover, the research examines the positive and negative aspects of import substitution policy in various countries, including the impact of government support, the transparency of the economy, and the technological development. The relevance of the topic is due to the increasing policy of sanctions pressure on Russia, causing the implementation of the effective import substitution measures, especially in high-tech industries. For instance, Russia's dependence on imports in 2022 in the manufacture of medicines reaches 45%, in the manufacture of textiles – 28%, and in heavy machinery – 65%. Therefore, it as a threat to national economic security. The purpose of this study is to examine the historical experience of the global economy, analyse the theoretical approaches to import substitution, and identify the most effective strategies for its implementation in modern Russia. Logically, we study the historical experience of the different countries to understand the prerequisites and consequences of import substitution policy, and the theoretical foundations of the concept to form a comprehensive understanding of the phenomenon. This paper dwells on the use of historical, comparative, and logical methods, and analyses the works of leading economists. Analysing various approaches to concept of import substitution, we conclude on the importance of a balanced approach. Those combines a multi-level economic strategy for the development of competitive national production with the ability to completely or partially replace imported goods and the structure of imports.

Keywords: import substitution; global economy; ISI strategy; import substitution policy; history of import substitution

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Introduction

The international trade at the current stage of global economic development provides countries with the opportunities to increase exports, but makes them dependent on imported goods.

In the current situation, ensuring and maintaining the competitiveness of domestic goods in relation to imported foreign counterparts is very important as providing the export potential and independence of the domestic market. Therefore, countries are increasingly paying attention to the development of the domestic production and changing the structure of imports.

However, the low level of industrial modernisation and the inability of domestic producers to meet domestic demand makes imported goods relevant for most countries due to the absence of necessary resources for the production of certain goods. At the same time, the country has to cover the foreign trade costs of import with foreign currency funds received from exports. In the countries with low export potential, dependence on imports of finished products in the long term can cause a decrease in demand for domestic products, and an increase in the country's external debt. Therefore, import substitution issue is of the particular importance.

The research uses the following general scientific research methods: historical and logical analysis and synthesis, modelling, comparison, graphical method. Additionally, the paper examines the literature on the history of import substitution and the implementation of various strategies of the economic development.

Main Part

In the modern conditions of the geo-economic and geopolitical development, the countries cannot be independent in terms of the necessary goods, services, and resources. The elimination of imports of the finished products for many unavailable items often results in the emergence of parallel import flows or raw materials and components imported into the country.

The policy of import substitution was provided by many countries of the world and in different periods of their development. Import substitution in the world economy has occurred over a long-term period. It makes possible to identify its certain stages.

The first stage is the experience of the developed countries during the industrialisation period of the 1850s and 1920s. For instance, The USA, escaping the colonial dependence on Great Britain, constantly used various customs restrictions on British goods to develop their own industry. In the second half of the 19th century, the German industry gradually displaced the goods of England and France from the domestic market, becoming more competitive on world markets [22]. Those time, almost all modern developed countries used tariff protection and subsidies to stimulate the development of their industries. The United States, Germany, and the United Kingdom used protection and subsidy measures most aggressively, despite their leading positions in global industrial potential, free market policies, and trade. Indeed, these countries formed the basis of the world import substitution policy [8]. France, the Netherlands, and Switzerland actively used import substitution in the early stages of industrialisation. The implementation of protectionist measures disagrees with the free competition, and caused the market stagnation. It was due to insufficient domestic manufacturers' motivation to produce the goods during a decrease in the competition. On the other hand, the decrease in the share of imported goods and their replacement with domestic analogues gave an impetus to the development of the national industries, making goods of their own production competitive both in price and quality.

Therefore, in the period of the 1850s and 1920s, the ISI Strategy (Import Substitution Industrialization Strategy) import substitution model was implemented in developed countries. It was a strategy of industrialisation through import substitution, design and development of national goods. Its general meaning is as follows: greater industrialisation gives greater prosperity [12]. In the economic territory of the country, the volume of goods output, employment, well-being, and GDP per capita are increasing. In addition, an increase in market size stimulates the competition, and reduces the production costs and prices.

The ISI Strategy import substitution model is based on the development of the technological innovations and ensured the substitution of imported goods with national ones. It is provided by the economic barriers supported through tariff and non-tariff restrictions. Additionally, the state makes direct investments in the priority sectors of the national economy, and regulates imports through tariff restrictions (customs tariff, quotas, import licenses, etc.).

The beginning of the global stage of import substitution is usually associated with the post-war period of the 1950s. Many economies experienced structural and sectoral imbalances developed during the period of the economic militarisation. During the Second World War, production resources were distributed to military-industrial complexes. Therefore, there was a need to redistribute them into the production of consumer goods. At the same time, the cost of the consumer basket steadily increased worldwide. Moreover, the global economic recession provides an increase in the overall price level, resulting in higher prices for basic foodstuffs and raw materials. To overcome the recession, the industrial potential of the country should be increased [8]. Additionally, these factors have determined the spread of import substitution policies in developing countries.

The traditional idea of import substitution policy is often reduced to replacing all imported products with domestic ones. However, according to the first studies of import substitution policy by G. Myrdal and R.

Prebish, import substitution is a change in in the total volume of imports structure (in the 1950s, the consumer goods were transformed into capital-intensive ones) [24]; import substitution is not an export reduction. Provided sufficient exports grow, there will be no necessity to restrict imports, since import expenditure depends on foreign exchange earnings from exports [20].

The combination of changes in the structure of imports with industrial exports provides a relatively better results compared to other ways of implementing import substitution policy. It is confirmed by the experience of Latin American countries in the mid-1960s. The raw material specialisation of these countries and the peculiarities of the international division of labour ensured import substitution in the early 1930s. These processes were also facilitated by the protectionist policy widespread in the world. Furthermore, the numerous changes of power, social disruptions and revolutions characteristic of Latin America have also contributed to the reduction of the international economic relationships, demand, and the contraction of regional and national markets [23]. According to the economic literature, there were not opportunities for import substitution in the production. However, Latin American countries have achieved substantially lower results in the implementation of import substitution policies compared to the results they could have achieved with a rational policy combining import substitution with industrial exports [8].

Particularly in Brazil, increased imports of equipment and reduced domestic competition due to the absence of incentives in terms of foreign rivalry with foreign producers, resulted in an industry sustained by government subsidies, a total exclusion of the competition, and the barriers to entry into the domestic market by foreign competitors. According to a survey conducted by PWC, Brazilian entrepreneurs considered the reasons for their low competitiveness as follows: high taxes, low labour force, lack of technological equipment, high cost of raw materials. These was caused by the government's policy of intra-oriented import substitution [12].

In Latin America, import substitution policy focused on the most underdeveloped sectors of the oil refining, aviation, and telecommunication. The enterprises benefited from government support and access to investment, research and development. It helped them to attract foreign specialists, scientists, engineers, and managers. This policy was supposed to protect the domestic producers from the external threats and competition in the market, but there would not be a complete rejection of imports. High import tariffs contributed to the localisation of the production activities of the import companies [14].

The process of industrialisation started with the strict protectionist policies in major Latin American countries: Brazil, Mexico, Argentina, and Chile. This policy protected the developing national industry from the strong competition of foreign manufactured goods surpassed domestic products in quality and price. In the foreign economic policy of these countries, there was a state monopoly on trade. The additional difficulties for the transfer of national and foreign capital between the countries arose due to the non-convertibility of the national currency. Besides the sharp increase in the customs duties imposed as part of the protectionist policy, the subsidisation of the domestic industrial products to substitute for imported ones began. As a result, excessive production of these industries was often purchased at the expense of the state budget. Nevertheless, industrialisation was a symbol of modern progress and became a priority area of economic policy [23].

Simultaneously with import substitution policy, the reduction in imports of finished goods was unable to have the same speed as the reduction in exports. Indeed, the formation of a national industry required the import of machines, equipment, and other production resources were not produced domestically. This discrepancy has contributed to an increase in external debt in some Latin American countries. Furthermore, the development of the national industry was constrained by a number of factors: extremely weak production infrastructure, technology, underdeveloped banking system, shortage of qualified specialists, deficit of practical experience and knowledge in manufacturing, and low level of training.

However, there is no definite opinion on the issue of the crisis in import substitution in Latin America in the 1980s was the consequence of ineffective government policy. On the one hand, this kind of economic policy was necessary and successful for the branches of national production. However, some industries and enterprises have managed to use its advantages to increase their international competitiveness. Moreover, the investments in import substitution in the 1950s and 1970s made possible the rapid development of the private

sector in the 1990s in Latin American countries. On the other hand, government protectionism for selected industries and enterprises supported inefficient companies and the production of uncompetitive products for a long time [14].

The Latin American import substitution policy is traditionally opposed by the experience of the developed Asian countries. In the 1950s, Japan, South Korea, Taiwan, Singapore, and Hong Kong established the modern industry and provided the growth of the national economy. The government resources are allocated to the development of certain sectors of the economy and the agro-industrial complex. The state is developing the sectoral programs for the development of industries; domestic goods are aimed at export and receive tax breaks; other goods are subjected to various control measures. The industry is being modernised to reduce dependence on the imported investment goods, machinery, and parts [12]. Therefore, the same but less radical mechanisms of direct and indirect government regulation are used. Import substitution policy has been applied by the most developing countries. However, in Latin American countries its long-term implementation has led to a decrease in the competitiveness of the national economy.

In the countries of East and South-East Asia, the quality of primary and secondary education was steadily improving. It resulted in the transition to a knowledge-based economy, and the system of technical and vocational training, including higher education. The government spending on research and development increased, driven by the export revenues. In addition, the key success factor was the effective use of the "windows of opportunity" in the global market – periods of the favourable foreign economic conditions and the technological transformations [14].

However, the differences in import substitution policies between East Asian and Latin American countries did not emerge simultaneously. They became the result of a gradual evolution of approaches to the implementation of the strategy. The most East Asian countries (except Hong Kong and Singapore) have used protectionist measures (tariff and non-tariff restrictions on imports). Meanwhile, a parallel policy was pursued to stimulate exports, including through the application of a favourable exchange rate and the provision of various incentives. The transition to an export-oriented model in a number of countries in the region occurred quite early: Taiwan and China began liberalising trade as early as 1958, introducing import duty exemption mechanisms and establishing export-processing zones to attract foreign direct investment (FDI) oriented towards foreign markets. The Republic of Korea began this process in the mid-1960s, although it maintained a more restrained policy towards foreign investment. At the same time, Hong Kong and Singapore initially had relatively liberal trade policies due to their position in international trade. Indonesia, Thailand, and Malaysia only began stimulating exports and encouraging foreign investment in the 1980s. Subsequently, Taiwan, China, and Korea significantly liberalised their foreign economic policies, including reducing tariffs and developing a favourable investment climate. The result of these transformations was a sharp increase in the share of East Asian countries in world trade: from 9% in the period 1980-1985 to 18% by the end of the 1990s [8].

However, there have also been some failures of import substitution policies of South and Southeast Asian countries. For instance, in Pakistan the absence of competition due to import restrictions resulted in an inefficiency of national industries. Moreover, encouraging of import substitution in consumer sectors has attracted investment in many unprofitable industries with low competition rate. The overall negative effect was reflected in a decrease in the added value of Pakistan industries. In the Philippines, the protection of the domestic producers resulted in the incorrect allocation of resources in favour of less important industries and large consumers of foreign currency, with a negative impact on the savings rate [8]. The other countries experienced the negative effects of import substitution policies are Malaysia, Turkey, and Sub-Saharan Africa.

Therefore, the East Asian model is substantially export-oriented while protecting local industries, unlike the rigid import substitution strategies in Latin American countries. Those were domestically oriented with high tariff and quantitative barriers to trade and barriers to the foreign investments.

The elements of both import substitution strategies combine the strategy of mixed import substitution in various proportions. The priority directions for the subsequent development of the foreign markets are determined depending on the available resources of the economy. At the same time, less resource-intensive

industries are being developed for import substitution in the domestic market. The countries, implementing this strategy, combine the internal and external directions with division into different commodity groups or qualitative characteristics of goods in one commodity group [21].

For instance, with intense competition from British goods, India implemented a number of measures to develop import-substituting industries in the heavy industry sector. It mobilised the resources for the development of key heavy industries, improved economic infrastructure, and consequently established an environment for strengthening private enterprise. In consumer goods, the share of imports by the mid-60s. in the twentieth century did not exceed 4%; for intermediate-demand goods – 8%; for machine-technical products – 21%. According to the Reserve Bank of India, the economy was protected from foreign competition in both production and trade [15]. The result of a targeted policy to expand the base of the national industry in India was the achievement of significant results in the development of the pharmaceutical industry [26].

The main result of India's industrial policy of the 1950s and 1960s was the establishment of large pharmaceutical enterprises with government investments. Moreover, a course was taken to encourage the export of these products. Despite the improvement of some indicators (a doubling in value of pharmaceutical exports in 1968-1971), there was an issue of dependence on imported medicines. Indian pharmaceutical companies could not compete with foreign TNCs in terms of large-scale R&D and advertisement.

The adoption of the Patent Law in 1970 changed the situation. According to the law, the object of patenting could only be the manufacturing process itself, not the product or substance. By statistics, it fundamentally changed the pharmaceutical market in India. Both large and small pharmaceutical companies have begun to produce generic analogues.

Additionally, to changes in patents legislation, there were measures concerning market access for foreign drug manufacturers (1979). All medicines were divided into four groups (according to the degree of vital necessity). Foreign companies were allowed to distribute medicines of the third and fourth groups, i.e. less important for the population.

At the same time, the government continued to increase the scientific potential of the pharmaceutical industry. There were established several educational institutions and government laboratories conducting research and development of new drugs [4].

The combination of restrictive (licensing; specifying groups of drugs to be supplied only by Indian manufacturers; high import duties) and stimulating measures (government investment in R&D, support for pharmaceutical exports) resulted in impressive results. An analysis of the structure of domestic drug sales shows that during the mid-1980s, the dependence on imports was eliminated and Indian pharmaceutical manufacturers were already dominating the domestic market.

The policy of import substitution has a long and diverse history, showing the various stages of economic development of the countries (Fig. 1). The evolution of import substitution policy from rigid protectionism to export-oriented strategies demonstrates the urgency of adapting economic policy to the changing conditions of the global economy.

Based on the historical analysis of import substitution policy in the different world countries, it is possible to form strategic guidelines and draw conclusions for the development and adaptation of appropriate policies in modern Russia. Historically, a successful import substitution policy does not include a complete rejection of imports. On the contrary, according to R. Prebish and G. Myrdal, it concerns with changing the structure of import itself. Russia, like many countries of the world, cannot produce all necessary goods independently. Therefore, it is important to focus on replacing important goods, primarily high-tech ones, while developing exports and integrating Russian manufacturers into global production chains.

The development of import substitution strategy and the selection of measures to realise the strategic goals are actually reduced to the determination of the key indicators (Fig. 2)

The examples of Latin America (Brazil, Argentina, Chile) have shown recently that long protectionist policies without access to foreign markets result in the stagnation, increased costs, and lower quality. In the conditions of the modern Russian economy, it is advisable to limit imports in strategic areas, but maintain competition and export orientation of the business. It is also confirmed by the experience of South Korea,

Taiwan, and China. These countries developed the competitive sectors through investment in R&D, education, export stimulation, combining import substitution with export expansion. The systemic investments in human capital and scientific research were also implemented in East Asia. The example of India shows there is potential for changes in patent policy, state support for R&D and restriction of foreign companies' access to key segments to provide a significant impetus to the industry. A similar approach can be applied in Russia. In a number of industries (i.e., mechanical engineering, microelectronics, chemistry, pharmaceuticals), direct government investments, subsidies, and tax incentives are needed to both stimulate innovation and support applied science.

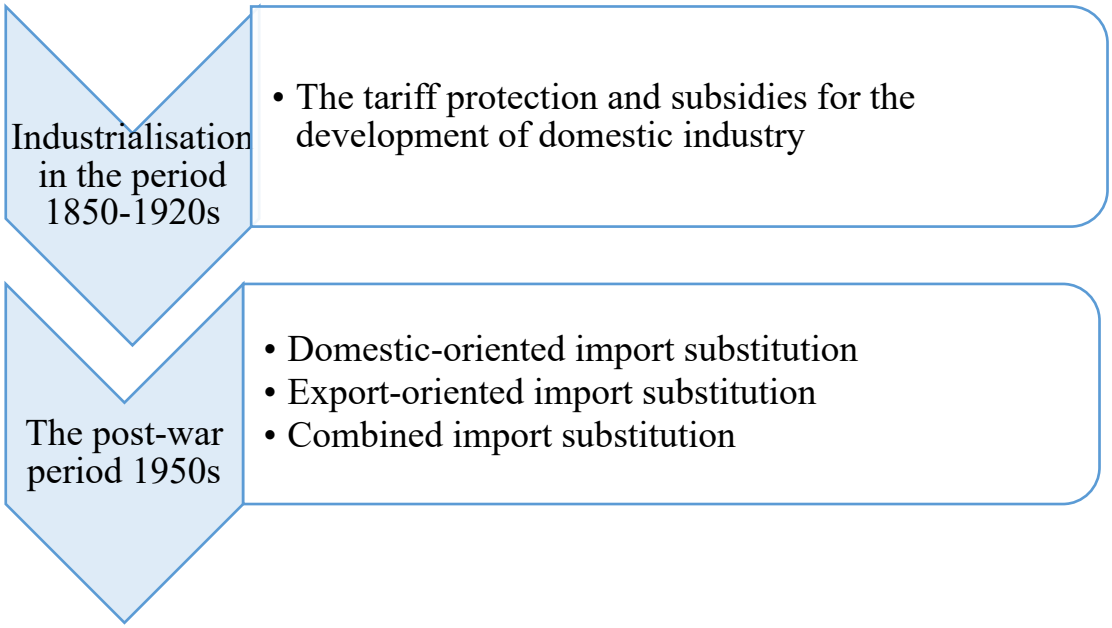

Figure 1. The history of import substitution development

Source: Authors

Each strategy has its advantages and disadvantages in terms of the specifics of each import substitution model. Indeed, the application of individual support measures and the specifics of industrialisation of each branch of the national economy contribute to the integrated development of the country's economy and maximise the effect of the activities of its individual subjects, providing the most appropriate approach for Russia. The experience of various countries demonstrates the importance of import substitution as a strategy, requiring a certain flexibility in the choice of instruments, a combination of protectionism and liberalism in international trade, reliance on science, education, and export activity Russia has all the necessary resources to successfully implement a balanced, adaptive, and innovative import substitution model. Those will ensure the technological sovereignty and sustainable economic development in terms of external economic challenges and uncertainty.

Historical retrospective of the development of import substitution in the countries and the analysis of the economists' works highlighted the main approaches to the concept of import substitution definition. The works of many domestic economists, various classifications of the concept of import substitution are considered. However, there are similarities in many theoretical approaches; differences occur according to the purposes of the papers; minor differences in sources depend on the interpretation of the definition itself.

Firstly, in the economic literature, import substitution is considered as a regulated, positive, and time-limited process for the country, resulted in the reduction or gradual replacement of imported products with domestic analogues [1]. At the same time, the share of national production, consumption of domestic goods, and its exports increases due to higher competitiveness of domestic production [5]. Indeed, a definition has more concise formulations. For instance, import substitution is the termination of importation of a specific commodity into a country due to the organisation of its production domestically.

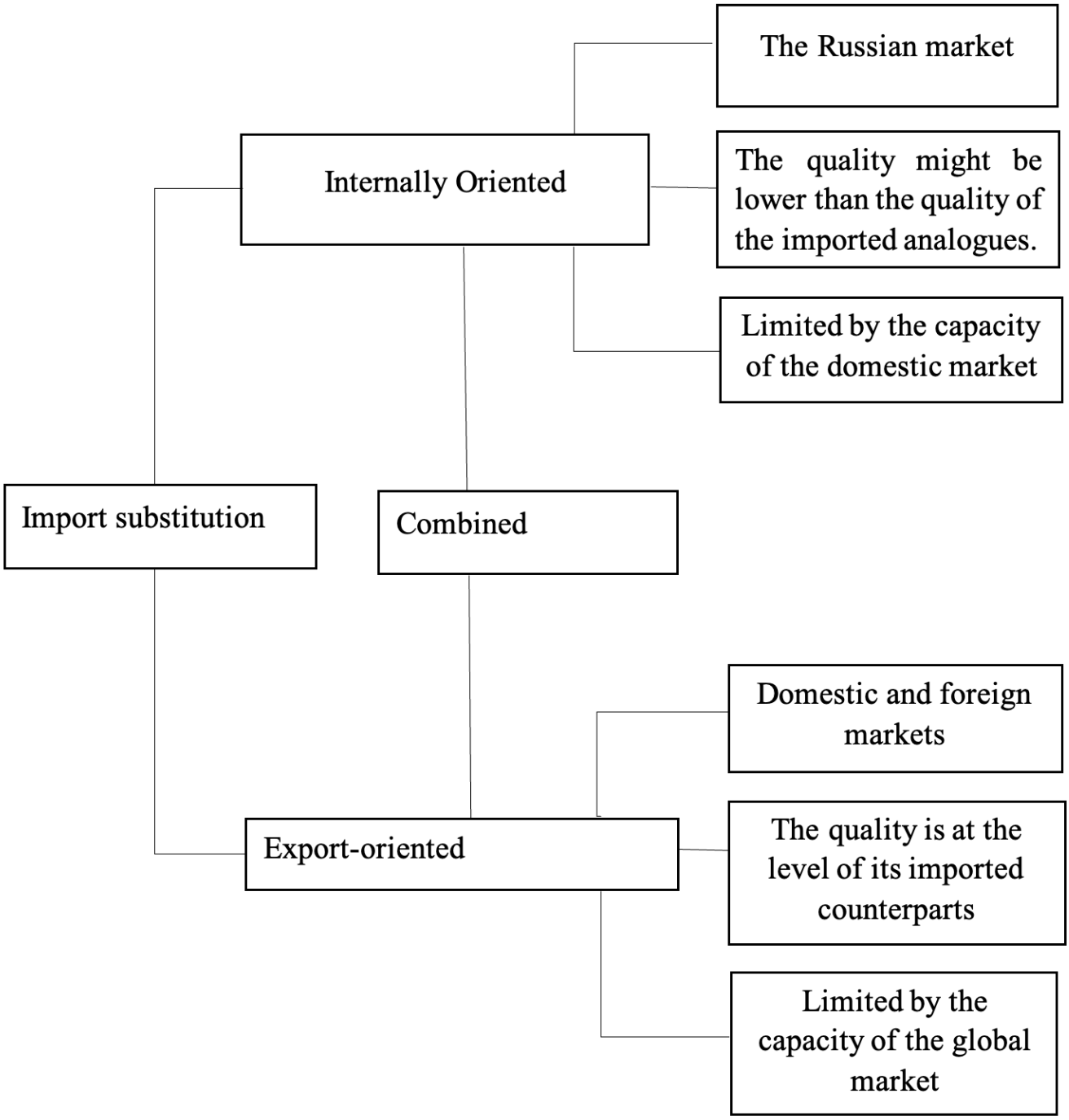

Figure 2. Key parameters of import substitution strategies

Source: Authors

Secondly, import substitution is most often understood as the policy of replacing imported goods with domestic products supported by quotas and tariffs to ensure economic independence, develop own production, and achieve economic benefits [1]. This approach has been widely used in the implementation of import substitution policies in Latin American countries – the ISI strategy. In a broader interpretation, import substitution as an economic strategy is a set of tools for the implementation of trade and economic policy of the state [5].

Thirdly, import substitution can also be interpreted a specific type of economic strategy and government policy aimed at replacing imports of goods in demand on the domestic market with goods of national production. In this case, high import duties are combined with tax benefits for local producers. According to this approach, program for the development of the necessary production infrastructure is being developed

and implemented.

Fourthly, import substitution is interpreted as a way for the country's economy to integrate into the system of world economic relations. This theoretical framework for the development of international trade, based on the idea of industrial import substitution, focuses on the growth of the domestic market, goods, and services. This model of import substitution is mainly developed by the Western economics, associating it with the pressure of domestic demand [1].

Fifth, import substitution is an important factor in the economic development of the regions. In this case, import substitution is a system of measures ensuring the achievement of the regional goals in terms of the volume and structure of domestic production while reducing the consumption of imported goods [19].

Economists representing the sixth scientific approach consider the organisation of the production of import-substituting products in terms of the development of industrial enterprises [5] (Table 1).

Table 1 – The approaches to the definition of import substitution

The authors	The approaches	Characteristic
A.N. Matantsev, E.E. Rumyantseva, V.A. Semykin	import substitution as a process	The termination of importation of a specific commodity into a country due to the organisation of its production domestically.
A.A. Matyukhin, I.T. Rustamova, B.S. Zhamankulova	import substitution as a policy	The policy of ensuring economic independence, developing own production, and achieving benefits.
A. Lewis, G. Myrdar, R. Prebish, V.A. Petukhov, O.V. Starovoitova	import substitution as an economic strategy	The government's strategy is to replace imported goods with domestic ones, combining the import duties and tax incentives for local producers.
H. Channery, N. Kander, S. Linder, P.H. Linder, P.A. Kadochnikov	import substitution as a tool for the country's economy to integrate into the system of global economic relations	Industrial import substitution and the growth of the domestic market.
A.N. Makarov, D.N. Zaitsev, R.R. Ismailova	import substitution as an important factor in the economic development of the regions	The measures ensuring the achievement of the regional goals in terms of the volume and structure of domestic production.
E.V. Volkodavova, E.N. Nazarchuk	the production of import-substituting products in terms of the development of industrial enterprises	Ensuring the objectives of the enterprise in terms of volume and structure of import substitution to ensure operational efficiency.

Source: Authors

However, the classifications of import substitution approaches have a number of similar features. For instance, the economic literature considers import substitution as a functional perspective, including "import substitution as an economic strategy" and "import substitution as a policy". Indeed, "import substitution as a process" focuses on stimulating exports by increasing the competitiveness of domestic production. It corresponds to the approach considering import substitution as a way of integration into the global economy. Similarly, "import substitution as a category of economic relations" focuses on the replacement of imported products with domestic analogues. It shows the essence of import substitution as a regulated, positive, and time-limited process resulted in a reduction or phased replacement of imported products with domestic

analogues.

However, not all the approaches in these classifications for import substitution can be easily compared or expressed through each other, as the concept of import substitution is being shrinking. For instance, "import substitution as a tool" aimed at realising sustainable development is a niche category focusing on the application of specific mechanisms to achieve long-term goals; the microeconomic approach focuses on the organisation of import substitution production from the perspective of industrial enterprise development. These approaches have different analytical focus, complicating their direct correlation. Similarly, import substitution as a factor of regional economic development, emphasising the importance of sectoral and regional development and is not expressible through another classification.

The variety of approaches to import substitution in the scientific literature shows the complexity and versatility of the phenomenon. Different approaches focus on different aspects of import substitution concept. Some economists emphasise the temporary nature of import substitution as a measure to stimulate production. The others associate it with the sustainable regional and sectoral development, or consider exports as an integral part of a successful import substitution policy. These differentiations derive from different objectives and the interpretative range in terms of the economic sustainability and independence. Moreover, the traditional idea of import substitution policy is often reduced to replacing all imported products with domestic ones. However, the ideologists of import substitution policy noted the following: (1) import substitution is a way of changing the composition of imports (from consumer goods to capital-intensive goods in the 1950s) rather than reducing the total volume of imports; (2) import substitution does not mean a reduction in exports, on the contrary, if exports grow sufficiently, there will be no need to limit imports, since import expenditures depend on foreign exchange earnings from exports [8].

Therefore, it is possible to present a classification of import substitution according to two main criteria: the level of application of import substitution and the nature of its impact on the economic phenomena. It systematises various approaches to understanding and implementing import substitution policy in the economy (Fig. 3).

Import substitution can be implemented at different levels of the economic system. At the macrolevel, import substitution is a government policy aimed at ensuring economic security and reducing the dependence of the national economy on external imports through tariff and non-tariff regulatory measures, and support for national producers. The mesolevel is interpreted as the implementation of import substitution programs at the regional and industry levels, emphasising the specifics of value chain formation and efficient use of the resources. The microlevel implies the activities of enterprises and corporations to produce previously imported goods to increase their own competitiveness and sustainability.

Depending on the nature of the impact on economic processes and phenomena, import substitution can be interpreted as a policy, strategy, process, or tool for implementing the functions of economic entities. The policy provides the institutional conditions and incentives for the development of domestic production. The strategy is a long-term set of measures, including the development of priority areas of development, resource planning, and targets for import substitution. The process shows the dynamics of domestic production of goods and the gradual displacement of imports, including technological and production changes. It implies the availability to achieve the industrial development, investment promotion, employment growth, and integration into the global economy (Fig.3).

Considering the analysis, import substitution can be defined as a multi-level economic strategy aimed at the establishment and development of competitive national production capable of completely or partially replacing imported goods, accompanied by a change in the commodity structure of imports. This approach concerns with the implementation of import substitution at the macro-, meso-, and micro- levels. It corresponds to the modern public administration practices, regional and sectoral development, and enterprise activities. At the same time, the qualitative side of import substitution is essential one. Therefore, it requires the development of the national products, which are able to compete both in the domestic and foreign markets. However, the realism and variability of import substitution policy should be taken into account. The key consequence of import substitution for most countries is the redistribution of imports

towards more complex or specific goods and reduction of dependence on critically important import goods.

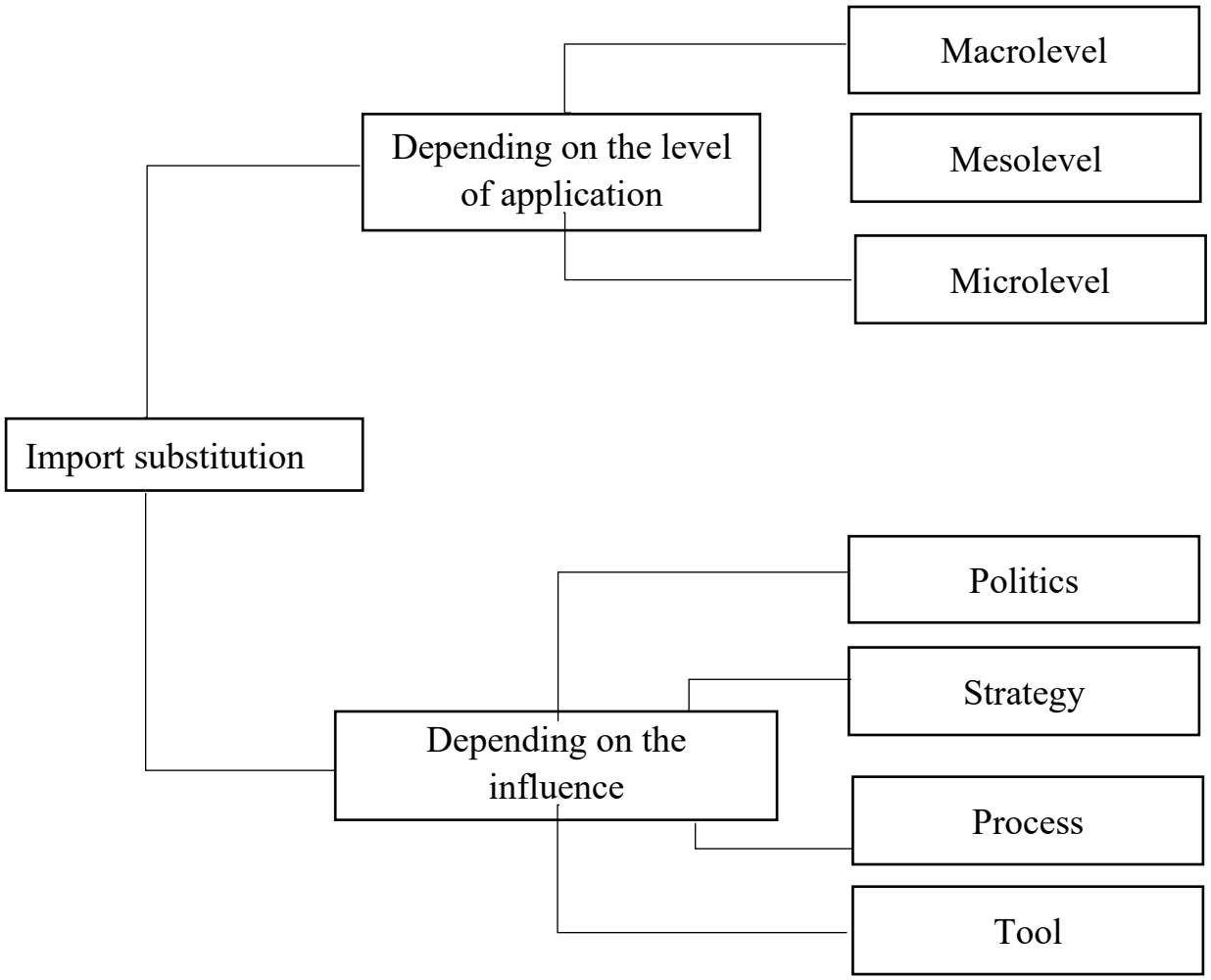

Figure 3. Classifications of the concept of import substitution

Source: Authors

Conclusions

Therefore, import substitution is a complex and multifaceted phenomenon plays a key role in the strategic development of the national economies to reduce their dependence on imports and develop national production. The analysis of the background and theoretical framework has shown an increase in global trade, accompanied by intensified international competition and import dependence, especially in countries with low export potential. It encourages public and private institutions to develop measures to stimulate domestic production. Based on the research results, we can draw comprehensive conclusions covering both historical, theoretical, and methodological aspects of import substitution policy.

The analysis of historical experience in implementing import substitution policy shows the most effective models combined elements of protectionism and export-oriented strategy. An important example is the experience of East Asia, in particular South Korea and China, where the initial protection of the domestic market was organically combined with active government support for exports and technological innovations. Meanwhile, the excessive protectionism characterising many Latin American countries in the twentieth century often had negative consequences, such as reduced competitiveness, technological backwardness, and the accumulation of external debt.

The number of approaches to the concept of "import substitution" emphasises the diversity of the interpretations of the phenomenon. In particular, import substitution can be interpreted as an economic strategy, policy, tool, process, or category of economic relations. These aspects concern with a wide range of

its applications, from stimulating national production to changing the structure of international economic relations. Moreover, the concept of import substitution has undergone significant changes since its appearance in economic theory. The modern understanding should focus on reducing import volumes, changing its composition, and the development of the export potential.

This research allows ones to systematise the historical experience and theoretical approaches for a deeper understanding of the conditions and factors determining the effectiveness of import substitution policy. Additionally, it draws conclusions and recommendations for modern Russia.

However, our research has a number of limitations. One of them is insufficient attention to microeconomic aspects of import substitution policy implementation. Nevertheless, the effectiveness of import substitution largely depends on the individual characteristics of industries and enterprises. Therefore, the general recommendations can be adapted to the specific conditions of the industry and production. In addition, import substitution policy should be implemented in accordance with changing economic and geopolitical conditions. It requires continuous monitoring and adjustment of government support measures.

Indeed, further scientific research on import substitution should be focused on an in-depth empirical analysis of the effectiveness of various measures in certain sectors of the Russian economy. Hence, the development of new or detailed additions to existing sectoral strategies, based on the specifics of the market conditions and import substitution potential in each specific area, becomes extremely important. In our opinion, future scientific research should also pay attention to issues of technology transfer and human capital development, since successful import substitution directly depends on the level of qualifications and the ability to innovate.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR'S CONTRIBUTIONS

Irina G. Perelomova – conceptualization; supervision.
Daniil V. Kornov – writing – original draft.

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The prospective estimations of demographic problem addressing in the Russian Federation as a key factor in increasing the country's international competitiveness

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ORIGINAL ARTICLE

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Abstract. The current complicated geopolitical and economic conditions of the development for the Russian Federation and the demographic problem determine both the national security and the international competitiveness of the country in the socio-economic sphere. It provides the relevance of the research. The purpose of the research is an attempt to forecast the prospects for addressing the demographic problem in the Russian Federation to increase the country's international competitiveness in the future. The demographic forecast of Rosstat using the PERT method considering the optimistic, realistic, and pessimistic scenario. Therefore, an assessment of the prospects for addressing the demographic problem in the Russian Federation in the next 20 years provides the novelty of the research. Moreover, according to the forecast period under consideration, the total population increase is at an average rate of 27,014 people per year due to the natural population increase (by 96%). However, it can not provide a positive dynamic. The practical significance the research consists in their implementation in the design of the effective geopolitical and economic conditions to address the demographic problem and ensure the international competitiveness of the Russian Federation.

Keywords: forecast estimates; demographic problem; Russian Federation; country's international competitiveness; demographic forecast

JEL codes: F01; L13; Q54

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Introduction

The modern complicated geopolitical and economic conditions of development for the Russian Federation ensure the urgency of addressing the demographic problem. It determines both the national security and the international competitiveness of the Russian Federation in socio-economics. Indeed, this problem is reflected in the national goal «Preservation of the population, strengthening health and well-being of people, family support»[1] (Fig. 1). It is part of the National Development Goals of the Russian Federation for the period up to 2030 and for the future up to 2036, defined by Decree of the President of the Russian Federation on May 7, 2024, No. 309 (Fig. 2). These determined the research topic.

The purpose of the research is an attempt to forecast the prospects for addressing the demographic problem in the Russian Federation to increase the country's international competitiveness in the future.

[1] *Decree of the President of the Russian Federation No. 309 on May 7, 2024 "On the National Development Goals of the Russian Federation for the period up to 2030 and for the future up to 2036". Source: http://www.kremlin.ru/acts/bank/50542 (accessed on 10.03.2025).*

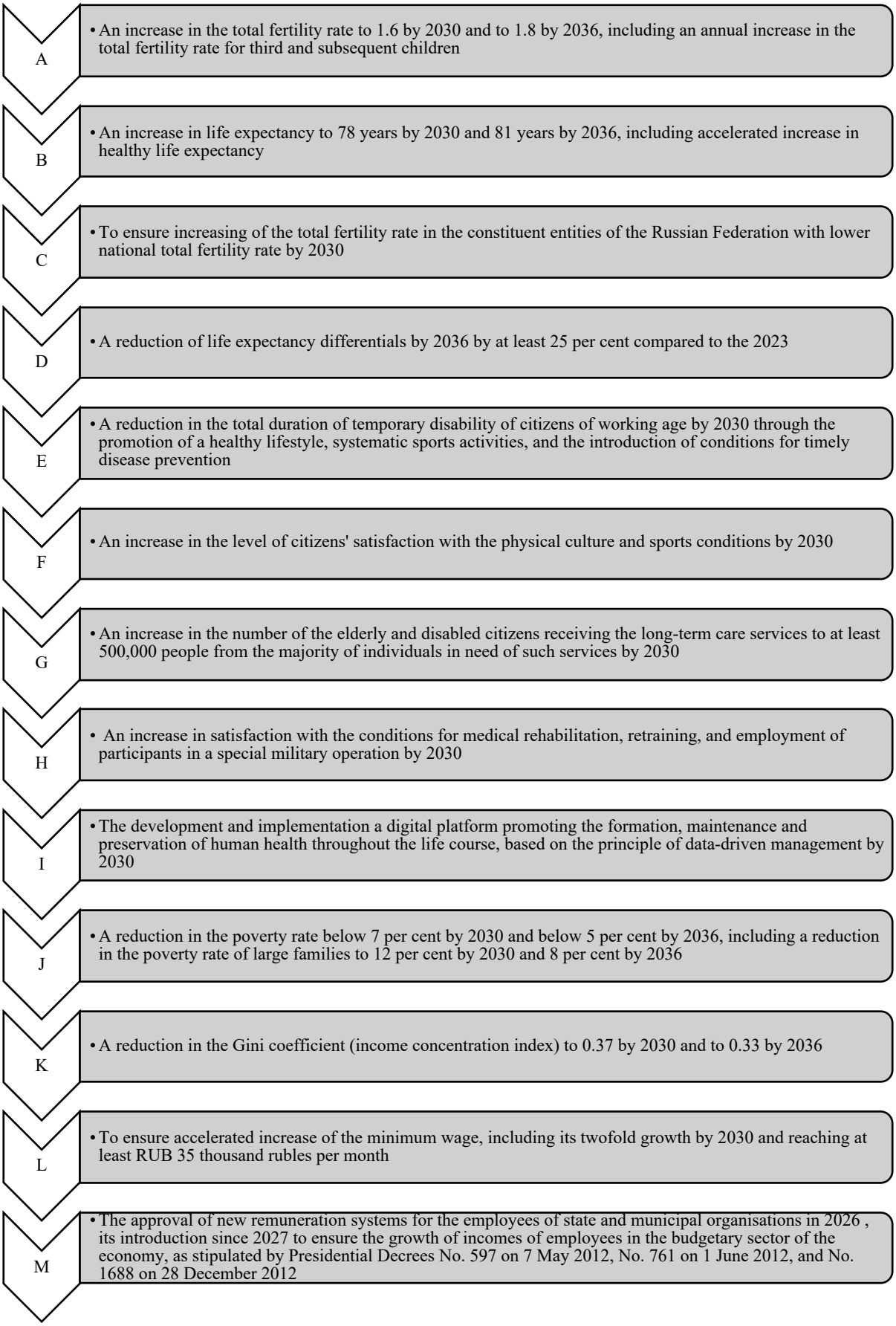

Figure 1. The goals and objectives relating to the achievement of the national goal «Population preservation, promotion of health and well-being of people, family support»

Source: Authors

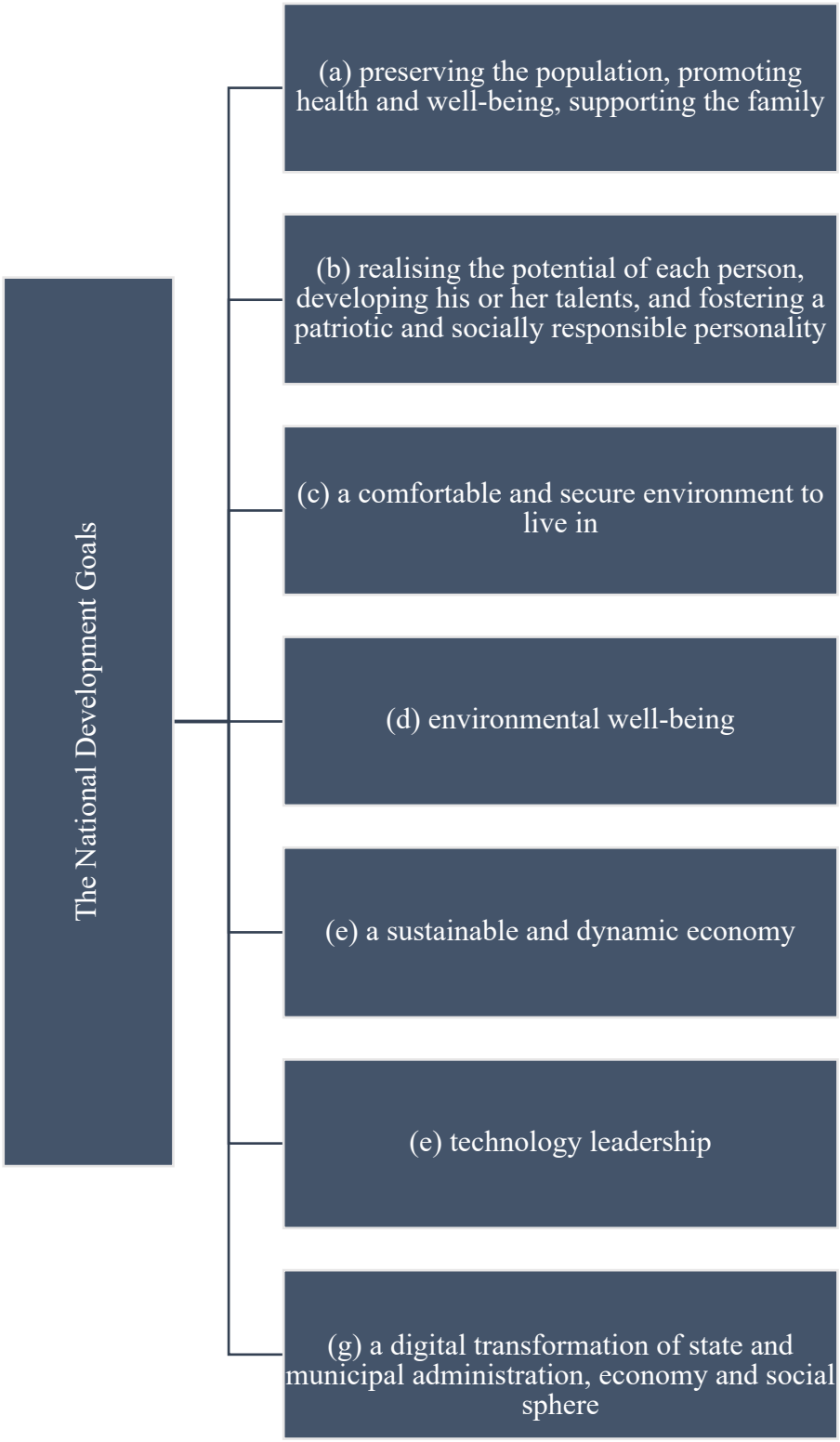

Figure 2. The National Development Goals of the Russian Federation, defined by Decree of the President of the Russian Federation No. 309 on May 7, 2024

Source: Authors

The methodological basis of the research consists in the well-known scientific works devoted to the study of the demographic problem in the Russian Federation [6], and analytical materials on [1-5], etc. They are as follows: Elin A.M., Pashin N.P. [1], Medvedkova A.I. [2], Nochevnova A.A., Potapova E.V. [3], Rodina T.Yu., Zabugina A.A., Usyakov R.A. [4], Saltykova Yu. A., Kurganskaya O.V. [5].

Main Part

The National Development Goals of the Russian Federation, defined by Decree of the President of the Russian Federation No. 309 on May 7-7, 2024 (Fig. 2) was the initial idea of this research.

We analyse the demographic forecasts of Rosstat[2] in terms of the objectives and tasks related to achieving the National Goal: a) «Population preservation, health promotion and well-being of people, family support» (Fig. 1). It allows us to analyse the prospects for addressing the problem of increasing the total fertility rate (Block A, Fig. 1).

According to the pessimistic forecast on changes in the country's population until 2046 (Fig. 3), a population decline is predicted for the next twenty years (on average minus 1,252 people per year). Moreover, the negative dynamics of natural increase (on average minus 805 people per year) will not be covered by positive migration balance. As it also has the negative dynamics (on average minus 446 people per year)[3].

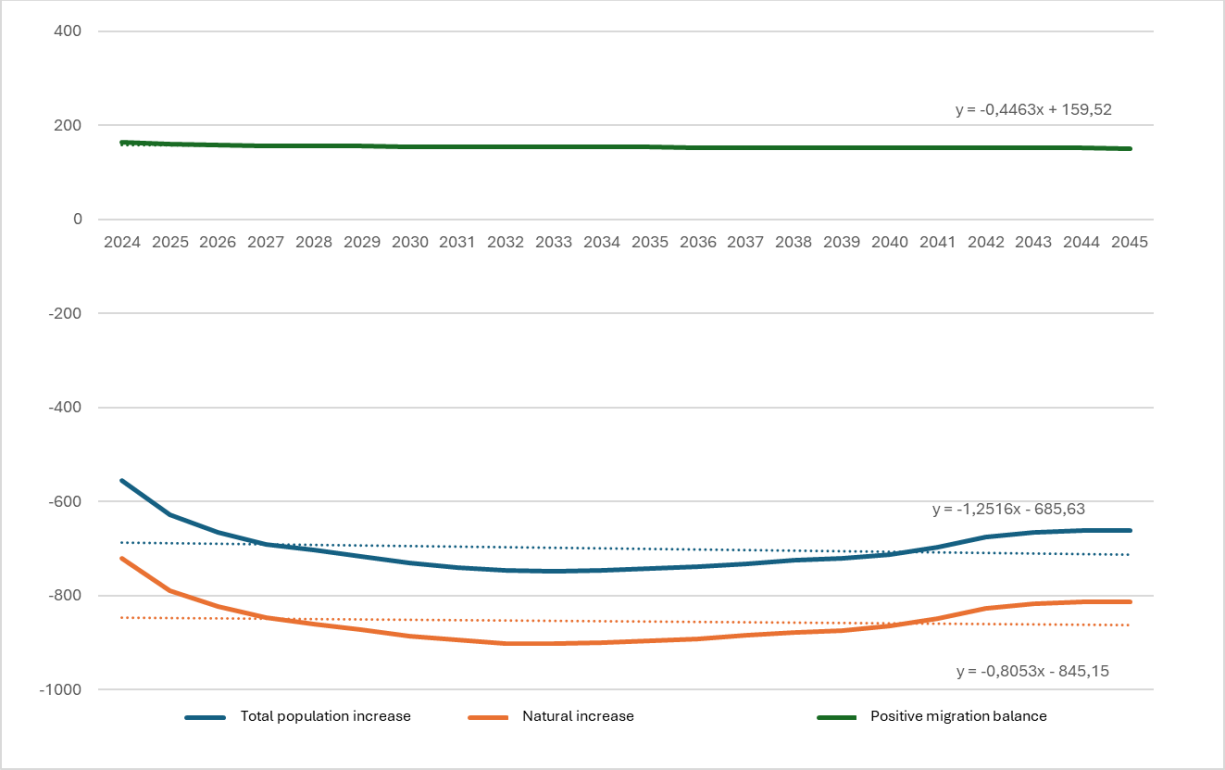

Figure 3. The pessimistic option of Rosstat's forecast for population increase in the Russian Federation until 2046

Source: Rosstat, 2025[4]

As a result, according to the pessimistic option of Rosstat's forecast, the population of the Russian Federation will decrease at an average rate of over 716,000 people per year until 2046 (Fig.4).

According to the realistic option of the forecast of population change until 2046 (Fig. 5), a reduction in population decrease is projected for the next twenty years (with an average rate of 17,394 people per year). At the same time, the reduction in population decrease due to the natural increase (an average of 17,209 people per year) prevails the positive migration balance (an average of 184 people per year).

According to the optimistic option of the forecast of population change until 2046 (Fig. 7), increasing of population is projected for the next twenty years (with an average rate of 40,474 people per year). At the same time, population increase due to the natural increase (an average of 36,036 people per year) prevails the positive migration balance (an average of 4,437 people per year).

As a result, according to the realistic option of Rosstat's forecast, the population of the Russian Federation

[2] *The demographic forecast by Rosstat. Source: https://rosstat.gov.ru/folder/12781 (accessed on 10.03.2025).*
[3] *The demographic forecast by Rosstat. Source: https://rosstat.gov.ru/folder/12781 (accessed on 10.03.2025).*
[4] *The demographic forecast by Rosstat. Source: https://rosstat.gov.ru/folder/12781 (accessed on 10.03.2025).*

will decrease at an average rate of over 333,000 people per year until 2046 (Fig. 6).

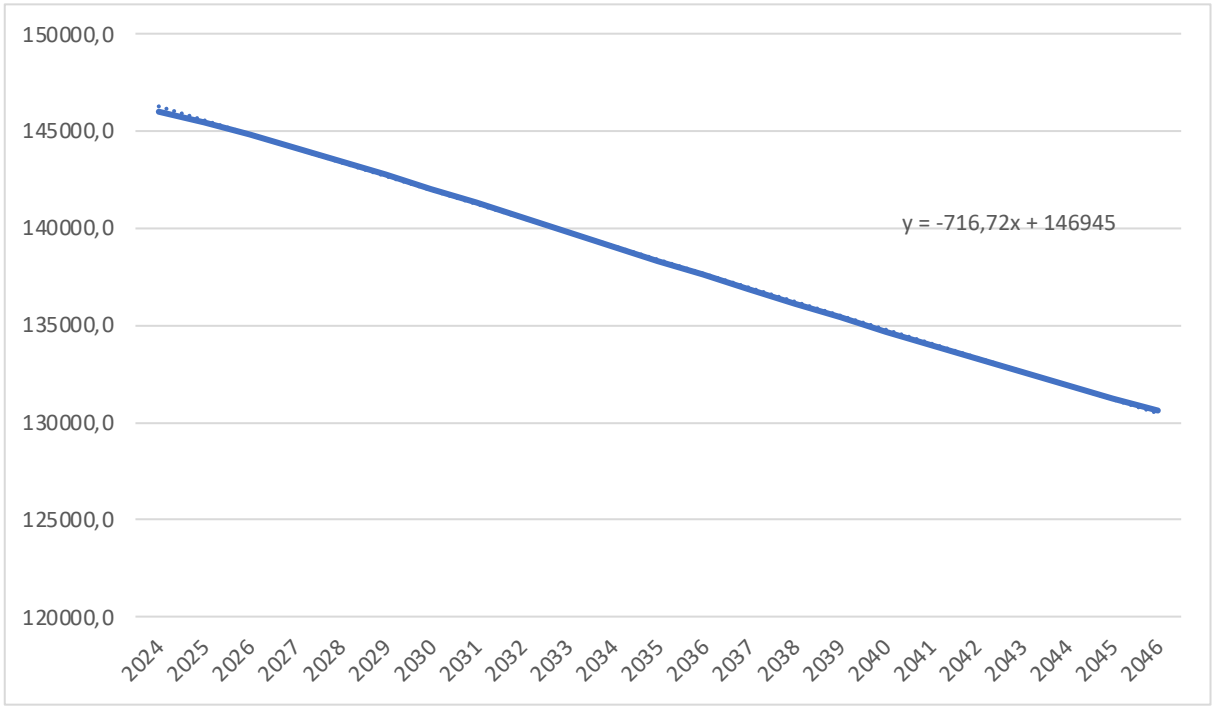

Figure 4. The pessimistic option of Rosstat's forecast for population change in the Russian Federation until 2046

Source: Rosstat, 2025[5]

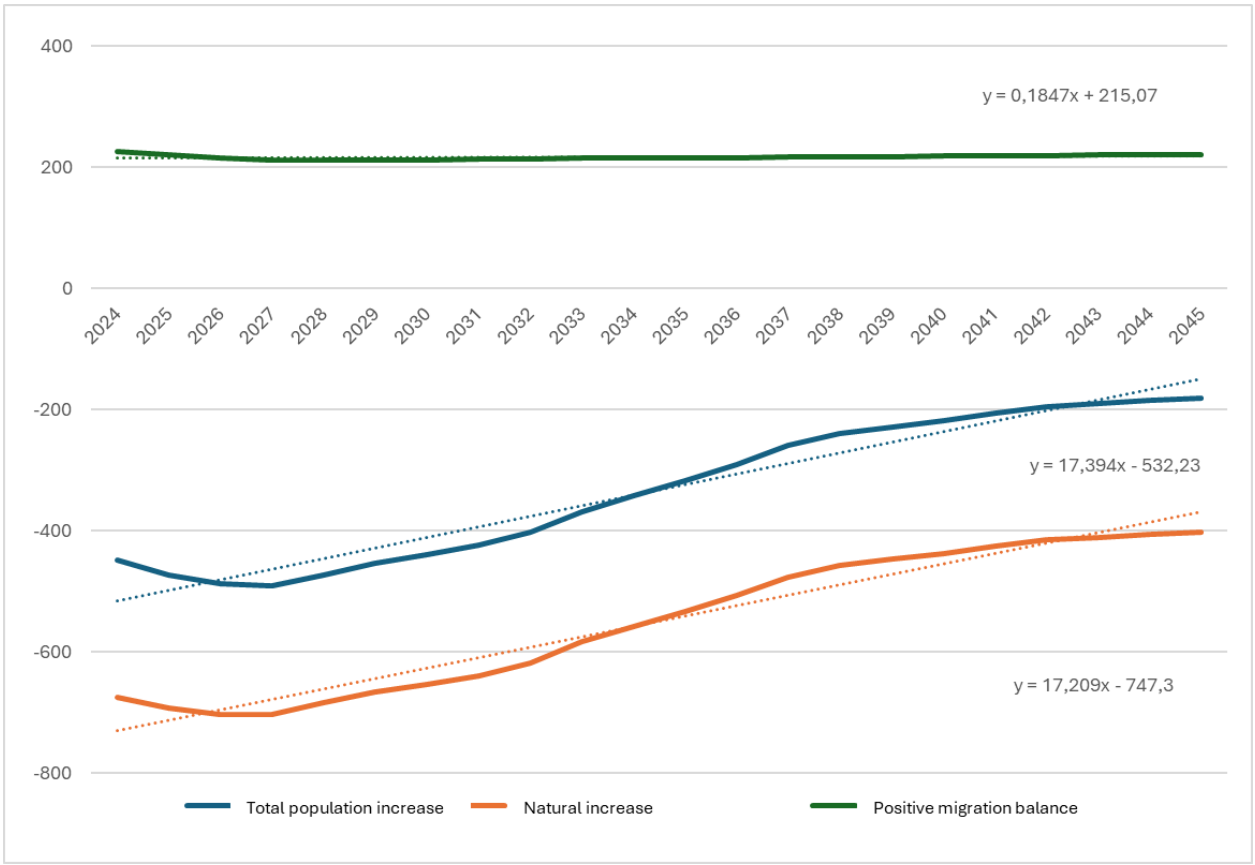

Figure 5. The realistic option of Rosstat's forecast for population increase in the Russian Federation until 2046

[5] *The demographic forecast by Rosstat. Source: https://rosstat.gov.ru/folder/12781 (accessed on 10.03.2025).*

Source: Rosstat, 2025[6]

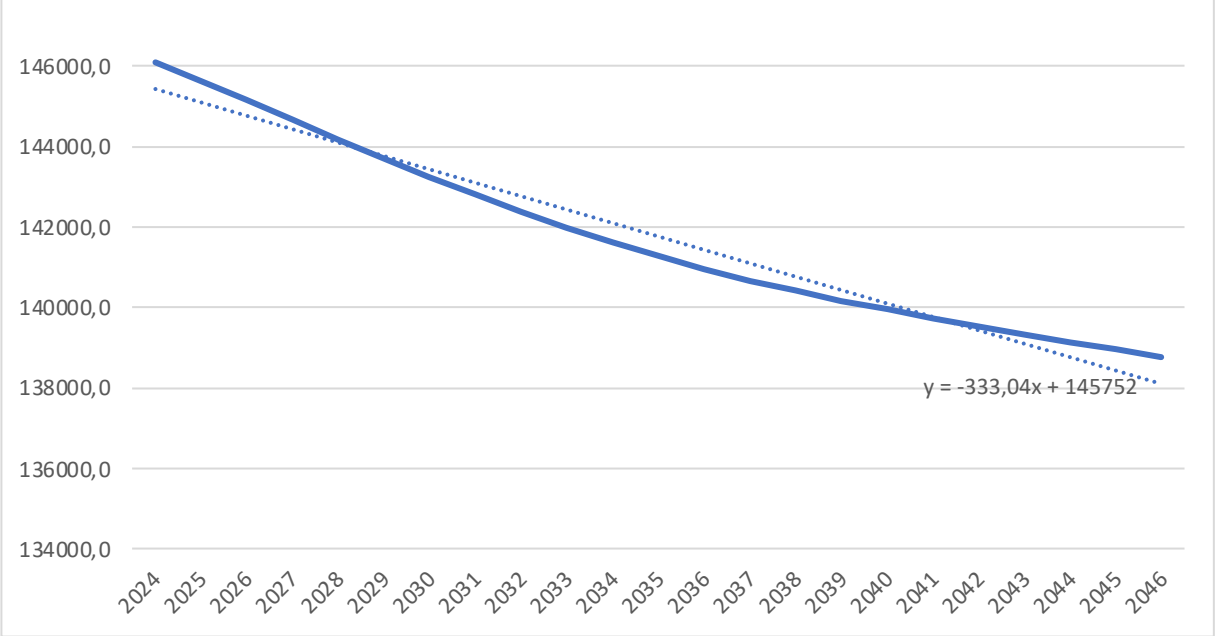

Figure 6. The realistic option of Rosstat's forecast for population change in the Russian Federation until 2046

Source: Rosstat, 2025[7]

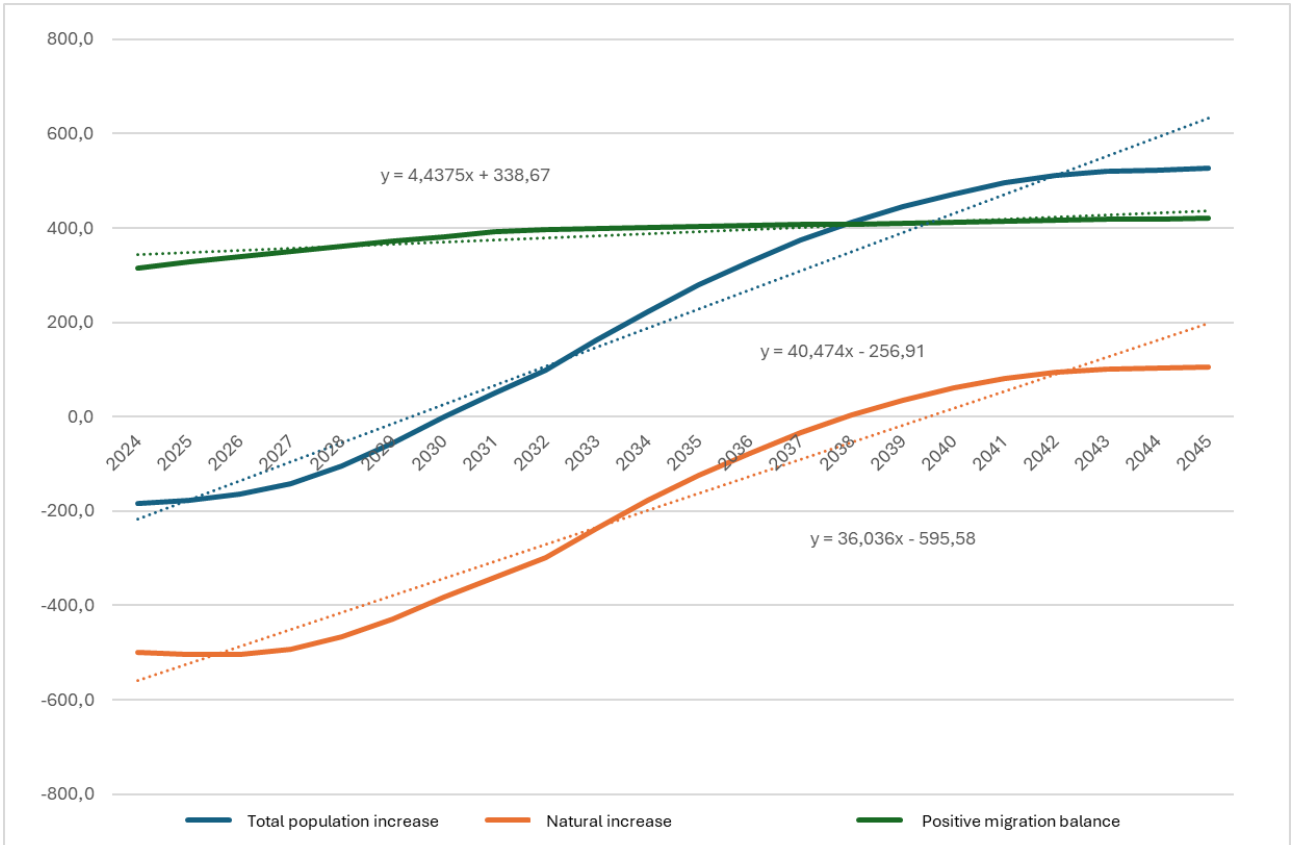

Figure 7. An optimistic option of Rosstat's forecast for population increase in the Russian Federation until 2046

Source: Rosstat, 2025[8]

[6] *The demographic forecast by Rosstat. Source: https://rosstat.gov.ru/folder/12781 (accessed on 10.03.2025).*
[7] *The demographic forecast by Rosstat. Source: https://rosstat.gov.ru/folder/12781 (accessed on 10.03.2025).*
[8] *The demographic forecast by Rosstat. Source: https://rosstat.gov.ru/folder/12781 (accessed on 10.03.2025).*

As a result, according to the optimistic option of Rosstat's forecast, the population of the Russian Federation will increase at an average rate of over 219,240 people per year until 2046 (Fig. 6).

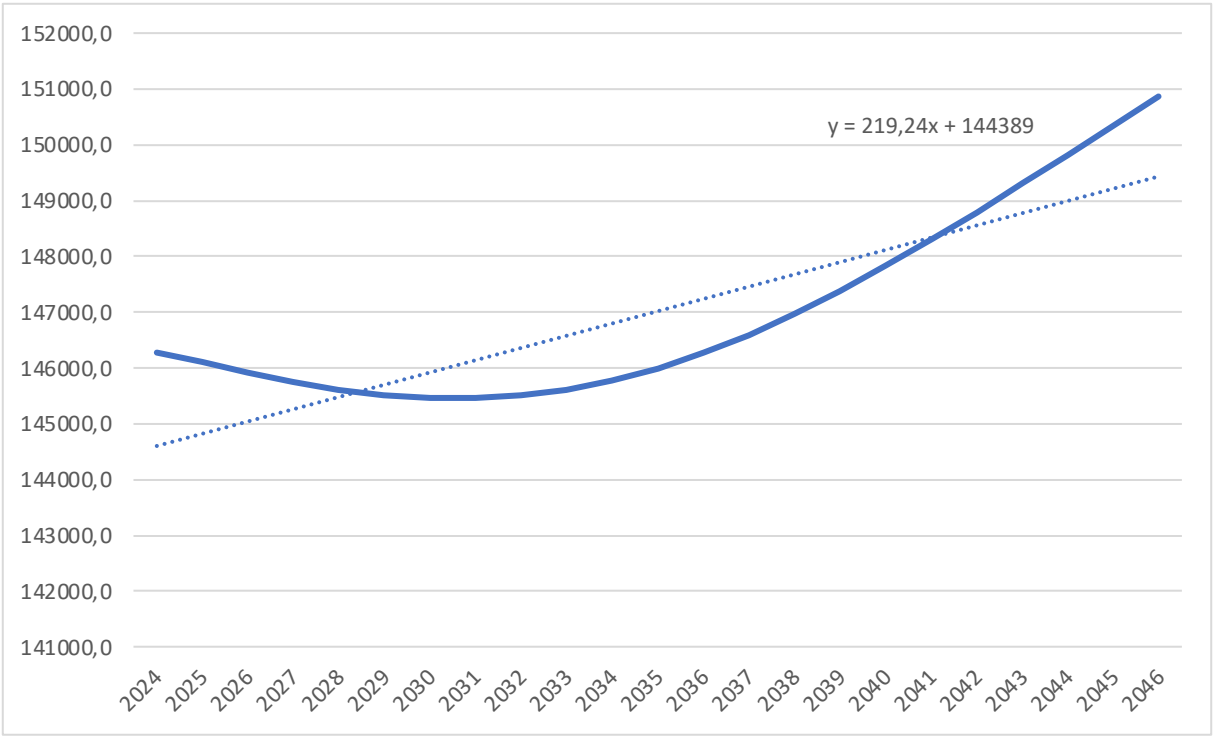

Figure 8. An optimistic option of Rosstat's forecast for population change in the Russian Federation until 2046

Source: Rosstat, 2025[9]

To estimate the change in the country's population, we used the forecast options from Rosstat until 2046, and developed the PERT (Project Evaluation and Review Technique) project assessment and analysis method as follows:

$$F_{exp}=[F_{opt}+4\times F_{real}+F_{pess}]:6, \quad (1)$$

where F^{exp} is the expected value of the result of the estimated forecast indicator;

F_{opt} is the optimistic value of the result of the estimated forecast indicator;

F_{real} is the realistic value of the result of the estimated forecast indicator;

F_{pess} is the pessimistic value of the result of the estimated forecast indicator;

The use of the considered criterion for estimation the expected result allowed this study to assess the expected dynamics of the country's population and its increase for the period up to 2046, according to Rosstat forecasts (Table 1). Moreover, developed as the part of the PERT (1) project assessment and analysis method was widely used as a recommended tool for scenario analysis of the forecast values for a wide range of indicators.

Table 1 – Assessment of the expected dynamics of the country's population for the period up to 2046

The type of the forecast estimation	Indicators, people / year			
	The population dynamics	The dynamics of total population increase	The dynamics of the natural population increase	The dynamics of positive migration balance
Pessimistic	-716,720	-1,252	-805	-446
Realistic	-333,040	+17,394	+17,209	+184
Optimistic	+219,240	+40,474	+36,036	+4,376

[9] *The demographic forecast by Rosstat. Source: https://rosstat.gov.ru/folder/12781 (accessed on 10.03.2025).*

The type of the forecast estimation	Indicators, people / year			
	The population dynamics	The dynamics of total population increase	The dynamics of the natural population increase	The dynamics of positive migration balance
Expected result by the PERT method	-304,940	+27,014	+26,016	+1,166

Source: Authors

Conclusion

Therefore, the next 20 years the total population increase in the Russian Federation is expected at an average rate of 27,014 people per year. It will be achieved mainly due to natural population increase (+26,016 people per year, more than 96% of the total increase). However, it can not provide a positive dynamics. According to the estimates, during the 20-year forecast period under study, the country's population will continue to decline at an average rate of 304,940 people per year.

The positive dynamics of the country's population increase until 2046 is expected only with an optimistic option of the Rosstat forecast. According to this, the average population increase rate will be +219,240 people per year.

However, to implement this a scenario, a wide range of favourable geopolitical and economic conditions would have to be established.

FUNDING

The work was done on a personal initiative.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTION

Alexey V. Tebekin – conceptualization, project administration, writing – original draft.
Aleksandra A. Egorova – formal analysis; writing – review & editing.

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Allocation of 'Investments and development' for the objects of cultural heritage to the separate activity in Russian Classification of Economic Activities

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ORIGINAL ARTICLE

Abstract. In modern conditions, the issue of qualification and legal registration of development is becoming increasingly important. The development projects have long been part of the economic practice. However, the absence of codification in OKVED classifier (Russian Classification of Economic Activities) makes it difficult for it to be effectively supported and regulated by the government. The purpose of this work is to substantiate the need to distinguish development as a separate type of activity, analyse possible changes aimed at regulating investments and project management for Objects of Cultural Heritage (OCH). The research implements the method of scientific dialectics, a systematic approach, the analysis and synthesis of theoretical development and regulatory documents. The article examines the specifics of development, including its complex, project-based nature, and suggests specific formulations for OKVED classifier and urban planning legislation. Therefore, the legalisation of development as a special type of activity stimulates an increase in investment activity, establishes the preconditions for the development of the construction market, and promotes a systematic preservation and adaptation of OCH.

Keywords: development; Objects of Cultural Heritage; OKVED; investments; development activities; urban planning legislation; economic development

JEL codes: L85, R52, Z18, K25

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Introduction

The development of the real estate market is increasingly attracting attention from both business circles and government agencies. The various forms of construction support (including preferential mortgage loans and regional development programs) naturally increases the demand for professional services related to the implementation of complex real estate projects. Nowadays, this activity named as 'development'. However, the concept of 'development' does not have a legal basis in Russian legislation. Nevertheless, developers form complex project teams, attract investors, deal with organisational and financial issues, and take on the risks inevitable during the reconstruction of real estate.

The projects related to cultural heritage sites should be paid a special attention. Those have high social, historical, and cultural significance, and often require significant investments for restoration, preservation and further use. The current OKVED concerns only construction, restoration, or protection of the objects of cultural heritage [1]. It complicates their state and municipal support, and reduces the investment attractiveness of such projects.

The purpose of the research is to identify development as a separate type of economic activity in OKVED classifier, in terms of the objects of cultural heritage. The objectives of the research are as follows:

1. To identify the key features of development as an entrepreneurial and investment activity.
2. To establish differences between development and related types of activities (including construction contracting and architectural services).
3. To propose possible changes to OKVED and urban planning legislation in terms of the specifics of

OCH development.

Indeed, the main attention is paid specifically to the systemic (complex) interpretation of development, and not to individual construction or restoration. However, in practice, development involves investment, management, and marketing. This is of particular value in terms of projects on the objects of cultural heritage development.

Methods

To study the research problem, we used scientific publications on development and urban planning legislation [1-8], regulatory legal acts of the Russian Federation, the Urban Planning Code, the current edition of OKVED classifier, judicial practice, data of official websites of state departments responsible for cultural heritage and construction.

The systematic study on development and the issues of its legal formalisation required an analysis of theoretical and practical documentation. During the research, we define two main vectors: identifying general trends and searching for specific arguments, as it allows us the comprehensive analysis of the research problem.

There are a lot of scientific publications [1-8] dwell on the organisational structure, financing of projects, the role of development on the construction market. However, they often provide a unified interpretation of development concept, but allow us to trace its dynamics over the past decades. Some authors pay special attention to the financial and economic mechanisms of project management, while others focus on the urban context and interaction with municipal authorities. The study of such sources helps us to forecast the trends in legislative nature of the development concept.

Therefore, it is necessary to study the regulatory legal acts of the Russian Federation directly related to the subject of the research. The Urban Planning Code provides the legal base for construction, architecture, design, etc. in terms of the modification of the urban (or other) environment. An analysis of the current norms has shown the absence of development concept causing a number of terminological and methodological difficulties.

Nevertheless, the study of OKVED requires the identification of the codes in construction, design, protection, etc. However, it does not include investments, marketing, or integrated project management. To scientifically substantiate the proposals for supplementing OKVED, it was necessary to analyse which codes are concern with development itself. As a result, this analysis formed the basis of the section on possible adjustments to the classifier [2].

Another important component of the work is the analysis of the judicial practice. For instance, the Decision of the Arbitration Court of the Krasnodar Krai shows the role of the development in property and financial disputes[1]. It confirms the courts to establish and form criteria for distinguish development from construction, contracting services, etc. According to our analysis of the court materials, the absence of fixed legal acts and terms categories complicates law enforcement: the developer is sometimes referred there as the customer, contractor, investor, and owner. Although, he or she has a broader range of functions on the construction market.

Indeed, legislative and judicial documents give formal ideas. Therefore, we examined data of the official Internet resources of government agencies responsible for the management and preservation of cultural heritage. These websites contain methodological recommendations, orders, program documents, and comments on the most pressing issues of restoration, major repairs, and preservation of historical buildings [3]. It allows us to review the difficulties and coordination procedures for financing and regulation of developer's activities in the field of social and historical objects.

It was important to develop certain logic for selecting and analysing these data to avoid redundancy of information. Therefore, we used the scientific methods. Firstly, we used a dialectical approach, considering in development activity as a dynamic phenomenon. Therefore, we identified their contradictions, patterns, and trends and compare them with the actual state of the legal framework. Secondly, we structured data

[1] *Decision of the Arbitration Court of the Krasnodar Territory on 21.04.2017. A32-43078/2016. Source: https://sudact.ru/arbitral/doc/pHpmgNPyQPdj/ (accessed on 01.02.2025)*

obtained to separate development into an independent type of economic activity. For instance, the analysis of the regulatory field revealed gaps, and the synthesis of data from judicial practice and scientific sources helped to formulate proposals for making changes to OKVED [5]. A systematic approach also allows us to study development in terms of urban planning, economic, and social contexts. Finally, a critical review of the literature concern with the proper development, and its relations with the interests of the state, business, and society.

Hence, during the research we avoided a narrow interpretation of the development. According to many definitions, development includes financial planning, marketing policy, risk management, the search for objects with the prospect of increasing their value (including redevelopment), etc [4]. Indeed, some papers consider development as the mechanisms of urban renewal, and highlight its economic efficiency.

Moreover, the materials of the official websites of government agencies confirmed discrepancies between existing practice and the regulatory field. For instance, the detailed instructions on project documentation for the restoration of a cultural monument called the initiator of the project 'customer', 'investor' rather than 'developer'. Therefore, the legal framework shows the absence of the correct terminology in terms of the development concept.

Additionally, we studied the expert comments and interviews in the open sources. Indeed, some of these publications are not the scientific articles or court cases; however, they provide interesting ideas on challenges of developers and government interaction. For instance, the typical difficulties in approving projects for the reconstruction of ancient buildings in the historical part of the city involve the architectural appearance, attracting a tourist flow, organizing parking areas, etc. Therefore, development of the objects of cultural heritage is a special sphere requiring a special legal status. However, it is not included into the current version of OKVED classifier [6].

An important method in evaluating the data obtained is the comparison of practice with existing international standards. It demonstrates similar challenges, i.e. preferential taxation, commercial risks for practice in terms of the objects of cultural heritage. Indeed, understanding of foreign experience helps us to formulate more precise proposals for the reform of the Russian classifier and legislation on urban planning.

Hence, complete overview of regulatory norms provides the comprehensive analysis in terms of the development through dialectical analysis and systematic assessment of the role of development in the economy and urban planning. These data confirm the hypothesis on development in the field of cultural heritage requires its own legal status and codes implementation in OKVED. On the basis of these data, it is necessary to improve existing regulations.

Moreover, the legal framework in terms of construction and cultural heritage is quite dynamic. Therefore, it is necessary to use only out-dated source [7]. Therefore, following the regular changes in legislation is an integral part of this study.

Hence, an analysis of scientific publications, regulations, judicial practice, data from government agencies and the use of a comprehensive methodology combining the principles of analysis, synthesis, dialectics, and consistency provide an existence of development both in theoretical and practical field. The conclusions obtained are justified and relevant both for a theoretical and practical aspects of development in terms of changing OKVED and urban planning legislation [8].

The empirical basis of the study is formed through analysing the current norms of OKVED classifier (in particular, sections F and 91), considering the types of work in terms of the construction and preservation of the objects of cultural heritage. We consider proposals on inclusion of new formulations in section 91.03 "Activities for the protection of historical sites and buildings, cultural monuments" taking into account its investment and management components.

Results

The essence and specifics of development

The review of scientific and practical materials [1-7] considers development as a multicomponent process combining a wide range of tasks, from the construction of new buildings to the transformation of

existing facilities with their subsequent capitalisation. Generally, the term is used in the context of bringing facilities to a higher quality or redevelopment of outdated buildings, industrial areas, or the enhancement of historical territories attractiveness. However, the term development is not defined clearly in Russian legal acts. It resulted in a lot of interpretation of the term. When dealing with disputes between project participants, courts are forced to identify and formulate development activities, which diversified an approach[2].

Within the framework of various projects related to real estate and infrastructure, development actually combines the functions of an investor, a manager, a marketer, etc. Historically, the Russian legal system has been dominated by a narrow interpretation of the construction process. Every qualitative change in a real estate object or territory was reduced to a building or reconstruction project [9]. However, the analysis of theoretical publications shows that the concept of 'development' prevails over the traditional construction activity. It combines financial, managerial, and marketing aspects ensuring the launch, control, and completion of various stages of the facility's life cycle. Moreover, it could be resulted in a physically renovated or newly built facility, including the transition from industrial buildings to innovative technology parks or tourist clusters focused on preserving historical heritage [10].

According to domestic and foreign publications [1-7], development is not a repair or construction. It has three key stages: pre-project, investment (sometimes referred as 'project'), and operational. The pre-project stage involves conducting of marketing research, assessment of the project prospects, potential limitations, and strategic goals. For instance, reconstruction of an ancient building defined as OCH requires obtaining of appropriate permits from the developer. The investment phase involves the development of project documentation, calculation of a budget, contract, and construction or reconstruction management. The operational stage includes the introduction of the object in the market and its operational management. All the stages are under marketing support: advertising campaigns, negotiations with tenants or buyers, an image of the object, etc.

In terms of historical buildings, the developer's responsibility is of special importance. Moreover, the support of OCH requires detailed interaction with specialists in the field of restoration and cultural studies, the use of special techniques and materials, coordination of each step with relevant government agencies [11]. As a result, a developer protects cultural heritage and tries to have a profit.

In law enforcement practice[3], courts are often forced to use analogies of the law. On the one hand, there is a contractor that undertakes to construct or restore a building within a certain time frame. On the other hand, there is a client-developer without highly specialised knowledge about the initial restoration of building decoration. At the same time, development determines the development strategy of the facility, controls deadlines, allocates resources, and interacts with banks and investors. The absence of a distinct legal status of a 'developer' ensures the diversification of obligations and complicates court proceedings.

The developer has to build a system of interaction between architects, contractors, suppliers, officials, etc. For instance, it is not enough to build a house or renovate a former factory. It is important to think on logistics, infrastructure, and engineering networks, social and cultural aspects. When working with OCH, such an approach may include preserving authentic elements, establishing museums or creative spaces, and adapting buildings for exhibitions or conferences. Therefore, development acquires the status of change management in the urban environment, which takes into account both market trends and public interests.

The restoration projects are more complicated, since historical buildings are under the special protection regimes, requiring non-standard forms of financing (sponsorship, public-private partnership, etc.). Hence, there is a necessity to recognize development as an independent business sphere with legal fixation in OKVED and in legislative acts [12].

Multi-stage, combining the functions of investment, management, marketing, restoration and construction allow us to define development as a special kind of complex activity, qualitatively different from conventional construction services. It requires a separate codification and legal regulation to allocate

[2] Decision of the Arbitration Court of the Krasnodar Territory on 21.04.2017. A32-43078/2016. Source: https://sudact.ru/arbitral/doc/pHpmgNPyQPdj/ (accessed on 01.02.2025)

[3] Decision of the Arbitration Court of the Krasnodar Territory on 21.04.2017. A32-43078/2016. Source: https://sudact.ru/arbitral/doc/pHpmgNPyQPdj/ (accessed on 01.02.2025)

responsibilities and differentiate the roles of project participants, develop additional support aimed at preserving cultural heritage.

Differentiation of development from related activities

Nowadays, development is mostly considered as the work of general contractors, however, the developer assumes to have a wide broader range of responsibilities. While the tenant builder concentrates on the construction process within the framework of the technical regulations, and the general contractor controls the subcontractors and the quality of work, the developer integrates all stages [13]. He is responsible for identifying a promising site or an existing building, assessing its potential in terms of profit and further operation, setting deadlines and budgets, and forming a financial model that may include funds from private investors, bank loans, company equity, and other financing tools.

Moreover, development activity includes a marketing justification of the concept, an analysis of the needs of potential customers (tenants, buyers, future users), a study of the technical possibilities of reconstruction or creation of new areas, etc. [14]. This includes engineers, designers, lawyers, marketers, cultural heritage experts, etc. In practice, developer starts his activity long before signing construction contracts: develops a building management scheme, lobbies the interests of owners in government agencies, and promotes the facility on the market.

Table 1 – Comparison of construction contract and development[4]

Parameter	Construction contract	Development
The main focus	Performing construction or restoration work according to the terms of reference and project documentation.	Comprehensive project management: from planning and investment to occupancy.
Stages of work	Construction, repair, restoration, and service of the facility.	Pre-project research, financing, construction/renovation, and marketing support.
Degree of responsibility	The contractor is responsible for the quality and timing of the work according to the contract.	The developer takes risks in terms of finances, timing, choice of concept, and management of the facility after commissioning.
Key competencies	Technical and engineering skills, experience in construction operations.	Skills in project management, financial analysis, marketing, and investor relations.
Relation to the objects of cultural heritage (OCH)	Restoration under the license.	Responsibility for the entire development and adaptation strategy of OCH, including coordination with the monument protection authorities.

Source: Author

The current OKVED codes are not correlated with the diverse developer functions and activities. Section F (Construction) covers a wide range of construction activities, including the construction of new buildings and the restoration of OCH heritage sites; it does not concern the issue of investment activities or the integrated management of the project from the developer's point of view. Section 71 – the activities of architects, engineers, technical consulting and expertise specialists. It mainly concerns with services for design, geodesy, and assessment of the condition of facilities. It does not consider the managerial and financial aspects forming the development approach. Finally, code 91.03 (Activities for the protection of historical

[4] *The table shows the key differences between a construction contract and a development project*

sites and buildings, cultural monuments) implies the preservation and protection of monuments; it does not concern with investment, commercial operation, and promotion of the OCH [15].

As a result, a developer forced to perform diverse tasks: engineering and economical ones [16]. Therefore, it is impossible to develop targeted support measures or provide special tax incentives, since formally the developer is not under the legislation as a subject of strategically significant investment activity.

Moreover, the use of multiple codes makes statistical accounting difficult. The government agencies and real estate management cannot assess developers activities and their costs in terms of the OCH. It hinders the formation of a transparent development market and cooperation of business and the state. As a result, development companies continue to work under the disparate codes and have no guarantees that, with the support of the state or regional budget, their activities will be interpreted correctly. It is especially typical for projects related to the OCH, where additional benefits and approvals are needed, since the development of a concept and the preservation of a unique appearance often require time, specialised knowledge and an increased budget.

In fact, the absence of a corresponding code in OKVED disparate licensing and control procedures and provide difficulties in obtaining a single comprehensive support. As a result, the entire real estate management system, including historical real estate, have no the mechanism for holistic planning and investment, cannot effectively stimulate large-scale projects for the preservation and development of cultural monuments.

Proposed changes to OKVED

The systematisation of the collected data on the role of development in working with OCH demonstrates the need for an approach to classifying these types of work. Currently, section 91.03 focuses exclusively on the protection of historical objects, buildings, and cultural monuments[5]. However, development activities at OCH include a range of managerial, investment, financial, and organisational operations. Therefore, the wording 'Activities for the protection of historical objects and buildings, cultural monuments' should be transformed to cover the range of actions for promoting such projects.

Table 2 – Proposed changes in OKVED classifier (Section 91.03)[6]

OKVED (current edition)	Wording (current)	Proposed revision
91.03 Activities for the protection of historical objects and buildings, cultural monuments	It covers the functioning and protection of historical objects and cultural monuments, and does not include investment and management aspects.	'Management, conservation (protection) and investment in historical objects and buildings, objects of cultural heritage'

Source: Author

According to the analysis, the previous edition of OKVED does not cover the stages of the development cycle. Indeed, it includes the search for sources of financing, the formation of a concept for the reuse of a historic building, marketing and legal support for each of the stages. The subsequent management of the facility after its commissioning is also significant, when the developer continues to coordinate business activities and monitor the return on investment.

The expansion of the section 91.03 and the introduction of position 91.03.1 with the possible title 'Management and investment activities in historical objects and buildings, objects of cultural heritage' provides the implementation of management decisions, risk management, financial analysis, and the search for a profitable scheme, interactions between government agencies, businesses, and public organisations, and planning a development strategy for the facility[7]. The previous wording of the section F (Construction)

[5] *The Law of the Russian Federation "On State Registration of Real Estate" on July 13, 2015 No. 218-FZ. Source: https://www.consultant.ru/document/cons_doc_LAW_182661/ (accessed on 01.02.2025)*

[6] *The new version provides for the possibility to cover the investment and management components related to projects at objects of cultural heritage*

[7] *The Urban Planning Code of the Russian Federation. Source: https://www.consultant.ru/document/cons_doc_LAW_51040/ (accessed on 01.02.2025)*

concerns with the engineering and technical side of the project; the development company can make decisions on the economic feasibility, strategic prospects, and positioning of the object in the market.

Upgrading of separate code 91.03.1 may also affect the legal status of organisations engaged in the field of cultural heritage. A significant part of such structures requires investments in conservation or cosmetic restoration, and implementing of an effective financial and management model. As part of the proposed clarification of OKVED, a development organisation is able to officially declare its activities as management and investment.

For more accurate identification of such operations, it is important to take into account the specific features of cultural heritage. These include special requirements for project documentation, coordination procedures with monument protection authorities, additional social and ethical aspects, because such objects often have not only material, but also symbolic value for the regional or even national community. The inclusion of the management and investment components in 91.03.1 ensures this difference and gives developers the opportunity to officially position their business as a complex framework of repair and restoration [17].

However, there is a need to establish the developer's area of responsibility and the areas covered by the F code. Hence, companies involved in restoration are in section F; companies involved also in planning, attracting finance and commercial operation are in section 91.03.1. This differentiation gives flexibility of choice and regulates the market, as each business entity determines more precisely [19].

In the long term, the changes introduced will also encourage more detailed statistical reporting on OCH. It will help to optimise monitoring the volume of investments, the dynamics of these projects, and their final impact on the economy and the cultural environment. Developers will be able to reasonably apply for specialised support measures or benefits in the field of preserving historical heritage, because the existing codes and their descriptions will allow them distinguish their activities.

The interpretation 91.03 with the addition of 91.03.1 is advisable from the point of view of theoretical systematisation, legal regulation, and market participants. Therefore, a separate category for complex development projects in the field of cultural heritage will ensure business approaches for the OCH. At the same time, the structure of the classifier will remain stable, but construction activities and investment management will be separated according to OKVED codes. A description of section 91.03 with 91.03.1 code will consolidate the existence of an economic activity consisting of construction and security functions, investments and management [18].

Criteria for classifying activities as development

There is a problem is especially evident if a company undertakes work with OCH. Indeed, the developer can be engaged in construction or restoration, but also in investing, finding partners and tenants, managing functions, and marketing support for a future project.

Table 3 – Criteria for classifying activities as development[8]

Criteria	Content	Applicability to OCH
Share of revenue/income	The percentage of revenue (or total income) from development activities in relation to the turnover of the entire organisation is determined.	The predominance of operations on investment and management of OCH, development can be declared as the main activity.
The degree of participation in the project stages	The involvement in pre-project research, design, financial planning, subsequent implementation and operation is assessed.	Organisation is recognised as developer after expertise of its activity

[8] *The criteria make it possible to distinguish between development and related types of work.*

Criteria	Content	Applicability to OCH
Compliance with statutory goals (for non-profit organisations)	The right to invest, manage real estate, marketing, etc. is prescribed in the constituent documents.	For funds and associations related to the restoration and preservation of OCH it allows ones to officially conduct development activities.
Marketing and investment activities	It takes into account whether the organisation is engaged in the search for investors, the development of a marketing concept, ensuring the payback of the project.	It is of the great importance as it requires specialised measures (attracting grants, subsidies, and partner programs).

Source: Author

According to the existing methodological recommendations on the application of OKVED codes, the choice of the main type of activity is based on a share of revenue, the amount of income received, a compliance with the statutory goals (in the case of a non-commercial format). For commercial organisations the percentage of revenue in an area relative to the total turnover of the company is recognised as a key guideline. The significant increasing of the share of the development component in the total income of the company could be a result of company's engaging into a renovation of buildings. It expands its responsibilities to the integrated management of an old mansion restoration project, attracts financing and assumes part of the responsibility for the operation of the facility. As a result, such a company is able to demonstrate development as a prominent component of its business.

For individual entrepreneurs, the revenue criterion is transformed into total income, which, in addition to basic earnings, includes taxes, related deductions and other mandatory fees levied on transactions. It is of fundamental importance for statistical accounting and reporting. The transformation of OKVED classifier will ensure the importance and relevance of development.

Moreover, there are non-profit organisations without a traditional profit. Their efficiency (and hence the definition of a profile) is closely related to the statutory goals. The organisation declares development (in terms of OCH) as a leading activity and provides for investment and project management, it can be determined as a developer. This is extremely valuable for receiving grants, various forms of government support, interaction with private investors, etc. Although the non-profit sector does not aim to make a profit, it can still work with a financial planning mechanism, develop capital raising schemes, and receive some benefits (for example, in the form of lease payments, but without distributing profits among participants)[9]. This type of activity assists in the preservation of the monument and increasingly resembles the classic development model with an integrated approach.

In any case, these criteria (the share of revenue or income, the relationship with the statutory goals, and the actual volume of projects implemented) allow us to form an objective scale corresponding to the concept of development. For the enterprise is engaged exclusively in repair and construction of OCH it is advisable to remain in section F, without claiming special status privileges related to management, investments, and project coordination. On the one hand, it protects the market from confusion of concepts, and on the other hand, it provides additional opportunities for complex and large-scale activities.

When a company or sole proprietor transits from restoration services to multi-stage investment planning, they actually take on new risks: from financial and legal to image ones. On the contrary, the development company may decide to optimise costs and transfer part of the construction tasks to subcontractors, retaining only the functions of organiser, coordinator and manager. All such strategies affect the revenue structure and the actual share of activities that are classified as development. Consequently, the interpretation of the main

[9] *Federal Law of the Russian Federation "On State Registration of Rights to Immovable Property and Transactions with It" on 21.07.1997. No. 122-FZ. Source: http://www.kremlin.ru/acts/bank/11239 (accessed on 01.02.2025)*

type of activity is directly related to the logic of the organisation of the entire project.

In practice, construction companies or investors realise their assistance in evaluating an object, financing advice, legal support for transactions, marketing to the end user (tenants, buyers), etc. It makes them the developers, changing the proportion of their income and, consequently, transits from the construction activity section to the group, which will be fixed in the updated 91.03 (or separate 91.03.1) [21]. In this case, the calculation of the revenue share will already show that the main turnover is not formed by performing repairs as such, and through integrated project management, capital rising, and subsequent facility maintenance.

Therefore, determine of development it is an urgent task. It allows the managers to assess their construction specialisation, a range of services, and the introduction of modern management tools. It is important for potential customers and partners to see the reliable information about the business profile, supported by official figures (revenue volume, revenue share).

The regulation of the criteria for classifying an enterprise to development becomes the key to form a transparent market. This system forms a structure in the market, ensures statistical reliability, and makes it easier for public authorities to form priorities and support measures in the field of cultural property preservation.

Discussion

The importance of separating development into an independent OKVED code might have a complex impact on the system of economic relations, regional planning, and historical heritage. However, development projects, especially those focused on historical buildings have their own specifics that require additional financing, special design and cooperation with government agencies. The enterprises will have a formal opportunity to apply for subsidies, tax breaks, and grants for the integrated development and adaptation of historical territories. Those will become a kind of motivation to implement more responsible and high-quality projects and do not compile the functions of a contractor, manager and cultural expert.

The regional statistics and analytics are very important. The local authorities should analyse investments and OCH activity. An absence of a separate development code makes it difficult to collect and analyse data. The special OKVED code helps to the regional officials and researchers analyse the actual volume of investments and the dynamics of the projects. It will simplify decision-making in budget expenditures: the municipal authorities will prefer to support development initiatives, since statistics will show their effectiveness in terms of involving the population, jobs formation and improving the urban landscape.

Moreover, it will have the beneficial effects on judicial and supervisory practice. Today, many disputes concerning complex projects involving OCH attempt to determine whether a particular company is responsible for the entire range of work (from financing to marketing) or acts as an ordinary contractor performing a given section of construction activities [22]. Absences of legislative consolidation of the term 'development', courts are guided by the rules on intermediary services, lease or investment, which causes terminological inconsistencies. The transformation of OKVED, confirmed by the substantive characteristics of the developer's activities, allows ones to decrease the quantity of disputes, resolve the conflict, etc.

Indeed, the new code will not eliminate the contradictions that arise in the field of cultural monuments preservation. Many factors interact here, from financing to public discussions on possibilities to reconstruct the OCH. Nevertheless, developers receive a legal instrument recognised by the state; it will be easier for them to negotiate with relevant authorities, attract external resources and specialists to restore the exterior facades and analyse the life cycle of the building [23]. According to the experts, a competent developer focuses on the right combination of the commercial component and public interest, striving not only to make a profit, but also to establish new cultural spaces for the citizens.

Additionally, the allocation of development as an independent area can stimulate the establishment of professional communities. Nowadays, there is a market fragmentation – architects, restorers, engineers, lawyers are working in their own segments. The development companies prefer to involve specialists from several industries to ensure unified design. These companies will have an additional incentive to form associations, participate in specialised conferences, share techniques and experience, make proposals to

improve the legislative framework, and support the young employees. Hence, there is a formation of the project management culture.

Note, an absence of regulations prevents the foreign investors' participation. An absence of the terminology allowing the activity registration could not guarantee the transparent use of funds, comprehensive analysis of investments in accordance with the laws in terms of OCH. The introduction of the new code provides transparent cooperation of potential partners and investors.

This information can form the basis of territorial development programs. Data analysis shows a number of incentive measures can be proposed to balance development. The competent analytics on the development of OKVED directly affects the quality of strategic planning.

Another important detail is social responsibility. The development of historical sites is a multi-stage process, often requiring negotiations with the public and local initiative groups. When development is recognised as a special type of economic activity, developers will have increased responsibility not only to investors, but also to society [24]. An inattentive approach to cultural monuments causes negative consequences: the destruction of authentic elements, the replacement of unique structures with cheap analogues, etc. On the contrary, a socially responsible developer is forced to protect the territory, and consult with the experts.

To summarize, the allocation of development to an independent OKVED group will not replace the entire set of reforms required in the field of cultural heritage conservation. However, this is a significant step towards modernising the management system, forming the favourable conditions for public-private partnerships, targeting support for responsible projects, building new cooperation, and increasing the transparency of business activities. The regulatory status of development can help to form the additional values for the urban environment, culture, and society as a whole.

Conclusions

The research covers a wide range of issues related to development as a unique type of entrepreneurial activity, different from the usual construction or design of real estate. It considers both scientific literatures, where development is viewed through the prism of project management and investments, and regulatory legal acts regulating the activity in terms of OCH. As a result, many sources consider the term 'development' controversially. Meanwhile, its formalisation can have a real impact on the development of the industry and OCH important for culture and tourism.

The one of the central ideas of the entire analysis is that development is not a collection of disparate transactions for the purchase and sale of land or buildings [25]. It is a complex process covering the range of activities from funding and negotiating with investors to planning the future use of constructed (or renovated) facilities. It requires a special place for development among the other economic activities. The developer should be an expert in architecture, engineering, legislation, marketing, financial planning, and balance between profit and public interests in the field of OCH.

The conducted research identified the several key ideas. The developer involves the simultaneous solution of organisational, legal, economic, and technical problems. For instance, a construction company may be engaged in the construction of a new building or the reconstruction of an old one, but it does not always assume the functions of financing and a comprehensive operational strategy. When working with cultural monuments, specific conditions are added: the need to comply with security requirements, take into account public opinion, and coordinate with relevant government agencies. The success of such initiatives is often directly related to the competence of the developer, and his or her ability to construct a dialogue between architectural bureaus, restorers, historians, municipal administration, and financial institutions.

Secondly, the absence of a special code in OKVED equates development to either construction, mediation, or other similar field, which loses the real uniqueness and scale of the tasks that the developer solves. Hence, it complicates the process of obtaining support from the state budget, but also introduces confusion for potential partners. It slows down the development of the industry and often prevents the potential investors to finance such projects.

Thirdly, the expansion and refinement of the 91.03 or formation of a new position in the classifier

provides more targeted support policy. The activity defined and separated from other types of work helps the government agencies to assess the resources, especially those related to historical sites. For instance, the ministries or regional authorities may develop specialised grant competitions or preferential tax regimes specifically designed for developers engaged into the preservation of cultural heritage. A similar practice exists in a number of foreign countries. The developer is given tax holidays or subsidies in case of his preservation the historical authenticity by integrating the building into a modern urban infrastructure.

Fourth, the introduction of the term 'development' into the Urban Planning Code of the Russian Federation will simplify judicial and administrative procedures. Currently, courts sometimes have no comprehensive definitions to consider disputes on the distribution of risks and responsibilities between the developer, investor, and customer. A legally established concept of 'developer' concerns with these issues. In addition, supervisors i.e. monument protection inspections or territorial administrations of the Federal Property Management Agency will be able to identify the actors responsible for investment and organisational risks faster, which will reduce the conflict situations and illegal work.

The results of the research demonstrate the importance of this initiative both for investors and for the entire real estate market as a whole. The urgency of long-term benefits to society, combining the preservation of cultural heritage with economic efficiency, requires an expert development. We believe, only the expert development ensures the interests of the state, social demands for the preservation of historical memory, financial results, and profitability. Therefore, development as a term and activity should be formally fixed in the legislation.

We formulated the main provisions of the research as follows:

1. The multi-stage nature of the development. Modern projects require technical knowledge, economic expertise, project management skills, negotiation skills, and a deep understanding of the specifics of security legislation. The developer designs a development strategy for the facility, considering the life cycle from the moment of design to stable operation and even subsequent maintenance.

2. The absence of a particular code in OKVED and its consequences. In practice, the development companies are often forced to register under non proper codes. As a result, government support (tax incentives, grants) is ignored, because formally the recipient of subsidies is an individual. Irresponsible to reconstruct the facilities. This affects both the transparency of statistics and the attractiveness of the market for the investors.

3. The need to expand and adjust the grouping 91.03. Today, 91.03 focus on the protection of cultural heritage, but it does not specify the mechanisms of project management and investment in OCH. The allocation of development into a special sector, which includes management, financing, and integrated implementation will systemise the industry. In the long term, these processes at the regional and national levels are becoming easier.

4. The inclusion of relevant regulations will help distinguish development from classical construction and consulting. The judicial practice will have a terminology base for resolving disputes related to the developer's liability. It stimulates the regulatory framework, speeding up the approval process, and attracting private investment.

As a result, the idea of allocating development to a separate category of OKVED and including this term in the Urban Planning Code of the Russian Federation has significant practical significance. The benefits for the real estate market are as follows: acceleration of economic processes, transparency of interactions between the government and business, improvement of the investment climate. However, it is particularly important in terms of OCH, where the slightest mistake in the reconstruction process can lead to the irreparable loss of the unique appearance of buildings. A developer operating in a legislative field assumes the commercial risks, and a part of public responsibility. As this activity is becoming visible and measurable in terms of high professional and ethical standards.

According to the international experience, real estate development is an independent business trend providing the establishment of the institutions, training programs and professional associations. In Russia, this process is only at start, and the legal consolidation of the developer's status can serve as a catalyst for further development. The result will be a higher level of competition and a higher-quality projects appearing

on the market.

Today, development plays a significant role in the spatial development of cities: it forms an attractive environment for life and business with the right approach to cultural heritage support. We believe, it is necessary to introduce a separate code in OKVED classifier and a system of legal norms. It can ensure a stable foundation to act effectively, transparently, and in the interests of society.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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The role of ESG signals in attracting and retaining employees: evidence from top-tier Russian companies

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ORIGINAL ARTICLE

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Abstract. This article examines the role of Environmental, Social, and Governance (ESG) signals in attracting and retaining employees within top-tier Russian companies. As ESG compliance becomes increasingly essential for businesses, this study employs signaling theory to analyze how organizations communicate their commitment to sustainable practices. Existing theory suggests that effective ESG communication enhances organizational reputation and attractiveness to job seekers, ultimately influencing their intention to apply. To analyze, what is the current situation with ESG compliance communication to employees in leaders of their respective industries in Russia, we employ thematic and content analysis. By exploring the communication of various ESG practices in companies' ESG reports and on their career websites, we map the structure of ESG signaling by top employers and presence of these signals in direct communications with potential employees. Through this process, we gain insights on which ESG practices are signaled to the potential employees most often, and develop recommendations for organizations aiming to enhance their competitive edge in the labor market while promoting sustainable business practices.

Keywords: signaling theory; ESG signals; ESG reports; employee attraction; employee retention; thematic analysis; content analysis

JEL codes: M12, M14, G34, Q56, J28

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Introduction

There is no doubt that ESG compliance has become an integral and necessary part of business for basically any enterprise, regardless of its size. At the same time, it is clear that large, top-tier enterprises are the ones setting the tone of the in the area of sustainable business practices. The rationale behind such ESG activity is clear, and it isn't solely the desire to appeal to the customers, but also the opportunity to market the firm to potential (and even current) employees. Evidence shows, that the engagement of companies in ESG activities is noted and valued by the job seekers, thus, businesses are incentivized to promote their ESG compliance not only to investors, but also to the participants of the job market. To be more precise, ESG compliance is not only valued, but employees are actually more likely to stay with companies that actively demonstrate their commitment to social, environmental and governance causes and principles. This statement is especially fair if we take into consideration the younger generation of employees, Gen Z, which are increasingly interested in the sustainable operations of potential employers. Such conclusions have been obtained by Lee et al. [14] regarding the impact of environmental and social dimensions on employee retention, or by Kim et al. [12] regarding the value of ESG for recruitment of new employees. One of the mentioned reasons for the high importance of ESG strategies for new generation of employees is alignment of corporate sustainability with personal values, which increases the satisfaction gained from the job. However, the companies looking for the long-term positive impact from their ESG compliance should also be aware of the possible challenges – such as greenwashing, the exaggeration of a company's environmental efforts, in order to gain from the overstated sustainability practices. The results of greenwashing once identified are high turnover intentions from employees, as established by Robertson et al. [18]. To foster the sustainable culture which resonates with the potential employees, companies need to actively measure, report and promote their ESG performance. As for the last point, the possible ways of promotion are numerous, as researchers have proposed a variety

of instruments by which companies deliver the message about their ESG practices. In our study we desire to focus on the approach, which have received much less attention from scholars, than, for instance, well-renowned concept of employer branding. This approach is based on the prominent signaling theory. Using its postulates, we posit that information about ESG compliance can be treated as signals about employer sent to employees in order to attract or retain them in the organization. Here, we come to another crucial point – the value and relevance behind the attraction and retention of employees for large enterprises. In addition to the more expected benefits, such as the reduction of costs caused by employee turnover or better productivity stemming from work of high-skilled employees, there is yet another reason why signaling ESG for the sake of better employee outcomes is relevant. This reason is the important issue of the situation at the job market in Russia. Currently, it can be characterized by one key problem – the lack of the necessary high-qualified professionals. Hence, the task of attracting or retaining such employees has become one of the primary goals for organizations looking to keep or boost their competitiveness in the time of high uncertainty. As much as 85% of firms named the lack of desired professionals as key challenge during 2023, and the statistics for the 2024 are not expected to show a positive trend. Thus, the understanding of how top-tier companies use ESG to signal the qualities of the workplace environment will be highly useful for any enterprises looking to leverage their ESG efforts in order to enhance the situation with hiring and keeping the valuable professionals.

The theoretical basis of the study is manifold; thus, we will review the knowledge on the topic step by step, starting with the key economic theory, which guides our study.

Signaling theory

The essential part of our research is well-renowned signaling theory. It was developed by Spence in 1973 [19], and have originally described the job market setting, seeking to analyze the interaction between employers and potential employees in the context of information asymmetry between organizations and job seekers. With this approach, the key idea that signaling theory arrives to is the following: individuals, who are looking for a job, send certain "signals" to the potential employers about their qualities, qualifications and capabilities, so that initially private information available only to the individual himself/herself can also be known and taken into account by the organization. Naturally, in this case, organizations/employer act as receivers of such signals and perceive them in a particular way. However, the further development of signaling theory has demonstrated, that the process of signaling is reciprocal – not only employees share certain information about themselves, but organizations are equally eager to signal their positive qualities and benefits to enhance the process of attracting necessary professionals. In our study, we employ this approach to proceed with the exploration of chosen topic.

ESG signals from employer to employees

Hence, we employ this idea of organizations sending "signals" to employees, both current and potential. It is worth pointing out that in our case, we treat the information that companies provide about their ESG practices/activities as such signals. The idea of analyzing organizations and employees from this standpoint has been previously implemented by researchers, confirming the legitimacy of such an approach. Actually, Kim et al. [10] described in detail, which ESG achievements firms prefer to signal and by what means, diving deep into the topic. Notably, Celani and Singh [4] maintained that signaling theory demonstrates that organizations send signals about organizational characteristics and applicant evaluate these signals in their application decisions. Guest et al. [9] established that signaling theory highlights how managers act as signallers of HR messages and employees act as receivers. Moreover, Carlini et al. [3] employed signaling theory in order to develop a conceptual model of employer branding process from the employee perspective, while Dineen et al. [6] took the idea of signaling further and investigated how third-party signaling might impact the perception of the organization by current and potential employees. Additionally, there is another important element to the process of employer signaling to employees – the characteristics of these signals. To be more precise, we will cite Wilden et al. [21], who maintained that job seekers evaluate the clarity, credibility and consistency of employer brands' signals – hence, ensuring the high level of these characteristics becomes essential.

ESG effect on organizational attractiveness

Nevertheless, it is also important to confirm, that using ESG as a way to enhance organizational attractiveness is indeed beneficial, either through signaling or otherwise. There is a substantial amount of literature highlighting that ESG plays a significant role on shaping the attractiveness of organization as an employer. Thus, the potential positive impact of ESG should not be omitted. For instance, Liu and Nemoto [15] have shown that "potential applicant place emphasis on evaluation of corporate commitment to environmental protection, conserving and managing resources, good relations with society and fair transparent management". As a result, firm's high ESG scores may provide a competitive advantage in attracting talents. Other examples include Gannon and Hieker [7], pointing out that employees' express desire to work for organizations with strong ESG commitments or Matsko [16] positing that compliance to ESG principles can be employed as a way to successfully market the company as an attractive employer. Additionally, several scholars have shown the effect of ESG on organizational attractiveness through organizational reputation.

Relevant examples are Teor et al. [20], establishing that ESG principles have value for employees and largely influence corporate reputation, and Chen et al. [5], claiming that organizational reputation is a critical linkage and underlying mechanism between the ESG compliance and organizational attractiveness. Another good example is Abraham et al. [1], proposing that job seekers use available information on firms' behavior towards society as a reputation signal, thus assessing how the organization might treat employees. The clear positive relationship between ESG and corporate reputation has also been posited by Kim and Cho [12] and Palacin-Bossa et al. [17]. One more angle to assess the impact of ESG on corporate reputation is its noticeable link with employee pride – papers such as Alves et al. [2] show that ESG perception significantly enhance employee retention through pride. With that being said, let us proceed with the detailed overview of the connection between ESG and employee retention.

ESG effect on employee retention

Literature also suggests that ESG has a positive effect on employee retention, similarly to employee attraction to an organization. Nowadays, when the process of finding a new highly-skilled employee becomes substantially harder, any instrument allowing to decrease employee turnover and keep necessary professionals in the organization is highly valuable. It should be accentuated, that in many cases, the positive relationship between ESG compliance and employee retention is not direct – for instance, Zhang et al. [22] emphasized that corporate ESG behaviors enhance employee satisfaction, which in turn can positively affect the retention of employees. Kim et al. [11] have established that ESG practices support company's efforts to nurture employee self-esteem and commitment, and thus enhance employee retention. Other relevant examples can be found; however, we would like to point out another important study, supporting the idea of exploring the situation with ESG signaling in various industries, which guides our study – Garsaa and Paulet [8] investigated the relationship between ESG disclosure and employee turnover, finding that turnover depends strongly on the economic sector and mandatory/voluntary type of disclosure. Thus, this highlights the value of analyzing the differences of ESG impact on employee attraction and retention outcomes in different industries.

Hence, we arrive at the conclusion, that despite the existing research efforts in the direction of ESG signaling for the purpose of employee attraction and retention, this issue still allows for further and deeper exploration, especially in the uncommon contexts, which Russian Federation also belongs to. Consequently, we propose to address several research questions in order to explore the mentioned issue in detail.

Hence, after laying out the theoretical basis of our study, we proceed with formulating the research questions, originating from presented theory and promising to shed light on the important issue of ESG signaling for employee attraction and retention, once answered.

RQ1: Which ESG practices top-tier Russian companies commonly signal about in their ESG reports?

RQ2: Which ESG practices are highlighted in the direct communications with potential employees, for instance, career websites and published vacancies?

RQ3: What is the connection between ESG reports and communications with employees, in terms of the common ESG signals sent to the employees?

Finding the answers to these questions will allow us to gain full understanding of how top Russian companies operate in terms of signaling their ESG compliance for the purpose of better employee outcomes.

In addition, it would be possible to point out the areas where the communication with employees is limited, and might offer additional benefits in case of enhancement/activisation. Moreover, we deem necessary to address the potential question, why only the top-tier companies have been chosen as an object of analysis. Here, we would like to point out, that we were guided by the benchmarking approach – the desire the identify the most advanced cases of ESG compliance from companies, which would serve not as a representation of the situation in the industry, but rather the ideal level of development of ESG practices, which other firms operating in the same industry could see as an example to follow. We take this approach, as one of our goals is to present managerial implications, providing the managers of firms with recommendations and guidance how communication about various ESG initiatives can benefit their business.

Methods

The methods used for the implementation of the study include thematic analysis and content analysis. The goal is to investigate the ESG reports of top-tier Russian companies in order to identify the key sub-themes and codes, acting as signals sent from the employer to the external environment as the report is published, and which are free for interpretation and perception by potential and current employees. As a result, we would outline the whole structure of the companies' ESG communications, with the detailed description of each relevant theme and sub-theme. At the same time, we are also to explore how often this codes and themes appear in the specific recruitment communications between company and employees, analyzing the career websites and available vacancies through the means of content analysis. It is necessary to point out, that unlike the exploratory analysis of themes in the ESG reports, with the end goal of detecting all important themes, sub-themes and codes, the content analysis of career websites and vacancies is set to identify the codes and sub-themes which were previously detected in the reports. Hence, other potential codes or sub-themes, which might be present on the career resources, are not in the scope of analysis.

Results

We have conducted thematic analysis of the ESG compliance reports for 7 top-tier Russian companies from different industries: heavy industry, banking, construction, grocery retail, logistics, oil and gas, information technologies. For each of the companies, we present the detailed structure of signals present in their ESG reports, cross-checked with their channels of direct digital communication with employees – career sites and published job vacancies.

Additionally, it is necessary to comment on the design of the tables, which we have implemented in order to demonstrate the cross-check between the results of thematic analysis of ESG reports and content analysis of career websites and vacancies published by companies. Below, we present the final results for each firm, with the outcomes of thematic analysis on the left side, and the results of content analysis on the right side. Moreover, in case certain sub-themes and codes are present both in the ESG reports and career resources, we have highlighted such a connection by a colored bar, linking the thematic and content analyses results. This allowed us to visualize the abovementioned connection, making it easier to establish which theme (correspondent to each dimension of ESG) is actually represented in employee communications.

Severstal (heavy industry)

Table 1 – Results of thematic and content analyses of ESG reports and career resources for Severstal

Theme	Sub-theme	Codes	SEVERSTAL	Codes	Sub-theme
We are a socially responsible firm	We guarantee the observance of human rights	Impermissibility of forced labor; zero tolerance of discrimination of any kind; employment of individuals with			

Theme	Sub-theme	Codes	SEVERSTAL	Codes	Sub-theme
		disabilities; impermissibility of harassement; provision of gender equality			
	We create development opportunities for employees	Development of management skills; development of functional skills; educational programs in external universities	+	Development of management skills; development of functional skills	We create development opportunities for employees
	We attract young, talented employees	Partnerships with universities, colleges and schools; educational events; career guidance events; internships; benefits for young professionals	+	Internships; benefits for young professionals	We attract young, talented employees
	We have a strong employer brand	Rewards and high position in HR ratings			
	We care about the well-being of our employees and their families	Promoting healthy lifestyle; organizing sports events; providing medical insurance; providing direct financial support; corporate pension program; comfortable and safe office spaces	+	Promoting healthy lifestyle; organizing sports events, providing medical insurance	We care about the well-being of employees and their families
	We help new employees to adapt	Digital programs of adaptation; mentorship	+	Digital programs of adaptation; mentorship	We help new employees to adapt
	We have a strong corporate culture	Atmosphere of trust and respect at the workplace;	+	Atmosphere of trust and respect at the	We have a strong corporate

Theme	Sub-theme	Codes	SEVERSTAL	Codes	Sub-theme
		engagement in cultural and sport events, professional contests; volunteering initiatives		workplace; engagement in cultural and sport events; volunteering initiatives	culture
	We support and develop local communities	Municipal landscaping; support of medical and cultural organizations; development of tourism; support of local SMEs; support of disadvantaged families	+	Municipal landscaping; support of medical and cultural organizations	We support and develop local communities
	We fairly compensate our employees for their work	High level of compensation; bonuses; salary indexation	+	High level of compensation; salary indexation	We fairly compensate our employees for their work
	We guarantee the safety of the workplace	Full compliance with the law; safety training for employees; "safety comes first" culture	+	Full compliance with the law; safety training for employees	We guarantee the safety of the workplace
We reduce firm's negative effect on environment	We reduce our carbon footprint	Modernization of production equipment; introduction of low-carbon products			
	We improve our energy efficiency	Reduction of high-carbon resources in production proccess	+	Reduction of high-carbon resources in production process	We improve our energy efficiency
	We responsibly use water resources	Modernization of sewage treatment facilities; incorporation of water recycling systems			

Theme	Sub-theme	Codes	SEVERSTAL	Codes	Sub-theme
	We implement recycling initiatives	Modernization of recycling equipment; separate waste collection			
	We care about the environment and biodiversity	Eco-friendly events; partnership with nature reserves; projects of restoration of nature			
	We create environmentally responsible supply chain	Assesment of the environmental impact of suppliers	+		
We are an innovative firm with effective corporate governance	We adhere to business ethics	Zero tolerance of corruption; fair and respectful interaction with partners, suppliers and clients; compliance with agreements			
	We ensure the cybersecurity and safety of private data	Detection of potential threats; incorporation of data protection systems; testing the security of IT systems			
	We constantly introduce innovations	Development of risk-encouraging culture; development of process-enhancement culture; system of bonuses for accepted initiatives		Development of process-enhancement culture	We constantly introduce innovations

Source: Severstal. Sustainability Report 2023[1]

In the table above, we can observe from the results of the conducted analyses for Severstal, as well as the identified codes and sub-themes, which correspond with certain ESG practices exhibited by company.

[1] *Severstal. Sustainability Report 2023. Source: https://severstal.com/upload/iblock/ff1/cq6luhfheejn39r7yuyjdzxls7sljmw6/Severstal_Sustainability_Report_2023.pdf (accessed on 01.02.2025)*

We should point out, that Severstal proved to be the most thorough in terms of communicating ESG compliance, demonstrating the biggest number of sub-themes. The detailed analysis of ESG practices and their representation in employee communications follows in the discussion section.

VTB (banking)

Theme	Sub-theme	Codes	VTB	Codes	Sub-theme
We are a socially responsible firm	We guarantee equal opportunities	Impermissibility of discrimination			
	We create development opportunities for employees	Programs for management skills; programs for functional skills; programs for digital competencies	+	Programs for functional skills; programs for digital competencies	We create development opportunities for employees
	We attract young, talented employees	Partnerships with universities; career events; internships; grants	+	Internships; career events; grants	We attract young, talented employees
	We guarantee the safety of the workplace	Compliance with law; safety training for employees			
	We fairly compensate our employees for their work	Indexation of salary	+	Indexation of salary	We fairly compensate our employees for their work
	We care about well-being of employees and their families	Medical insurance; direct financial support; corporate pension; corporate sports events	+	Medical insurance; corporate pension; corporate sports events	We care about well-being of employees and their families
	We check employee satisfaction	Surveys; corporate HR website and app			
	We help new employees to adapt	Digital adaptation service; mentorship	+	Digital adaptation service; mentorship	We help new employees to adapt
	We develop regions and support local communities	Support of medical institutions; sponsorship for sports events;	+	Volunteering	We develop regions and support local communities

Theme	Sub-theme	Codes	VTB	Codes	Sub-theme
		partnerships with cultural institutions; partnership with universities; volunteering			
	We promote inclusivity	Supporting special funds; organizing events promoting inclusivity			
We reduce firm's negative effect on environment	We improve our energy efficiency	Green offices and sales branches			
	We engage in green financing	Investing in low-carbon projects			
	We consume resources responsibly	Reduction of the resource consumption; recycling			
	We promote eco-friendliness among partners	Acting as eco-ambassador; sponsorship of events and institutions; volunteering			
	We care about the biodiversity	Sponsoring programs to save rare species; landscaping			
We are an innovative firm with effective corporate governance	We adhere to business ethics	Zero tolerance of corruption; ethics training for employees; prevention of conflict of interests; guarantee of human rights			
	We implement digitalization and innovations	Digital products and services; AI usage			

Source: VTB. Sustainability Report 2023[2]

The analyses result for VTB bank are presented in the table. It should be noted, that VTB appeared to be

[2] *VTB. Sustainability Report 2023. Source: https://www.vtb.ru/media-files/vtb.ru/sitepages/about/bank/sustainability/VTB_Sustainability_Report_2023_rus.pdf (accessed on 01.02.2025)*

the only company to strongly accentuate inclusivity initiatives. Moreover, the industry-specific sub-themes and ESG practices, such as engagement in green financing, have been spotted. We continue the detailed review of results in discussion section.

LSR Group (construction)

Table 3 – Results of thematic and content analyses of ESG reports and career resources for LSR Group reuse of resources

Theme	Sub-theme	Codes	LSR GROUP	Codes	Sub-theme
We are a socially responsible firm	We provide development opportunities for employees	Programs for management skills; programs for functional skills	+	Programs for management skills; programs for functional skills	We provide development opportunities for employees
	We attract young, talented employees	Partnerships with universities; career events; internships			
	We fairly compensate our employees for their work	Competitive salary; financial motivation for employees	+	Competitive salary	We fairly compensate our employees for their work
	We develop local communities	Construction of social infrastructure; construction of public spaces; construction of accessible environment	+	Construction of public spaces; construction of accesible environment	We develop local communities
	We engage in charitable initiatives	Support of the organizations helping children in need and disadvantaged groups; support of cultural projects			
	We guarantee the safety of the workplace	Safety training for employees; regular control of the implementation of safety protocols; development of "safety first" culture			

Theme	Sub-theme	Codes	LSR GROUP	Codes	Sub-theme
	We support the well-being of employees and their families	Medical insurance; direct financial support of employees; financial support of employees with children; organization of sports events	+	Financial support of employees with children; organization of sports events	We support the well-being of employees and their families
We reduce firm's negative effect on environment	We engage in green construction	Lower environmental impact of construction; enhanced energy efficiency; recycling and separate waste collection; territory redevelopment and landscaping			
	We create environmentally responsible supply chain	Assessment of suppliers in terms of their environmental impact			
	We build circular economy	Reduction of resource consumption; reuse of resources			
	We reduce our carbon footprint	Reduction of carbon emissions through effective technologies			
	We use water resources responsibly	Reduction of water consumption; enhanced sewage treatment			
	We care about the biodiversity	Minimizing the negative impact on nature and species			

Theme	Sub-theme	Codes	LSR GROUP	Codes	Sub-theme
We are a responsible firm with transparent corporate governance	We adhere to business ethics	Impermissibility of discrimination; zero tolerance of corruption; antitrust policy; guarantee of human rights			
	We ensure cybersecurity and safety of private data	Development of digital data protection system			
	We have a fully transparent corporate governance system	Full background of all board members; open information on compensation and bonuses for all top management			

Source: LSR Group. Annual Report 2023[3]

The table contains the results of thematic and content analyses for LSR Group. In comparison with the companies reviewed prior to LSR Group, the ESG reporting from LSR appeared to be briefer, however, that does not influence its quality, especially in terms of industry-specific sub-themes, such as implementation of green construction.

X5 Group (grocery retail)

Table 4 – Results of thematic and content analyses of ESG reports and career resources for X5 Group

Theme	Sub-theme	Codes	X5 GROUP	Codes	Sub-theme
We are a socially responsible firm	We guarantee equal rights and opportunities	Impermissibility of discrimination; gender equality; inclusivity			
	We create development opportunities for employees	Programs for management skills; programs for functional skills; corporate university; professional contests	+	Programs for management skills; programs for functional skills	We create development opportunities for employees

[3] *LSR Group. Annual Report 2023. Source: https://www.lsrgroup.ru/assets/files/2024/Disclosure/%D0%93%D0%9E%20%D0%93%D1%80%D1%83%D0%BF%D0%BF%D0%B0%20%D0%9B%D0%A1%D0%A0%202023.pdf (accessed on 01.02.2025)*

Theme	Sub-theme	Codes	X5 GROUP	Codes	Sub-theme
	We have a strong employer brand	Articulated mission, vision and values; leadership in HR ratings	+	Leadership in HR ratings	We have a strong employer brand
	We attract young, talented employees	Partnerships with universities; internships; participation in career events	+	Internships; participation in career events	We attract young, talented employees
	We guarantee the safety of the workplace	Compliance with the law; safety training for employees; automatization of safety training	+	Compliance with the law	We guarantee the safety of the workplace
	We fairly compensate our employees for their work	Salary indexation; financial motivation programs	+	Salary indexation; financial motivation programs	We fairly compensate our employees for their work
	We check employee satisfaction	Annual surveys; HR hotlines	+	Annual surveys	We check employee satisfaction
	We engage in charitable initiatives	Food aid; fundraising projects and events; volunteering	+	Fundraising projects and events; volunteering	We engage in charitable initiatives
We reduce firm's negative effect on environment	We improve our energy efficiency	Smart systems for lesser energy use; using green sources of energy			
	We have effective waste management	Reduction in waste production; recycling; green packaging			
	We responsibly use water resources	Reduction in use of water resources; sewage control			
	We care about the biodiversity	Ensuring no harm of nature reserves or rare species; landscaping			

Theme	Sub-theme	Codes	X5 GROUP	Codes	Sub-theme
We are a responsible firm with effective corporate governance	We adhere to business ethics	No tolerance of corruption; ethics training for employees; antitrust policy; conflict of interest management			
	We create environmentally responsible supply chain	Assessment of environmental impact for each element of supply chain			
	We ensure the cybersecurity and safety of private data	Incorporation of data protection systems; detection of potential weaknesses; data protection training for employees			

Source: X5 Group. Sustainability Report 2023[4]

The obtained results of analyses of X5 Group ESG report and career resources are presented in the table. The identified sub-themes appeared to be similar to the previously analyzed companies, without the industry-specific ESG practices identified.

Delo Group (logistics)

Table 5 – Results of thematic and content analyses of ESG reports and career resources for Delo Group

Theme	Sub-theme	Codes	DELO	Codes	Sub-theme
We are a socially responsible firm	We provide development opportunities for employees	Programs for management skills; programs for functional skills	+	Programs for management skills; programs for functional skills	We provide development opportunities for employees
	We attract young, talented employees	Partnerships with universities; internships	+	Internships	We attract young, talented employees
	We fairly compensate our employees for their work	Transparent competitive salary	+	Transparent competitive salary	We fairly compensate our employees for their work

[4] *X5 Group. Sustainability Report 2023. Source: https://www.x5.ru/wp-content/uploads/2024/06/x5-sr2023-rus.pdf (accessed on 01.02.2025)*

Theme	Sub-theme	Codes	DELO	Codes	Sub-theme
	We develop local communities	Construction of logistics infrastructure; investments in social infrastructure; organization of sports events			
	We engage in charitable initiatives	Volunteering; sponsoring of projects supporting children			
	We guarantee the safety of the workplace	Safety training for employees; extra social package for dangerous jobs; system of accident prevention			
	We guarantee equal rights and opportunities	Observance of human rights; diversity and inclusivity of workforce; observance of labor rights			
	We support the well-being of employees and their families	Medical insurance; financial support of employees; financial support of employees with children; corporate pension	+	Medical insurance; financial support of employees; financial support of employees with children; corporate pension	We support the well-being of employees and their families
We reduce firm's negative effect on environment	We improve our energy efficiency	Using renewable sources of energy; using electric cargo equipment			
	We have effective waste management	Building circular economy; utilisation of dangerous wastes			

Theme	Sub-theme	Codes	DELO	Codes	Sub-theme
	We reduce our carbon footprint	Usage of environmentally friendly energy sources; monitoring the level of air pollution; purchase of fuel efficient equipment			
	We use water resources responsibly	Reducing water consumption; sewage treatment procedures			
	We care about the biodiversity	Sponsoring projects to save rare species; landscaping; community cleanups			
We are a responsible firm with effective corporate governance	We adhere to business ethics	Zero tolerance of corruption; conflict of interest management; antitrust policy			
	We ensure cybersecurity and safety of private data	Checking the effectiveness of data protection systems; detection of potential weaknesses; checking employee knowledge on IT security			
	We create environmentally responsible supply chain	Assessment of the sustainability compliance of suppliers			
	We implement digitalization and innovations	Incorporation of IT technologies into the business processes; automotization of logistics and insurance	+	Incorporation of IT technologies into the business processes;	We implement digitalization and innovations

Theme	Sub-theme	Codes	DELO	Codes	Sub-theme
				automotization of logistics and insurance	

Source: Delo Group. Sustainability Report 2023[5]

The specifics for Delo Group is the nature of the analyzed company – the group of companies includes five different enterprises, each with their own web resources. The companies are: Delo Ports, Ruscon, Transcontainer, Global Ports and DeloTech, each representing a certain part of the whole business. It is important to point out, that Delo Group and Delo Ports websites do not comprise a section specifically devoted to the career opportunities and vacancies in the group of companies/company. Hence, the analysis of the career resources, which was conducted, drew its results from the websites of Transcontainer, Global Ports and DeloTech, which all have specific career communication present on their web sources.

Gazprom (oil and gas)

Table 6 – Results of thematic and content analyses of ESG reports and career resources for Gazprom

Theme	Sub-theme	Codes	GAZPROM	Codes	Sub-theme
We are a socially responsible firm	We guarantee equal rights and opportunities for employees	Impermissibility of discrimination of any kind; full compliance with labor law	+	Impermissibility of discrimination of any kind; full compliance with labor law	We guarantee equal rights and opportunities for employees
	We provide development opportunities for employees	Programs for management skills; programs for functional skills	+	We provide development opportunities for employees	Programs for management skills; programs for functional skills
	We attract young, talented employees	Partnerships with universities; career events; internships; adaptation programs; grants; professional orientation events in schools	+	Partnerships with universities; career events; internships; adaptation programs	We attract young, talented employees
	We fairly compensate our employees for their work	Competitive salary; financial motivation for employees; bonuses; corporate awards	+	Competitive salary; financial motivation for employees; bonuses; corporate awards	We fairly compensate our employees for their work

[5] *Delo Group. Sustainability Report 2023. Source: https://www.delo-group.ru/upload/iblock/ba6/tkpul7tkf0g7x1t8ot4drb7ql383yn8d/14_%D0%9E%D1%82%D1%87%D0%B5%D1%82%20%D0%93%D0%9A%20%D0%94%D0%B5%D0%BB%D0%BE%20%D0%BE%D0%B1%20%D1%83%D1%81%D1%82%D0%BE%D0%B9%D1%87%D0%B8%D0%B2%D0%BE%D0%BC%20%D1%80%D0%B0%D0%B7%D0%B2%D0%B8%D1%82%D0%B8%D0%B8%20%D0%B7%D0%B0%202023%20%D0%B3%D0%BE%D0%B4.pdf (accessed on 01.02.2025)*

Theme	Sub-theme	Codes	GAZPROM	Codes	Sub-theme
	We develop local communities	Construction of social infrastructure; gasification; support of local peoples; organization of cultural and sports events; support in the education sphere; development of Saint Petersburg			
	We engage in charitable initiatives	Volunteering; programs and projects helping children in need and disadvantaged groups; support of cultural projects; construction of sports infrastructure and popularization of sports; support of science; support of medicine; preservation of historic and cultural heritage			
	We guarantee the safety of the workplace	External and internal control of safety procedures; identification of threats and risks; safety training for employees; investigation of incidents; prevention of accidents; regular assessment of labor conditions			

Theme	Sub-theme	Codes	GAZPROM	Codes	Sub-theme
	We support the well-being of employees and their families	Medical insurance; accident insurance; direct financial support of employees; financial support of employees with children; corporate pension; additional corporate medical care; organization of sports events; organization of cultural events	+	Medical insurance; accident insurance; direct financial support of employees; financial support of employees with children; corporate pension; additional corporate medical care; organization of sports events; organization of cultural events	We support the well-being of employees and their families
We reduce firm's negative effect on environment	We consume resources responsibly and efficiently	Reduction of resource consumption; usage of renewable sources of energy; modernization of equipment; incorporation of technologies of energy preservation			
	We have effective waste management	Utilisation of wastes; reduced use of plastic			
	We reduce our carbon footprint	Reduction of carbon emissions through innovative technologies; recycling of gas; utilisation of carbon dioxide; development of hydrogen energy sources; monitoring of levels of air pollution			

Theme	Sub-theme	Codes	GAZPROM	Codes	Sub-theme
	We use water resources responsibly	Reduction of water consumption; sewage treatment; modernization of equipment; reconstruction of water resource infrastructure			
	We care about the biodiversity	Minimizing the negative impact on nature; preservation of rare species; support of scientific projects; support of national parks and reserves; recultivation and restoration of land			
We are a responsible firm with effective corporate governance	We adhere to business ethics	Counteraction against corruption; antitrust policy; prevention of conflict of interests; protection of personal data			
	We implement digitalization and innovations	Development of new technologies; cooperation with scientific community; cooperation with universities; usage of artificial intelligence; digitalization of taxation			

Source: Gazprom. Sustainability Report 2023[6]

As we can see in the results presented below, the results for Gazprom are once again quite similar to the other firms we have analyzed. The clear emphasis is placed on the social element of ESG, with the environmental practices and governance policies left out of the career communications. To be fair in our characteristic of the company, we have to point out, that the website of the company does contain detailed information about most ESG practices mentioned in the report, however, in its own separate section, while our object of analysis is solely the career websites and job vacancies posted by the companies under review.

[6] *Gazprom. Sustainability Report 2023. Source: https://www.gazprom.ru/f/posts/07/429840/gazprom-sustainability-report-ru-2023.pdf (accessed on 01.02.2025)*

Yandex (IT)

Table 7 – Results of thematic and content analyses of ESG reports and career resources for Yandex

Theme	Sub-theme	Codes	YANDEX	Codes	Sub-theme
We are a socially responsible firm	We constantly introduce useful innovations	Development of neural networks; development of robotics; openness of innovations	+	Openness of innovations	We constantly introduce useful innovations
	We attract young, talented employees	Partnerships with universities; case championships and hackathons; internships; educational programs	+	Case championships and hackathons; internships; educational programs	We attract young, talented employees
	We promote equal rights and opportunities	Inclusivity in recruitment; creation of necessary infrastructure for people with disabilities in offices; adaptation of company services for people with disabilities			
	We motivate and engage employees	Regular employee surveys of engagement; adaptation programs for new employees; creation of communities based on common profession or interests	+	Creation of communities based on common profession or interests	We motivate and engage employees
	We provide development opportunities for employees	Educational courses and programs; conferences; change of career path; mentorship	+	Educational courses and programs; conferences; change of career path; mentorship	We provide development opportunities for employees

Theme	Sub-theme	Codes	YANDEX	Codes	Sub-theme
	We guarantee the safety of the workplace	Safety training for employees; investigations of incidents; automatization of dangerous jobs; accident insurance			
	We engage in charitable initiatives	Incorporation of charity into the services provided by company; partnerships with NGOs			
	We enhance the quality of life	Development of services which simplifies everyday activities; development of services which enhances public and personal safety	+	Development of services which simplifies everyday activities	We enhance the quality of life
	We support the well-being of employees	Medical insurance; financial support; free sports; corporate psychologist; benefits	+	Medical insurance; financial support; free sports; benefits	We support the well-being of employees
We reduce firm's negative effect on environment	We improve our energy efficiency	Datacenter architecture which reduces electricity usage; supercomputers which use less energy than standard servers			
	We implement recycling initiatives	Reuse of resources; sustainable packaging; promoting recycling in company services; separate waste collection; organisation of eco-friendly events; utilisation of outdated office			

Theme	Sub-theme	Codes	YANDEX	Codes	Sub-theme
		equipment			
	We reduce our carbon footprint	Monitoring of air pollution; development and incorporation of IT technologies with lower carbon footprint; development of technologies for ecological research			
	We adhere to business ethics	Employee training in ethics and corruption counteraction; prevention of conflict of interests and discrimination; care for intellectual property and author rights; responsible choice of suppliers			
	We ensure cybersecurity and safety of private data	Monitoring of security weaknesses; investigation of incidents; protection of personal data; management of personal data in accordance with law; protection from fraud and spam			

Source: Yandex. Report of Sustainability Progress 2023[7]

The results of the analysis for Yandex are demonstrated in the table. We have to mention that Yandex has proven to be rather different in terms of communicated ESG practices, in comparison with other companies in our analysis. The potential explanation for this is the nature of business for Yandex, which is quite unique, as the multitude of services Yandex provides to consumers offer very different types of products and services, some of which are innovative. In this case, the accentuation of the social role of such services appears to be a logical choice for the communication with potential employees.

Thus, in the process of conducting thematic and content analyses of companies' reports and career

[7] *Yandex. Report of Sustainability Progress 2023. Source: https://ir-docs.s3.yandex.net/sustainability/YA%20RU%20[23]%20Report_2706.pdf (accessed on 01.02.2025)*

websites, we have managed to pinpoint many valuable details, which we will present and elaborate on in the discussion section.

Discussion

Now, we proceed with the discussion of the results we have obtained through thematic and content analyses, which sought to illuminate the specific ESG practices communicated within ESG reports and career resources, and eventually offered many valuable insights into the ESG signals of companies and their representation in the communications with potential employees. We will review the findings structurally, beginning with Research Question 1, and then continuing with the Research Questions 2 and 3 paired into one section, to allow immediate comparison of practices in ESG reports and employee communications sources. Thus, we begin with the discussion of the ESG practices top-tier Russian companies commonly signal about in their sustainability reports.

RQ1

Our analyses revealed the trend for emphasizing the social dimension of ESG compliance within the reports of the studied firms, however, for certain companies, the amount of information for social and environmental blocks was approximately the same. Common sub-themes within social dimension included human rights observance, development opportunities for employees, engagement of young professionals, support of employee well-being, fair level of compensation, guaranteed safety of the workplace and development of local communities. Additionally, several companies have also actively highlighted their engagement in charitable projects and inclusivity initiatives. It is worth noting, that the prevailing social practices were basically the same for most companies, with the exception of Yandex – while most firms highlighted their positive impact on the local communities, Yandex appeared to focus on the enhancement of quality of life for the whole public, which is brought by the technologies developed and implemented by the company. This demonstrated the possible specificity of themes for firms based on their industry of operations, and we will come across more similar cases later.

As for the sub-themes which represent the environmental dimension of ESG compliance in the companies' reports, the commonly mentioned ones are improvement of energy efficiency, reduction of carbon footprint, responsible use of water resources, implementation of circular economy and recycling, and care about the biodiversity. Furthermore, several companies, such as Severstal and LSR Group, also indicated their commitment to creating environmentally responsible supply chain. Generally, we should point out that that Severstal's report contains strong signals regarding environmental compliance, with the extended amount of information about ecological initiatives, which possibly stems from the nature of the industry the company operates in. The same statement is also true for Gazprom, another company with high environmental impact within our analyses. Another important point is once again the specificity of themes which is present for the companies depending on the industry. In case of environmental practices in the reports, the appropriate examples to mention include the practices of green financing for VTB in banking or green construction for LSR in its respective industry. Last but not least, the process of analyses has also shown, that at certain times the previous social and currently discussed environmental themes can be connected – a good example is the volunteering initiatives by X5 Group, which are considered part of social dimension, but can also offer positive effect on environment – for instance, community cleanups.

As for review of corporate governance dimension and practices which commonly represented it in the ESG reports, we should point out adherence to the business ethics, cybersecurity and protection of private data, and implementation of digitalization and innovations. Moreover, it is necessary to mention, that two companies – X5 Group and Delo Group, specifically placed the practice of creating environmentally responsible supply chain in this group of practices, while other firms opted to list is within environmental dimension.

Hence, the findings suggest that ESG reporting in top-tier Russian companies is quite contextual, with industry-specific practices often shaping the thematic focus. The social dimension can be considered prevalent, but environmental and governance themes are also significant, particularly for firms in high-

impact industries. This reflects a strategic alignment of ESG communication with both operational realities and stakeholder expectations.

RQ2 and RQ3

In this section, we review ESG practices highlighted in the direct communications with potential employees – on career websites and published vacancies, and how these practices match with the ones present in the companies' ESG reports. The content analysis demonstrated that social themes largely dominated employee communications on career resources, with the rare occurrences of environmental or corporate governance elements. Hence, we will start with the practices corresponding with the social dimension of ESG, and then continue with environmental and governance dimensions.

Social themes present on the career resources and in the ESG reports for all companies include development opportunities for employees, engagement and attraction of young professionals, support of employee well-being and fair compensation. Some companies have also highlighted their guarantee of a safe workplace (Severstal, X5 Group), development of local communities (Severstal, VTB) and strong employer brand (X5 Group). Moreover, we should also highlight certain specifics and accents in employee communications, which were noticeable for various companies. For instance, X5 Group appeared to place a strong emphasis on charitable efforts, while Delo Group has extensively underscored the social support for employees with children, accentuating the positive impact on demography.

Thus, with the described findings, we have obtained the current picture of ESG signals representation on the career resources of top-tier Russian companies. However, we consider that it will be valuable to show, which social practices present in the ESG reports did not appear in the employee communications. Interestingly enough, such practices include observance of human rights and guarantee of equal rights and opportunities. Some of the social practices proved to be ambivalent – they were present for a smaller number of firms. These are actually engagement in charity (only appears for X5 Group) and safety of the workplace (only Severstal and X5 Group).

As we continue with the themes of environment and corporate governance, we must mention, that they are not completely struck out of the employee communications – some companies do employ them in order to create the image and perception of the firm. Still, they are much more underrepresented on the career resources than social themes. For that reason, we will only focus on the practices which made their way to employee communications, as the majority appears to be left out. For environmental dimensions, we see Severstal communicating their efforts to improve energy efficiency to the potential employees. Furthermore, Severstal also highlighted its commitment to constant introduction of innovations, fixed in its corporate governance policies. Delo Group actually implemented the same approach, emphasizing company's digitalization and automatization efforts and successes. This concludes the directly mentioned environmental and governance practices in the communication with potential employees. Hence, such prominent topics, as reduction of carbon footprint, care for biodiversity, or adherence to business ethics are not represented in the aforementioned communication, as per choice of top Russian companies.

As a result, the observed dominance of social themes in employee communications reflects their perceived relevance to potential employees, aligning with broader trends in employer attractiveness. The underrepresentation of environmental and governance themes may indicate a missed opportunity to differentiate employer brands, particularly for companies in industries where these dimensions are critical. Given the recent trends indicating a shortage of high-skilled professionals on the Russian labor market, the ability to effectively communicate not just social practices but also environmental and governance initiatives can prove to play a crucial role in winning the race for talent. Ultimately, through the incorporation of balanced ESG communications, organizations can achieve better overall brand perception among potential employees. As the dynamics of the labor market evolve, a holistic approach to ESG signaling can become increasingly vital for attracting and retaining top talent.

We suggest, that future studies should continue to investigate varied impacts of ESG signaling across different industries, enhancing our understanding of optimal practices in sustainable workforce development, but with the addition of other relevant and valuable approaches. For instance, it is possible to proceed with

ESG signaling for employee attraction and retention research from the angle of generational theory, finding the ESG practices most sought after by different generations of employees. Another potential venue of exploration is ESG signaling for various levels of employees – from blue-collar workers, to white-collars and top-management.

Conclusion

In conclusion, this study underscores the significant impact of ESG signals on employee attraction and retention within top-tier Russian companies. According to theory, effective communication of ESG practices not only enhances organizational reputation but also fosters a sense of commitment among employees. As the labor market becomes increasingly competitive, particularly in the context of a shortage of qualified professionals, companies that prioritize and transparently communicate their ESG efforts are better positioned to attract and retain talent. Based on the principles of signaling theory, the study finds out how organizations employ ESG signals in their communication with potential employees, identifying the themes most often used in order to attract and retain employees, and suggesting the possible alternations in the process of signaling. Future research efforts should continue to investigate the diverse effects of ESG signaling across different industries and contexts, providing deeper insights into how businesses can optimize their strategies for sustainable workforce development. In the end, integrating ESG considerations into core business practices is not just a moral imperative but a strategic advantage in today's dynamic job market.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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The management of gross output of the agricultural, forestry, and fishery sectors of Kazakhstan

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ORIGINAL ARTICLE

Abstract. The article analyses the management of gross output of agriculture, forestry, and fisheries in Kazakhstan as an important element of the economic structure. Current global challenges, including climate change, land degradation, and the reduction of natural resources require an effective management for ensuring food security and sustainable development of Kazakhstan's agrarian economy. The purpose of the research is to identify the factors affecting the production of agricultural, forestry, and fish products. Moreover, there is an attempt to develop proposals for improving management in these sectors through the integrated approach, including methods of quantitative and qualitative analysis, statistical data, etc. The analysis includes an assessment of the impact of government programs and policies on the development of agricultural sectors in terms of the climatic conditions, technological innovations, and demand. According to the results, the effective management of gross output is possible through the integration of innovative technologies, improved infrastructure, and coordination between public and private sectors.

Keywords: Kazakhstan's gross output; agricultural technologies; sustainable development; food security; climate change

JEL codes: R11, R53, Q58, Q55, Q14, Q16

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Introduction

The relevance of the study of gross output management in agriculture, forestry, and fisheries in Kazakhstan is determined by the importance of these industries for the national economic stability and food security. Agriculture, forestry, and fisheries are important sectors of Kazakhstan's economy. Moreover, they play a significant role in the socio-economic development of the regions, provide food products to the population, and preserve ecosystems. However, these industries face a number of challenges, including the negative effects of climate change, insufficient technological innovation, poor infrastructure development, etc.

The purpose of this research is to analyse the factors affecting gross output in these sectors and make recommendations for improving production management under changing economic and environmental conditions. The objectives of the research are as follows: 1) to identify the main issues of the agriculture, forestry, and fisheries in Kazakhstan; 2) to assess the impact of external and internal factors on production; 3) to draw up the specific recommendations on optimisation of management and improve interaction between the state authorities and the producers.

Moreover, the degree of scientific development on the topic of agricultural and natural resource management is quite high. However, there are still many challenges related to the optimisation of these processes in Kazakhstan. Theoretical significance of the research lies in the expansion of knowledge about the economic mechanisms of natural resources management in the agrarian sphere; practical significance is in the recommendations to improve management and introduction of innovative technologies in production.

The methodological basis of the research includes the use of the quantitative methods of analysis, statistical and SWOT analysis, comparative analysis with the international practice of agricultural production management. The results of the research ensure the development of the effective economic management mechanisms aimed at the development of Kazakhstan's agricultural sector.

There are several key approaches [1-15] devoted to the issues of socio-economic development of the agricultural sector and food security in the modern scientific literature.

1. Institutional and Governmental Approach

These researches focus on analysing the impact of the government policy and institutional regulation on agriculture and food security. For example, Berkinov B.B. and Saburova N.R. [1] consider the actual state and prospects of agricultural development in the Republic of Karakalpakstan, emphasising the importance of the improvement of the state mechanisms of support. The works by Omoshev T.T. and Kantoroeva G.K. [6] discuss the issues of functioning of the economic processes in the agricultural sector of the Kyrgyz Republic; Tikhonova T.B. [3] analyses the mechanisms of the regulation of the ecosystem services. The papers by Dambaulova G K. et al. [12] focus on the strategic development of the food sector in Kazakhstan.

2. Economic-analytical and Resource-based Approach

In this framework, the researchers analyse the economic and resource factors affecting the development of the agricultural sector. For instance, Abdiev M.J. et al. [2] study the food security of Kyrgyzstan through the prism of the agricultural development; Sabirova A.I. [10] considers the territorial organisation of the agricultural production in the various natural and climatic zones of Kazakhstan. The research of Ibraimov K.G. [13] focuses on updating the fixed assets of the agro-industrial complex; Rustembayev B.E. et al. [14] analyse the agrarian policy of Kazakhstan in terms of the integration with the EAEU.

3. Digitalization and Innovative technologies in Agriculture

The digitalisation and the technological development have become the important factors in increasing the efficiency of the agro-industrial complex. Ualieva M.A. and Maydirova A.B. [5] examine the processes of digitalisation in terms of the land policy of Northern Kazakhstan; Seitov S.K. [8] considers subsidies as a tool to stimulate the innovation in the agriculture. The research of Baidalinova A. et al. [11] confirms the contribution of the digital technologies in food security improvement in the context of economic integration.

4. Food market and Competitiveness

The studies on the agri-food markets analyses their structure, dynamics, and competitiveness factors. For example, Niyazbayeva A.A. and Imanbayeva Z.O. [9] examine the food market of the Aktobe region of Kazakhstan, identifying trends in its development; Abildaev S.T. et al. [7] assess the economic security of the agricultural exports in Kazakhstan; Kydyrbaeva E.O. et al. [15] investigate the sugar market, identifying criteria for its optimal functioning.

The analysis of the modern research allows us to identify four approaches to studying the problems of agriculture and food security: institutional, economic and analytical, digital, and market ones. Each of these approaches offers its own perspective on these problems addressing and strategic development of the agricultural sector in the different countries. In the future, the scientific research is supposed to focus on interdisciplinary approaches and the integration of the different tools to improve the sustainability of the agri-food sector.

Methods

The following methods and approaches were used:

Statistical analysis is an analysis of the dynamics and structure of gross output (services) of agriculture, forestry, and fisheries in Kazakhstan. It is based on official statistical data by the Bureau of National Statistics

of the Agency of the Republic of Kazakhstan for Strategic Planning and Reforms [16] and the Ministry of Agriculture of the Republic of Kazakhstan. Indeed, data for the last 13 years (2010-2023) allowed us to identify the trends and factors influencing changes in different sectors of the agricultural economy.

Qualitative analysis. It is the use of the content analysis method to assess the impact of government programs and strategies on the development of the agricultural sectors. It also allows ones to identify successful management practices in the certain regions of the country.

The comparative and SWOT analysis. It is a comparison of the results of the regions of Kazakhstan. These results allow ones to identify the strengths and weaknesses of the domestic agrarian policy and its management.

Interviews and surveys. These include conducting expert interviews with representatives of the Ministry of Agriculture, scientific institutes, and industry organizations, analysing research materials, reports, etc. They allowed us to understand the internal problems of the industries and draw the recommendations for their addressing.

These methods ensured a comprehensive approach to the study and identified the main factors affecting gross output of agriculture, forestry, and fisheries in Kazakhstan.

Results

The main results of the study show the current trends in the agricultural sector of Kazakhstan, and factors affecting the dynamics of gross output.

The total gross output (services) of agriculture, forestry, and fisheries in Kazakhstan in 2023 is KZT 7,625.2 bn tenge. This decline is related to several factors such as climatic conditions, an insufficient state funding of certain programmes in the agricultural sector, etc.

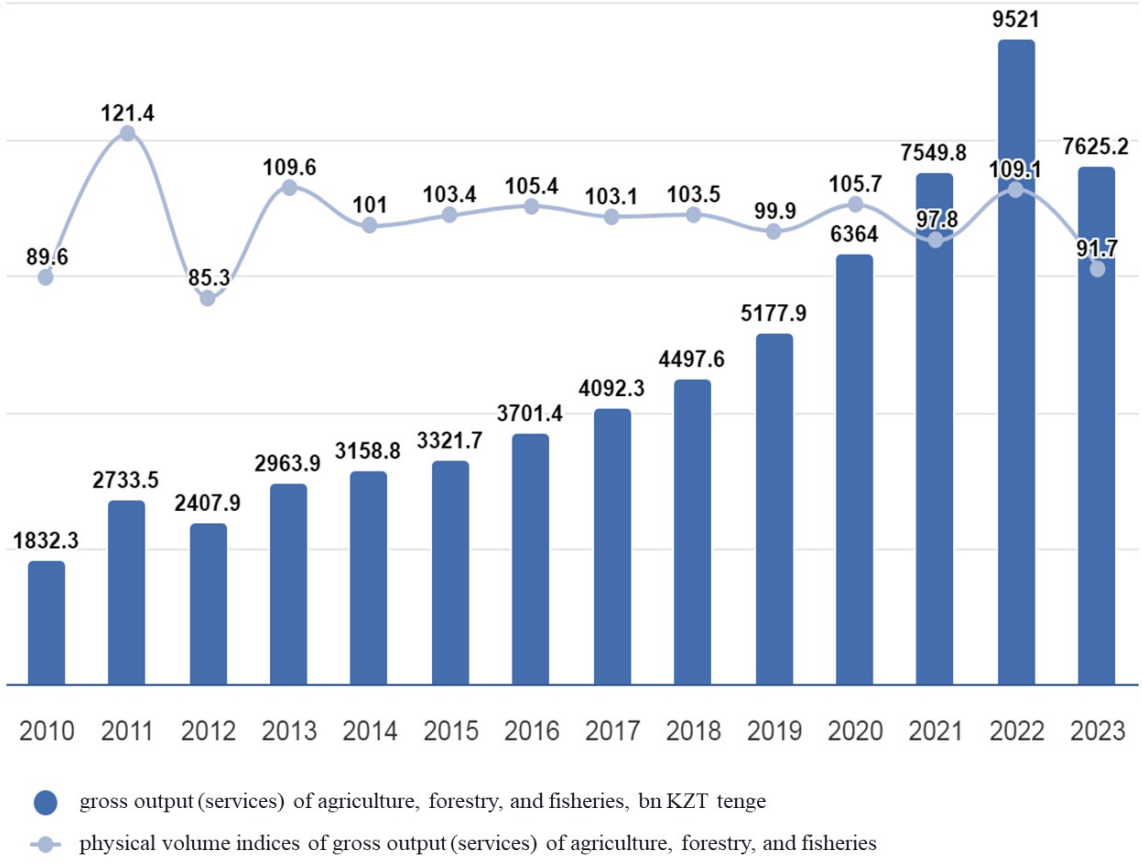

Figure 1. Dynamics of gross output (services) of agriculture, forestry, and fisheries

Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[1]

[1] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru (accessed on 10.04.2025)*

Table 1 – Economic analysis of gross output (services) of agriculture, forestry, and fisheries

Index	Value	Analysis and trends
The general trend	Growth until 2022, decline in 2023	Gross output of agricultural, forestry, and fisheries products (services) grew steadily in 2010-2022; it reached a peak in 2022 (KZT 9,521 bn tenge); it decreased by 20% in 2023 (KZT 7,625.2 bn tenge).
Average annual growth (2010-2022)	≈ 14%	Until 2022, there was steady growth in the sector. It indicates a positive trend in the development of agriculture.
Sharp decline (2023)	- 20%	In 2023, a significant decrease in output was recorded. Possible causes: a drought, the rising prices for fertilizers and fuels, the reduced government support, and inflation.
Physical Volume Index (2023)	91.7	A decrease in the index shows a drop in production volumes, not onle a decrease in the cost of the products.
Growth Factors (until 2022)	The government support programs, technology development, export demand	The increased yields, investments in the agriculture, and agricultural enterprises contributed to the growth of the industry.
Factors of decline (2023)	The climatic conditions, economic instability, rising production costs	The decline was caused by the external and internal factors, including the economic crisis, rising resource prices, and declining yields.
Forecast	The stabilisation is possible with government support.	To increase, the investments in the sustainability of the agricultural sector, diversification of agricultural products, and subsidising farmers are needed.

Source: Authors

Kazakhstan's agriculture has shown steady growth until 2022. In 2023, a significant decrease in output was recorded. The reasons for the decline are rising costs, climate (drought, frost, floods), and a decrease in production volume indices. To recover, it is necessary to strengthen the state support and invest in the modernisation of the industry. The main indicators of gross output (services) of agriculture, forestry, and fisheries for 2023 are shown in Figure 2.

Table 2 – Economic analysis of gross output of agricultural services, crop and livestock production

Index	Value	Analysis and trends
The general trend	The decrease in gross agricultural output in 2023 compared to 2022	In 2023, gross output amounted to KZT 7,576.5 bn tenge. It is 20% less than in 2022 (KZT 9,481.2 bn tenge).
Crop production	Decrease in production	In 2023, crop production decreased from KZT 5,808.3 bn tenge to KZT 4,552.4 bn tenge (-21.6%). The reasons are the unfavourable weather conditions, reduced acreage, or increased costs.
livestock production	Decrease in production	In 2023, livestock production decreased from KZT 3,658.8 bn tenge to KZT 3,012.5 bn tenge (-17.7%). Possible reasons include a reduction in livestock, rising prices for feed, and veterinary services.

Index	Value	Analysis and trends
Agricultural services	Volume reduction	In 2023, services decreased from KZT 14.2 bn tenge to KZT 11.6 bn tenge (-18.3%). It indicates a reduction in demand for agricultural services.

Source: Authors

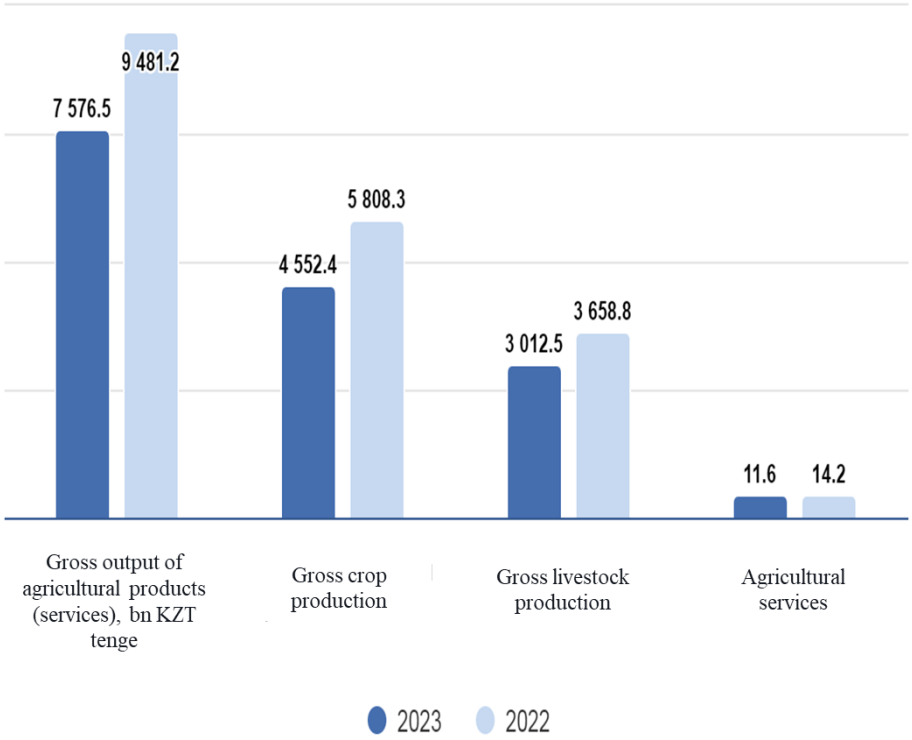

Figure 2. Gross output of agricultural products (services), bn KZT tenge
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[2]

In 2023, there is a decrease in gross output of the agricultural production. The largest drop was recorded in crop production (-21.6%). Livestock production also showed a decline (-17.7%). The support measures for the industry are needed, including subsidies and modernisation.

Gross output of agricultural products (services) by region is shown in Figure 3.

Table 3 – An economic analysis of the index of physical volume of gross crop production

Index	Value	Analysis and trends
The general trend	The decrease in the physical volume of gross crop production by 14.1%	The average decrease in the country indicates challenges in agriculture. These are possibly related to weather conditions, lack of resources, or rising costs.
Regions with a positive dynamic	Abai (+5.6%), Kyzylorda (+5%), Mangystau (+3.7%), Astana city (+3.3%), Zhetisu (+2.5%), Turkestan (+1.7%)	In these regions, the cultivation technologies have improved; new methods of the agricultural production have been applied; the acreage has been increased.

[2] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru (accessed on 10.04.2025)*

Index	Value	Analysis and trends
Regions with a moderate decline (up to -10%)	Atyrau (-2.7%), Almaty city (-3.4%), Almaty (-3.9%), West Kazakhstan (-4.1%), Zhambyl (-6.2%), Aktobe (-7.9%), East Kazakhstan Region (-8.2%), Karaganda (-9.5%)	These regions showed a slight decrease due to the unfavorable conditions and temporary difficulties in the agricultural sector.
Regions with high decline (10% or more)	Shymkent city (-18.9%), Kostanay (-19.7%), North Kazakhstan Region (-20.3%), Pavlodar (-26.7%), Akmola (-38%), Ulytau (-60.2%)	However, there is a crop production crisis in these regions. The largest decrease is in Ulytau (-60.2%) and Akmola (-38%). It indicates serious challenges caused by the climate (drought, frost, floods), reduced yields, and a shortage of agricultural resources.
Factors of decline	Climate change (drought, frost, floods), reduced investment, rising prices for fertilizers and fuel	A significant drop in production volumes indicates systemic problems in agriculture. It requires the significant support.
Forecast	The further instability is possible without support measures.	To stabilise, the subsidisation programs, development of irrigation systems, and investments in agricultural technologies are needed.

Source: Authors

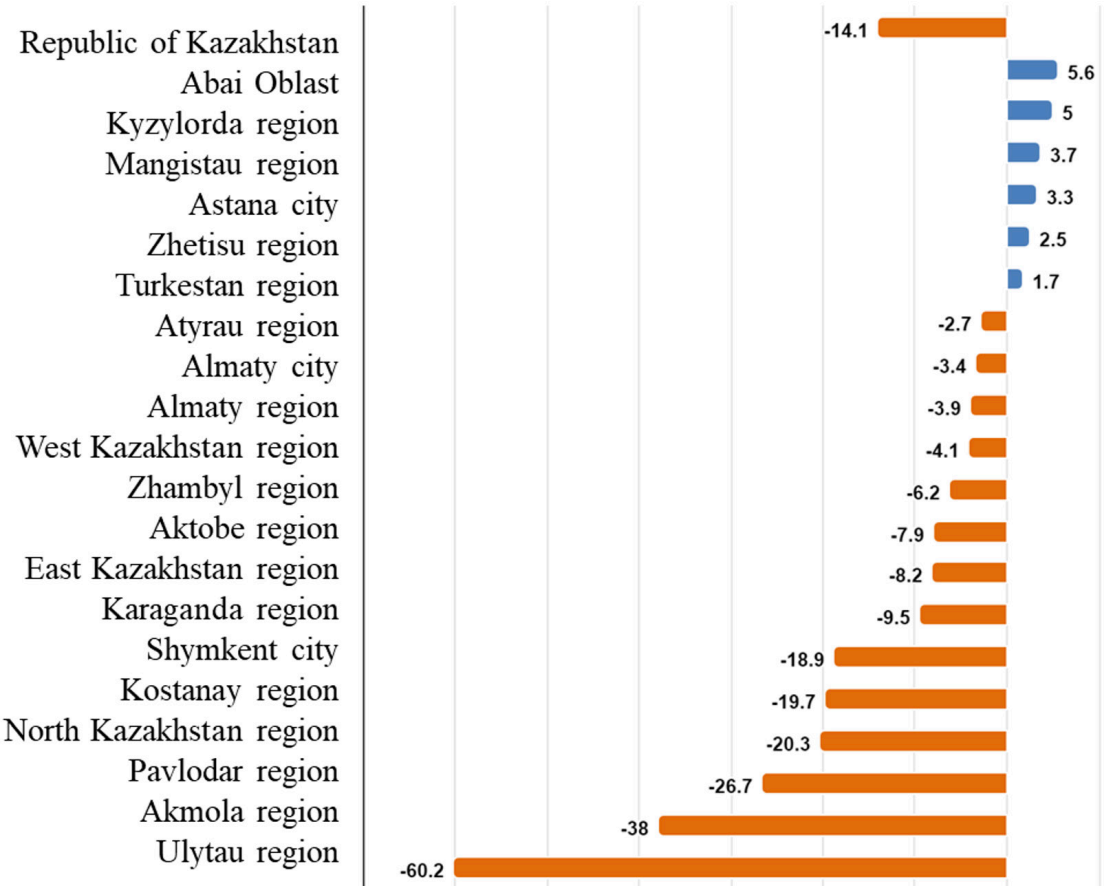

Figure 3. Index of the physical volume of gross crop production

Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[3]

[3] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.*

According to Figure 3, the decrease in crop production in the reporting year (by 14.1% compared to the previous year) is associated with a decrease in the production of cereals and legumes by 22.8%, and oilseeds by 31%.

The overall index of physical volume of crop production decreased by 14.1%. Ulytau (-60.2%) and Akmola (-38%) regions were the most affected. Indeed, only six regions showed growth. It indicates the possible influence of weather conditions and economic factors. The support measures are needed to stabilise the industry and prevent further decline.

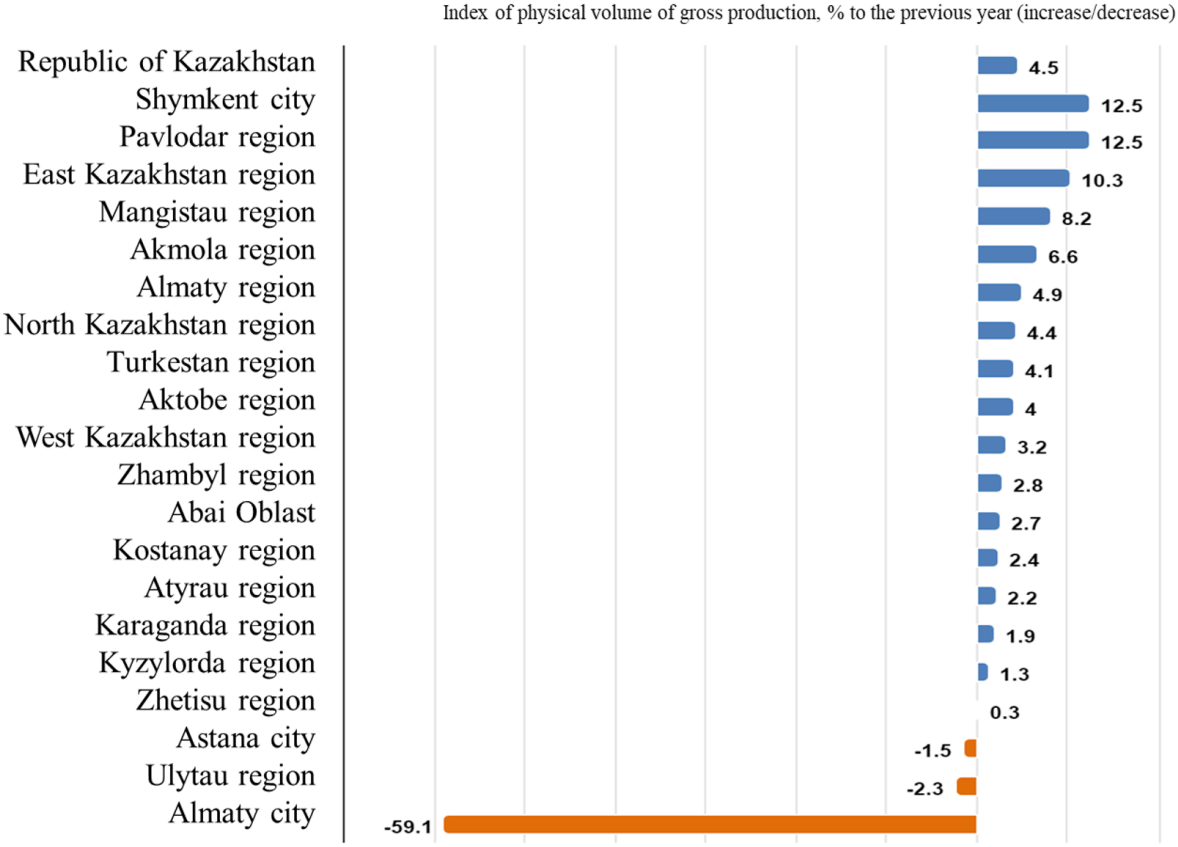

Figure 4. Index of physical volume of gross livestock production
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[4]

According to Figure 4, the gross livestock production increased by 4.5%. It is due to an increase in production volumes by the types of economic activity such as «poultry breeding» by 11.7%, «dairy cattle» by 2.7%, «horses and other equine animals» by 6.7% and «other cattle and buffaloes» – by 3.1%.

Table 4 – An economic analysis of the index of physical volume of gross livestock production

Index	Value	Analysis and trends
The general trend	The growth of the physical volume of gross livestock production in the republic	The most regions showed positive dynamics. It indicates the stability and development of the livestock sector.
Regions with the highest growth	Pavlodar (+12.5%), East Kazakhstan Region (+12.5%), Mangystau (+10.3%), Akmola (+8.2%), Almaty (+6.6%)	This significant growth is due to the expansion of farms, an increase in livestock numbers, and improved feeding and veterinary care conditions.

gov.kz/ru (accessed on 10.04.2025)
[4] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru (accessed on 10.04.2025)*

Index	Value	Analysis and trends
Regions with a moderate growth (2%-5%)	North Kazakhstan Region (+4.9%), Turkestan (+4.4%), Aktobe (+4.1%), West Kazakhstan (+4%), Zhambyl (+3.2%), Abay (+2.8%), Kostanay (+2.7%), Atyrau (+2.4%), Karaganda (+2.2%), Kyzylorda (+1.9%)	These regions are showing steady growth. It indicates the gradual development of the livestock production.
Regions with weak growth (less than 2%)	Zhetisu (+1.3%)	The minimal increase is due to insufficient investment or infrastructure constraints.
Regions with a decline	Astana (-1.5%), Ulytau (-2.3%), Almaty (-59.1%)	The most serious decrease is in Almaty (-59.1%). It is due to the crisis, changes in the structure of agricultural production, or administrative activity.
Growth factors	Increased investment, expansion of farms, improvement of veterinary control	The main reasons for the increase in production are the government support, industry subsidies, and favourable weather conditions.
Factors of decline	Decrease in demand, increase in costs, change in the structure of agriculture in Almaty	In Almaty, there was a redistribution of land and a reduction in livestock production.
Forecast	The further growth in the most regions, industry stabilisation	In general, livestock production shows a positive dynamic. However, there is still a need in support.

Source: Authors

Overall, the livestock sector is growing; the most significant growth is in Pavlodar, East Kazakhstan, and Mangistau regions. Almaty (-59.1%), in the contrary, shows the negative dynamics. It requires the further analysis of the reasons. The livestock production is a stable and promising industry, but the individual regions need the additional support.

Table 5 – SWOT-analysis of management of gross output of products (services) of agriculture, forestry, and fishery of Kazakhstan

Strengths	Weaknesses
The importance of the sector: Kazakhstan's agricultural sector plays an important role in ensuring food security and socio-economic development of the regions.	The infrastructural constraints: insufficient development of logistics, transport, and processing infrastructure.
The government support: the availability of government programs and policies aimed at the development of agriculture, forestry, and fisheries.	The climate risks: the impact of climate change, land degradation, and reduced soil fertility.
The natural resources: rich land resources, availability of water resources, and favorable climatic conditions for agricultural production.	The low level of mechanisation: the limited automation of production processes, dependence on traditional farming methods.

Innovative technologies: the development of digital tools and agricultural technologies to improve the efficiency of the production management.	Financial barriers: limited access of small and medium-sized enterprises to investments and credit resources.
Export potential: the opportunities for expanding agricultural exports to the international markets.	Human resources challenges: the shortage of qualified specialists in the agricultural sector.
Opportunities	Threats
The global trends: the growing global demand for environmentally friendly and organic products.	The economic instability: possible macroeconomic crises, currency fluctuations, and inflation.
PPP development: the opportunities for expanding public-private partnerships (PPPs) in the development of the agricultural production.	The competition in the global market: increased competition from the other agricultural countries.
The integration with the international markets: expansion of the export opportunities through the participation in the international trade agreements.	The environmental factors: the threat of depletion of water resources, changes in precipitation and drought conditions, frosts, and floods.
The digitalization of the sector: the introduction of Big Data, artificial intelligence, and automated control systems.	The political risks: the possible changes in the government policy and tax regulation.
The improvement of support policy: the development of concessional loans, subsidies, and investment programs.	The social challenges: urbanization and the outflow of labour from rural areas.

Source: Authors

Table 6 – PEST-analysis of management of gross output of products (services) of agriculture, forestry, and fishery of Kazakhstan

Factors
Political
The government policy and programs to support agriculture.
The legislative regulation in terms of the land use and ecology.
The impact of the international trade agreements and sanctions.
The government measures to subsidise the agricultural production.
Economic
The impact of inflation and exchange rate fluctuations on production costs.
Availability of lending and investment in the agro-industrial sector.
Development of the export markets and the trade partnerships.
The cost of fuel, fertilisers, and farm equipment.
Social
Increasing demand for organic products and environmentally friendly production.
Demographic changes and rural population decline.
The level of education and training in the agricultural sector.
Changing consumer preferences and increasing requirements to product quality.
Technological
The introduction of digital technologies and artificial intelligence in agribusiness.
The automation of the agricultural production.
Development of the agricultural technologies aimed at increasing yields and resilience to the climate change.

Factors
The use of drones, IoT, and satellite monitoring.

Source: Authors

Table 7 – The improvement of the management of gross output of products (services) of agriculture, forestry, and fisheries of Kazakhstan

Index	Analysis of the current situation	The recommendations for improvement
The government policy	The existing agricultural support programmes contribute to the sector's development, but have weaknesses in implementation and the distribution of subsidies.	The development of the targeted subsidy programmes, strengthening control over the efficiency of funds allocation.
Technological development	A low level of mechanisation, insufficient implementation of digital technologies and innovative solutions.	The active implementation of the digital technologies (Big Data, IoT), and automation of manufacturing processes.
Financial support	The limited access of small and medium-sized enterprises to loans, high cost of borrowed funds.	The expansion of preferential lending programmes, state guarantees for the agricultural manufacturers.
The environmental challenges	The climate change, droughts, soil degradation, and water scarcity.	The development of the sustainable agriculture, land reclamation, modernisation of the irrigation systems.
Logistics and infrastructure	The insufficient development of transport and storage facilities, low availability of sales markets.	the investments in the creation of agricultural centers, expansion of the network of storage and processing.
Human resources potential	The shortage of the qualified specialists, aging of personnel in the agricultural sector.	Training and retraining programs, popularisation of the agricultural professions among young people.
Sales and export markets	High dependence on the export of raw materials, low proportion of processed products.	The development of the processing industry, expansion of export geography, support for the manufacturers.
Investment attractiveness	A low level of private investment in agriculture due to the high risks.	Stimulating of the private investment through tax incentives and the development of public-private partnerships.

Source: Authors

Conclusions

A comprehensive modernisation of the agro-industrial sector is required, focused on the digitalisation and innovation. The climate risks require adaptive strategies, including the development of a sustainable agricultural technology. Moreover, the climate risks require adaptive strategies, including the development of sustainable agricultural technologies. The logistics and export infrastructure requires an improvement to increase the competitiveness of the sector. The development of human resources plays a key role in the sustainable development of the agricultural sector in Kazakhstan. These recommendations will provide the efficiency of managing gross output of agriculture, forestry, and fisheries, and ensure the sustainable development of the sector and strengthen food security in Kazakhstan.

The research is devoted to the analysis of the management of gross output of agriculture, forestry, and

fisheries in Kazakhstan in the context of the climate change, land degradation and insufficient government support. Therefore, consideration of the alternative points of view presented in the scientific literature provides an objective assessment of the validity of the results obtained and their compliance with international research.

In particular, the approaches proposed correlate with the institutional theory of state regulation of the agricultural sector, presented in the works of Berkinov B. B. and Saburova N.R. [1], Omoshev T.T. and Kantoroeva G.K. [6], Dambaulova G.K. et al. [12]. These studies emphasise the urgency of the integrated agricultural policy management through the introduction of targeted programs and production incentive mechanisms. Additionally, the research focuses on the combination of state regulation with innovative production management mechanisms. It was highlighted in the papers by Ualieva M.A. and Maidyrova A.B. [5], who studied the role of digitalization in the management of the agricultural processes.

However, the alternative approaches presented in the research of Abildaev S.T. et al. [7] indicate the critical dependence of the agricultural sector of Kazakhstan on global food markets and export opportunities. In contrast, we consider the internal structural problems such as technological and infrastructural gaps. This expands the theoretical understanding of the factors influencing output in agriculture, forestry, and fisheries in Kazakhstan.

Therefore, this particular research confirms previously established patterns, and highlights new aspects requiring more in-depth study, such as the complex integration of innovative technologies and the development of the logistics system of agriculture.

The scientific novelty of the research involves an integrated approach to the analysis of gross output of the agricultural sector of Kazakhstan, combining quantitative and qualitative methods, as well as comparative analysis with international practice. In contrary to the most previous studies focusing on individual factors (state support, climate risks, or digitalisation), this research examines the agricultural governance system as a multi-component structure highlighting the macroeconomic conditions, technological modernisation, and the interaction between public and private sectors.

The conclusions of the research are substantiated by analysing the dynamics of gross output over the past 13 years (2010-2023), using SWOT and PEST analysis, and statistical data from the Bureau of National Statistics of the Republic of Kazakhstan. The comparative data by region allows us to reasonably identify structural imbalances and factors influencing a decrease or increase in the production volumes.

Therefore, the scientific significance of the work consists in the integration of the different methodological approaches. They provide a comprehensive study of the factors affecting the development of agriculture, forestry, and fisheries in Kazakhstan.

The theoretical significance of the research consists in the development of the economic and analytical approaches to the management of agro-industrial complex. The analysis provides a basis for further research in terms of the sustainable agriculture, state regulation of food markets, and digitalisation of the agricultural sector.

The practical significance of the study includes the development of the specific recommendations to improve the management of gross output. There are as follows: improving government support and subsidies for the agricultural sector; the introduction of the modern digital technologies for monitoring and planning agricultural production; development of the infrastructure projects in the rural areas; stimulating private investment in the processing and logistics of the agricultural products.

The results of the research may be applied in the development of strategies for the development of the agrarian sector of Kazakhstan, planning of state programmes to support agriculture, formation of educational programmes on economics and management of the agro-industrial complex.

The presented research expands scientific understanding of the mechanisms of agrarian economy management in Kazakhstan, confirms the importance of the integration of modern technologies and state support and could provide a basis for the further interdisciplinary research in this field.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTION

Zhanna R. Ashimova – conceptualization, project administration, writing – original draft.
Amina M. Uristembek – writing – review & editing.
Zhanay J. Abitov – investigation.
Diana Z. Abitova – formal analysis.

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Ratings of sustainable development and implementation of the ESG agenda in small towns

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ORIGINAL ARTICLE

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Abstract. The paper considers a number of cities of different categories, and the dynamics of the population of small towns in the regions of the Central Federal District. The authors overview the indexes and rankings of cities calculated in Russia by the state corporation VEB.RF, Expert agencies, SGM, ESG Alliance, and various companies. They analysed the urban environment quality index calculated by the Ministry of Construction of Russia, using the example of small towns in 17 regions of the Central Federal District with a population of 25-50 thousand people, 5-25 thousand people, and up to 5 thousand people in a relatively comfortable climate. The research dwells on MGIMO'2023 ranking on SDG 11 'Sustainable cities and human settlements', the methodology of the RAEX rating consortium for ESG assessment of federal districts and cities of Russia. An analysis of the urban environment quality index calculated by the Ministry of Construction of Russia on the example of small towns in 17 regions of the Central Federal District, showed the following: the 15 small towns with a population of 5-25 thousand people (151 in the Central Federal District) have a range of scores for a conditionally comfortable climate 30. It indicates a significant difference in the level of comfort of living in small towns within the same region. The small towns with a population of 25-50 thousand people (there are 60 in the Central Federal District) have a range of points scored for a conditionally comfortable climate with a difference of more than 30 points is in the Moscow, Smolensk, Kaluga, Vladimir, Tambov, Tula, Yaroslavl, Belgorod, and Voronezh regions. There are only 16 small towns with up to 5,000 people in the Central Federal District. Hence, it is necessary to implement a special policy for the socio-economic development of small towns, including the development of their territories and infrastructure.

Keywords: small towns; sustainable development; ESG agenda; sustainable development goals; rating agencies

JEL codes: C49, J11, O18, R11, R58

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Introduction

In accordance with the Code of Rules 'Urban Planning. Planning and Construction of Urban and Rural Settlements' (SP 42.13330.2016) from the Ministry of Construction of the Russian Federation, Russian cities and towns are classified as follows:

– large metropolitan areas – with a population of over 1 mln people;
– metropolitan areas – with a population from 250 thousand to 1 mln people (including subcategories: from 250 to 500 thousand and from 500 thousand to 1 mln people);
– medium-size urban areas – with a population from 100 to 250 thousand people;
– small urban areas – with a population from 50 to 100 thousand people;
– small towns – with a population up to 50 thousand people (including subcategories: up to 10 thousand, from 10 to 20 thousand and from 20 to 50 thousand people; urban-type settlements are also included here).

By Table 1, according to the All-Russian Population Census 2020, October 1, 2021, the Central Federal District (CFD) includes:

– 2 large metropolitan areas – Moscow and Voronezh;

– 3 metropolitan areas with a population of 500,000 to 1 million people (Yaroslavl, Ryazan, Balashikha);
– 16 submetropolitan areas with a population of 250,000 to 500,000 (includes Ivanovo);
– 24 medium-size urban areas (there are no such cities in the Ivanovo region);
– 32 small urban areas (in the Ivanovo region – Kineshma and Shuya);
– 227 small towns (in the Ivanovo region – 14 cities)[1].

Table 1 – Russian cities by population, according to the All-Russian Population Census of 2020

Federal District	The cities	The metropolitan areas (500 thousand – 1 mln)	The submetropolitan areas (250 thousand – 500 thousand)	The medium-size urban areas	The small urban areas	The small towns	Total
Central	2	3	16	24	32	227	304
Privolzhsky	5	7	5	14	34	135	200
North-West	1	0	5	5	13	124	148
Uralsky	2	1	5	10	16	81	115
Siberian	3	5	0	11	18	77	114
South	3	0	5	12	18	59	97
Far Eastern	0	2	3	7	5	65	82
North Caucasian	0	2	2	11	10	33	58
Total cities, items	16	20	41	94	146	801	1118
Total population, people	35,507,054	12,185,294	14,449,289	14,286,769	10,086,665	16,021,525	110,075,322
Population share, %	32.3	11.1	13.1	13.0	9.2	14.6	100.0

Source: Rosstat, 2021[2]

The scientists of Ivanovo State University conduct interdisciplinary research of small towns [4], their demographic and educational characteristics, and potential [2].

The practices of sustainable development (SD) of economic entities are expanding at the macrolevel (states, microregions), mesolevel (local territories – regions, municipalities), and microlevel (enterprises and organisations). The number of publications on SD and ESG of regions, cities, and employee competencies is growing [1; 3].

The relevance of sustainable development and the promotion of the ESG agenda in small towns is due to the negative trends in population decline, young people migration outflow, and the general working-age population, which are based on various socio-economic reasons.

SD is assessed in three areas of economic entities activity: Environmental (environmental impact), Social (social policy), Governance (management), which are called ESG criteria. The companies strive to consider the principles of environmental, social, and managerial sustainability when implementing their development strategy; the ESG rating serves as a tool for assessment of their efforts. In recent years, SD and ESG ratings/rankings have been calculated in Russia for the for companies, regions, cities, and towns.

Methods

The purpose of our research is to analyse the ratings of sustainable development and the implementation of the ESG agenda in small towns of the Central Federal District (CFD).

[1] *Rosstat. The All-Russian Population Census of 2020. October 1, 2021. Vol. 1. Source: https://rosstat.gov.ru/vpn/2020/Tom1_Chislennost_i_razmeshchenie_naseleniya. (accessed on 27.03.2025)*
[2] *Rosstat. The All-Russian Population Census of 2020. October 1, 2021. Vol. 1. Source: https://rosstat.gov.ru/vpn/2020/Tom1_Chislennost_i_razmeshchenie_naseleniya. (accessed on 27.03.2025)*

The object of the study was the small towns of the CFDa. The subject of the study is the number of small towns and their population. The research used the statistical database of Rosstat, the results of ratings and rankings of cities calculated in Russia by MGIMO'2023 according to SDG 11, by the state corporation VEB. RF, Expert agencies, SGM, ESG Alliance, etc. Moreover, we analysed the urban environment quality index calculated by the Russian Ministry of Construction.

The research of the ratings of sustainable development of small towns is based on the use of general scientific methods of analysis and synthesis, induction and deduction, the method of content analysis of economic publications, the method of comparative economics, the monographic method. The main source of information was Rosstat data, websites of organisations promoting SD and ESG agenda, ratings and rankings of various expert and analytical organisations, universities, etc.

Results

According to the research on example of the regions of the Central Federal District,

1) the most of the cities in the regions of the Central Federal District are small towns (with a population of less than 50 thousand people);

2) the population in 3 of the 17 regions of the Central Federal District in all small towns is declining – in the Belgorod, Kostroma, and Smolensk regions;

3) in the period 01.01.2020-01.10.2021 (the date of the All-Russian Population Census), the dynamics of the population of small towns in the regions of the Central Federal District is as follows:

– Vladimir region (total – 23 cities); there are 18 small towns; population in 9 is increasing ( ); in the 9 is declining ( );

– Belgorod region (total – 11 cities); there are 8 small towns; population in 8 is decreasing;

– Bryansk region (total – 16 cities); there are 14 small towns; the population in 5 is increasing, in 9 is decreasing;

– Voronezh region (total – 15 cities); there are 11 small towns; the population in 5 is increasing, in 6 is decreasing;

– Ivanovo region (total – 17 cities); there are 14 small towns; the population in 6 is increasing, in 8 is decreasing;

– Kaluga region (total – 22 cities); there are 20 small towns; the population in 7 is increasing, in 13 is decreasing;

– Kostroma region (total – 12 cities); there are 11 small towns; the population in 11 is decreasing;

– Kursk region (total – 10 cities); there are 8 small towns; the population in 2 is increasing, in 6 is decreasing;

– Lipetsk region (total – 8 cities); there are 6 small towns; the population in 4 is increasing, in 2 is decreasing;

– Moscow region (total – 74 cities); there are 37 small towns; the population in 8 is increasing, in 29 is decreasing; in 16 small towns, the population exceeds 20,000 people.

– Oryol region (total – 7 cities); there are 6 small towns; the population in 1 is increasing, in 5 is decreasing;

– Ryazan region (total – 12 cities); there are 11 small towns; the population in 2 is increasing, in 9 is decreasing;

– Smolensk region (total – 13 cities); there are 11 small towns; population in 11 is decreasing;

– Tambov region (total – 8 cities); there are 6 small towns; the population in 4 is increasing, in 2 is decreasing;

– Tver region (total – 23 cities); there are 21 small towns; the population in 13 is increasing, in 8 is decreasing;

– Tula region (total – 7 cities); there are 14 small towns; the population in 9 is increasing, in 5 is decreasing;

– Yaroslavl region (total – 11 cities); there are 9 small towns; the population in 2 is increasing, in 7 is

decreasing (Table 2).

Table 2 –The population of the small towns, the regions of the Central Federal District, 2020

	Small towns	
	Number	Name
Belgorod region	8	Alekseevka – 36,578, Biryuch – 7,114, Valuiki – 33,032, Grayvoron – 6,179, Korocha – 5,623, Novyi Oskol – 18,359, Stroitel – 23,780, Shebekino – 39,680 (8)
Bryansk region	14	Zhukovka – 17,628, Karachev – 17,449, Sevsk – 6,732, Surazh – 11,176, Unecha – 24,274 (5) Dyatkovo – 25,255, Zlynka – 5,270, Mglin – 6,919, Novozybkov – 38,680, Pochep – 14,991, Seltso – 15,906, Starodub – 17,687, Trubchevsk – 13,287, Fokino – 12,538 (9)
Vladimir region	18	Vyazniki – 36,203, Gorokhovets – 12,666, Kameshkovo – 12,028, Kirzhach – 27,318, Kurlovo – 6,309, Petushki – 13,317, Pokrov – 17,747, Sobinka – 17,444, Sudogda – 10,408 (9) Karabanovo – 13,150, Kolchugino – 39,410, Kosterevo – 7,113, Lakinsk – 12,861, Melenki – 13,407, Raduzhny – 17,569, Strunino – 11,774, Suzdal – 9,286, Yuriev-Polsky -17,276 (9)
Voronezh region	11	Bobrov – 20,871, Boguchar – 14,370, Buturlinovka – 24,397, Novokhopersk – 5,948, Semiluki – 27,938 (5) Kalach– 17,624, Novovoronezh – 30,658, Ostrogozhsk - 31,699, Pavlovsk – 22,384, Povorino – 16,417, Ertil – 10,024 (6)
Ivanovo region	14	Kohma – 30,940, Komsomolsk – 8,364, Ples – 1,896, Rodniki – 24,101, Puchezh – 6,879, Yuzha – 12,957 (6) Vichuga – 30,694, Gavrilov Posad – 5,429, Zavolzhsk – 8,896, Navoloki – 8,167, Privolzhsk – 14,332, Teikovo – 31,305, Furmanov – 29,715, Yuryevets – 7,899 (8)
Kaluga region	20	Balabanovo – 30,194, Belousovo – 10,980, Borovsk – 12,686, Ermolino – 11,189, Kondrovo – 15,734, Mosalsk – 4,251, Spas-Demensk – 4,592 (7) Zhizdra – 5,433, Zhukov – 15,656, Kirov – 27,661, Kozelsk – 16,603, Kremenki – 11,637, Ludinovo – 35,276, Maloyaroslavets – 41,511, Medyn – 8,042, Meshchovsk – 3,722, Sosensky – 11,259, Sukhinichi – 14,407, Tarusa – 9,791, Yukhnov – 6,470 (13)
Kostroma region	11	Buy – 20,564, Volgorechensk – 14,355, Galich – 12,856, Kologriv – 2,468, Makaryev – 5,528, Manturovo – 13,043, Nerekhta – 19,977, Neya – 7,816, Soligalich – 5,534, Chukhloma – 4,252, Sharya – 20,439 (11)
Kursk region	8	Dmitriev – 6,317, Kurchatov – 40,318 (2) Lgov – 17,557, Oboyan – 11,844, Rylsk – 15,069, Sudzha – 5,127, Fatezh – 4,691, Shchigry – 14,927 (6)
Lipetsk region	6	Dankov – 19,726, Zadonsk – 9,887, Lebedyan – 20,049, Usman – 19,662 (4) Gryazi – 43,908, Chaplygin – 11,579 (2)

	Small towns	
	Number	Name
Moscow region	37	Aprelevka – 38,483, Zvenigorod – 37,271, Krasnoarmeysk – 26,606, Krasnoznamensk – 44,657, Kubinka – 23,472, Kurovskoye – 19,890, Protvino – 37,221, Staraya Kupavna – 23,553 (8) Bronnitsy – 20,981, Volokolamsk – 25,729, Golitsyno – 22,861, Dedovsk – 30,373, Zaraysk – 20,383, Istra – 34,971, Kashira – 44,551, Likino-Dulevo – 33,945, Lukhovitsy – 29,808, Mozhaysk – 32,755, Ozery – 23,826, Roshal – 20,875, Solnechnogorsk – 47,514, Khotkovo – 20,468, Shatura – 36,714, Elektrogorsk – 29,919 (29)*
Oryol region	6	Novosil – 2,938 (1) Bolkhov – 9,359, Dmitrov – 5,177, Livny – 42,928, Maloarkhangelsk – 3,512, Mtsensk – 36,070 (5)
Ryazan region	11	Rybnoye – 21,200, Skopin – 25,708 (2) Kasimov – 27,821, Korablino – 10,084, Mikhailov – 10,085, Novomichurinsk – 16,752, Ryazhsk – 20,197, Sasovo – 21,220, Spas-Klepiki – 4,591, Spassk-Ryazansky – 5,705, Shatsk – 5,791 (9)
Smolensk region	13	Velizh – 6,005, Gagarin – 25,374, Demidov – 6,261, Desnogorsk – 24,618, Dorogobuzh – 9,086, Dukhovshchyna – 3,866, Yelnya – 7,911, Pochinok – 7,351, Roslavl – 43,592, Rudnya – 8,490, Safonovo – 37,055, Sychevka – 7,469, Yartsevo – 40,330 (13)
Tambov region	6	Kirsanov – 16,164, Morshansk – 39,023, Rasskazovo – 47,644, Uvarovo – 23,584 (4) Kotovsk – 26,694, Zherdevka – 13,883 (2)
Tver region	21	Andreapol – 6,956, Bezhetsk – 21,466, Bely – 3,125, Vesyegonsk – 6,330, Vyshny Volochek – 45,830, Zapadnaya Dvina – 7,869, Zubtsov – 6,217, Kalyazin – 12,621, Kashin – 14,113, Krasny Kholm – 4,998, Kuvshinovo – 9,262, Nelidovo – 18,603, Ostashkov – 16,674 (13) Bologoe – 20,234, Kimry – 40,875, Konakovo – 33,560, Likhoslavl – 11,017, Staritsa – 6,938, Torzhok – 41,116, Toropets – 11,441, Udomlya – 25,950 (8)
Tula region	14	Belev – 12,746, Bolokhovo – 9,339, Efremov – 36,545, Kimovsk – 26,475, Lipki – 8,325, Plavsk – 16,893, Sovetsk – 7,889, Suvorov – 17,598, Chekalin – 935 (9) Bogoroditsk – 29,560, Venev – 12,668, Kireevsk – 25,560, Uzlovaya – 49,427, Yasnogorsk – 15,269 (5)
Yaroslavl region	9	Myshkin – 5,621, Uglich – 32,719 (2) Gavrilov Yam – 16,084, Danilov – 13,677, Lyubim – 5,037, Pereslavl-Zalessky – 37,738, Poshekhonye – 5,150, Rostov – 28,122, Tutaev – 39,643 (7)

*Note: * The small towns with 20-50 thousand people are given as an example for the Moscow region*
Source: Rosstat, 2021[3]

The rating of the cities in the Russian mass media is quite popular. Internationally, the rating of the in terms of the standard of living is conducted by the international HR consulting company Mercer and The

[3] *Rosstat. The All-Russian Population Census of 2020. October 1, 2021. Vol. 1. Source: https://rosstat.gov.ru/vpn/2020/Tom1_Chislennost_i_razmeshchenie_naseleniya. (accessed on 27.03.2025)*

Economist Group, USA; the similar rating is compiled annually by Monocle, the United Kingdom.

Since 2012, in the Russian Federation the All-Russian competition 'The City of Russia. National Choice' is held. It is the vote for the most attractive, recognisable and symbolic Russian city (voting is conducted by cities-regional centers)[4].

WEB.RF implements the project 'Quality of Life Index in Russian cities' as an information and analytical system of urban development[5].

AVA is a federal developer specialising in the integrated development of residential and commercial real estate. It publishes the TOP 20 best cities in Russia for living on its website[6]. A similar project 'TOP 10 best cities to live in Russia' is presented by the financial marketplace Sravni.ru[7]. The most comfortable cities to live in Russia are presented on the company's RBC website[8]. Monitoring of cities with the highest quality of life is provided by the Financial University under the Government of the Russian Federation[9].

The urban environment quality Index is calculated by the Ministry of Construction of Russia. The cities are considered favourable for living if they score more than 50% of the possible points. For instance, by the end of 2019, 300 Russian cities (26.9%) were recognised as comfortable; by the end of 2023, 759 cities (68% of 1,117 Russian cities) were recognised as comfortable.

In the Ivanovo region, the number of cities with a favourable urban environment increased from 59% to 82% in 2023, and scored 205 points, which is higher than the average for the Russian Federation (200 points).

The urban environment quality index is calculated for the metropolitan areas, submetropolitan areas, medium-size urban, and small towns. By the end of 2023, the resort town Zelenogradsk, the Kaliningrad region (population – 17.1 thousand people), Istra, the Moscow region (population – 35 thousand people), Innopolis, Tatarstan (population – 4 thousand people) are recognised as the most comfortable for living.

The small towns Kartaly, the Chelyabinsk region (population – 26.7 thousand people) and Svobodny, the Amur region (population – 48.8 thousand people) increased their living standards and gain the favourable status. The outsider was the small town Alzamai, the Irkutsk region (population – 5.4 thousand people).

However, the small towns (population – 25-50 thousand people) located in a relatively comfortable climate are 4 towns of the Ivanovo region: Vichuga, Kokhma, Teikovo, and Furmanov. The largest number of small towns out of 60 is in the Moscow region (16). There are 5 towns each in the Tver and Tula regions; 4 towns each in the Ivanovo, Kaluga, Smolensk, and Yaroslavl regions; 3 towns each in the Belgorod, Vladimir, Voronezh, and Tambov regions; 2 towns in the Oryol region; 1 town each in the Bryansk, Kursk, Lipetsk, and Ryazan regions. There are no small towns with a population of more than 25 thousand people in the Kostroma region.

The range of scores for a conditionally comfortable climate varies the most (the difference is more than 30 points) in the following regions: Moscow (73 points), Smolensk (52 points), Kaluga (47 points), Vladimir (43 points), Tambov (36 points), Tula (35 points), Yaroslavl (34 points), Belgorod (32 points), Voronezh (31 points) (Table 3).

The largest number of small towns out of 151 (population – 5-25 thousand people), located in a relatively comfortable climate, are in the Moscow region (20), Vladimir (15), and Tver (14) regions; 13 towns each are in the Bryansk and Kaluga regions; 9 towns each in the Ivanovo and Ryazan regions; 8 towns each in the Voronezh, Kostroma, Smolensk, and Tula regions.

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[4] Voting results of the All-Russian competition 'The City of Russia. National Choice'. Source: https:// город-россии.рф/rating (accessed on 12.02.2025)

[5] WEB.RF The Quality of life index. Source: https://citylifeindex.ru/ (accessed on 02.12.2024)

[6] AVA. TOP 20 best Russian cities for living in 2024. Source: https://avadom.ru/articles/reyting-luchshikh-gorodov-rossii-2023/ (accessed on 09.12.2024)

[7] Sravni.ru: a financial marketplace. Source: https://www.sravni.ru/text/luchshie-goroda-dlya-zhizni-v-rossii-top-10-po-versii-sravni/ (accessed on 09.12.2024)

[8] The most comfortable cities to live in in Russia. Source: https://realty.rbc.ru/news/660abc7d9a79474c317bc2ac (accessed on 12.02.2025)

[9] The portal of the Financial University under the Government of the Russian Federation. Results of 2023: cities with the highest quality of life. Source: http://www.fa.ru/News/2023-11-20-topcities23.aspx (accessed on 09.12.2024)

Table 3 – The small towns (25-50 thousand people) of the Central Federal District located in a relatively comfortable climate

Regions of the Central Federal District	Number of the small towns	Score range	City (points scored)
Moscow region	16	181-254	Istra (254), Mozhaysk (251), Protvino (249), Krasnoznamensk (248), Zvenigorod (244), Losino-Petrovsky (241), Krasnoarmeysk (240), Kashira (235), Solnechnogorsk (230), Volokolamsk (226), Aprelevka (219), Shatura (213), Elektrogorsk (212), Dedovsk (209), Likino-Dulevo (199), Lukhovitsy (181)
Yaroslavl region	4	212-246	Tutaev (246), Rostov (235), Uglich (228), Pereslavl-Zalessky (212)
Tambov region	3	197-233	Kotovsk (233), Morshansk (204), Rasskazovo (197)
Smolensk region	4	180-232	Roslavl (232), Gagarin (222), Safonovo (207), Yartsevo (180)
Vladimir region	3	187-230	Kolchugino (230), Vyazniki (221), Kirzhach (187)
Oryol region	2	227-228	Mtsensk (228), Livny (227)
Kaluga region	4	180-227	Kirov (227), Maloyaroslavets (212), Balabanovo (200), Ludinovo (180)
Ryazan region	1	227	Kasimov (227)
Tver region	5	197-222	Konakovo (222), Kimry (218), Udomlya (218), Torzhok (199), Vyshny Volochyok (197)
Kursk region	1	220	Kurchatov (220)
Belgorod region	3	187-219	Shebekino (219), Valuiki (207), Alekseevka (187)
Ivanovo region	4	202-218	Furmanov (218), Vichuga (213), Teikovo (212), Kohma (202)
Bryansk region	1	217	Novozybkov (217)
Tula region	5	180-215	Efremov (215), Uzlovaya (212), Kireevsk (209), Bogoroditsk (200), Kimovsk (180)
Lipetsk region	1	214	Gryazi (214)
Voronezh region	3	180-211	Novovoronezh (211), Ostrogozhsk (180), Semiluki (180)
Kostroma region	-	-	-
Total	60		

Source: Ministry of Construction, 2023[10]

The range of points scored for a conditionally comfortable climate from 17 regions of the Central Federal District varies by more than 30 points in 15, including: Vladimir region (92 points), Moscow region (72 points), Bryansk region (68 points), Yaroslavl region (59 points), Voronezh region (56 points), Tver region (51 points), Kursk region (50 points), Smolensk region (50 points), Tula region (49 points), Kostroma region (47 points), Tambov region (46 points), Kaluga region (44 points), Belgorod region (43 points), Ryazan region (42 points), Ivanovo region (40 points). The minimum difference in the values of the indicator is in 2 regions: Lipetsk (19 points) and Oryol (28 points) (Table 4). It indicates a significant difference in the level of comfort of living in small towns of the same region.

[10] *The official website of the Ministry of Construction of Russia. The urban environment quality Index by cities and the regions of the Russian Federation, 2023. 60 p. Source: https://minstroyrf.gov.ru/docs/364202/?clear_cache=Y (accessed on 09.12.2024)*

Table 4 – The small towns (5-25 thousand people) of the Central Federal District located in a relatively comfortable climate

Regions of the Central Federal District	Number of the small towns	Score range	City (points scored)
Vladimir region	15	163-255	Suzdal (255), Yuriev-Polsky (242), Gorokhovets (236), Melenki (210), Pokrov (209), Karabanovo (202), Raduzhny (198), Sudogda (194), Lakinsk (193), Sobinka (193), Strunino (193), Petushki (191), Kosterevo (180), Kameshkovo (176), Kurlovo (163)
Moscow region	20	180-252	Ruza (252), Pushchino (250), Taldom (249), Staraya Kupavna (238), Zaraysk (237), Peresvet (236), Chernogolovka (234), Drezna (232), Golitsyno (227), Roshal (226), Khotkovo (225), Vysokovsk (224), Kurovskoye (221), Ozery (216), Bronnitsy (215), Elektrougli (211), Kubinka (204), Krasnozavodsk (200), Yakhroma (192), Beloozersky (180)
Yaroslavl region	5	180-239	Myshkin (239), Nerekhta (215), Poshekhonye (198), Gavrilov Yam (197), Danilov (180)
Voronezh region	8	176-232	Kalach (232), Pavlovsk (232), Boguchar (229), Bobrov (204), Povorino (202), Buturlinovka (198), Novokhopersk (180), Ertil (176)
Bryansk region	13	163-231	Unecha (231), Karachev (215), Zhukovka (203), Zlynka (196), Surazh (196), Dyatkovo (180), Pochep (180), Sevsk (180), Starodub (180), Trubchevsk (180), Fokino (180), Seltso (178), Mglin (163)
Kursk region	6	180-230	Sudzha (230), Shchigry (221), Rylsk (203), Lgov (197), Oboyan (193), Dmitriev (180)
Tambov region	3	179-225	Kirsanov (225), Uvarovo (193), Zherdevka (179)
Tver region	14	174-225	Ostashkov (225), Kashin (208), Likhoslavl (207), Staritsa (206), Kalyazin (195), Bologoe (191), Andreapol (180), Bezhetsk (180), Zapadnaya Dvina (180), Zubtsov (180), Kuvshinovo (180), Nelidovo (180) Toropets (180), Vesyegonsk (174)
Tula region	8	176-225	Plavsk (225), Venev (219), Suvorov (205), Yasnogorsk (195), Belev (180), Bolokhovo (180), Sovetsk (177), Lipki (176)
Kaluga region	13	180-224	Tarusa (224), Kremenki (218), Belousovo (215), Borovsk (215), Kozelsk (215), Kondrovo (202), Sosenskiy (195), Zhukov (190), Ermolino (189), Zhizdra (189), Sukhinichi (187), Medyn (180), Yukhnov (180)
Belgorod region	5	180-223	Korocha (223), Grayvoron (221), Novy Oskol (212), Stroitel (210), Biryuch (180)
Kostroma region	8	175-222	Galich (222), Buy (214), Volgorechensk (214), Sharya (204), Makaryev (180), Soligalich (178), Manturovo (176), Neya (175)

Regions of the Central Federal District	Number of the small towns	Score range	City (points scored)
Ivanovo region	9	180-220	Gavrilov Posad (220), Komsomolsk (220), Privolzhsk (213), Yuryevets (195), Zavolzhsk (194), Rodniki (191), Navoloki (180), Puchezh (180), Yuzha (180)
Smolensk region	8	169-219	Velizh (219), Desnogorsk (213), Dorogobuzh (199), Yelnya (180), Sychevka (180), Rudnya (176), Demidov (173), Pochinok (169)
Ryazan region	9	176-218	Sasovo (218), Korablino (206), Mikhailov (191), Novomichurinsk (180), Rybnoye (180), Spassk-Ryazansky (180), Shatsk (180), Skopin (178), Ryazhsk (176)
Lipetsk region	5	198-217	Lebedyan (217), Dankov (210), Usman (199), Zadonsk (198), Chaplygin (198)
Oryol region	2	179-207	Dmitrovsk (207), Bolkhov (179)
Total	151		

Source: Ministry of Construction, 2023[11]

There are 16 small towns with the population up to 5,000 people in the Central Federal District: 3 towns in the Kaluga region, 2 towns each in the Kostroma, Orel, and Tver regions, and 1 town each in the Ivanovo, Kursk, Moscow, Ryazan, Smolensk, Tula, and Yaroslavl regions. There are none small towns in 6 regions – in Belgorod, Bryansk, Vladimir, Voronezh, Lipetsk, and Tambov. The range of scores over 30 is in the Kaluga (41 points) and Tver (40 points) regions. The maximum number of points scored is in Ples (224); the minimum is Dukhovschina (173) with a difference of 51 points (Table 5).

Table 5 – Small towns (up to 5 thousand people) of the Central Federal District located in a relatively comfortable climate

Regions of the Central Federal District	Number of the small towns	Score range	City (points scored)
Ivanovo region	1	224	Ples (224)
Moscow region	1	222	Vereya (222)
Kaluga region	3	180-221	Mosalsk (221), Spas-Demensk (204), Meshchovsk (180)
Tver region	2	180-220	Krasniy Kholm (220), Beliy (180)
Kursk region	1	213	Fatezh (213)
Oryol region	2	199-210	Maloarkhangelsk (210), Novosil (199)
Ryazan region	1	203	Spas-Klepiki (203)
Yaroslavl region	1	203	Lyubim (203)
Kostroma region	2	180	Kologriv (180), Chukhloma (180)
Tula region	1	180	Chekalin (180)
Smolensk region	1	173	Dukhovschina (173)
Belgorod region	-	-	-

[11] *The official website of the Ministry of Construction of Russia. The urban environment quality Index by cities and the regions of the Russian Federation, 2023. 60 p. Source: https://minstroyrf.gov.ru/docs/364202/?clear_cache=Y (accessed on 09.12.2024)*

Regions of the Central Federal District	Number of the small towns	Score range	City (points scored)
Bryansk region	-	-	-
Vladimir region	-	-	-
Voronezh region	-	-	-
Lipetsk region	-	-	-
Tambov region	-	-	-
Total	16		

Source: Ministry of Construction, 2023[12]

The rating contains data on small towns of different populations (population – 5, 5-25, 25-50 thousand people) in a conditionally uncomfortable climate. These are some small towns in the Northwestern, Ural, Siberian, and Far Eastern Federal districts. However, there are no such cities among the cities of the Central Federal District.

We considered existing publicly available ratings/rankings of sustainable development. Indeed, many methods and approaches have been developed in terms of ratings/rankings and indices of urban development internationally. Primarily, there is the experience of UN units. In 1996, the Urban Development Index was developed within the framework of the United Nations Human Settlements Program (UN-Habitat). Another indicator system was developed by the UN Commission on Sustainable Development. In domestic literature, the indicators and the justification of their selection criteria for assessing the degree of urban development take an important place [6].

Since 2013, the SGM rating agency has been compiling a sustainable urban development rating based on SD principles and international experience. However, this rating covers only large cities with a population of over 100,000 people (186 metropolitan areas and medium-size urban areas). Moreover, it is aimed at highlighting the strengths and weaknesses of municipalities, setting benchmarks for authorities and residents, providing incentives to achieve SDGs, and attracting the potential investors into leading cities. The number and composition of SD indicators in the rating has changed several times: 32 in 2012, 30 in 2013, 32 in 2014, 31 in 2015, 42 in 2016-2018. 43 in 2019-2020 [6, p. 92]. The indicator system includes three groups: economy and urban economy, social sphere, and environment. The choice of indicators based on several principles: openness of data (posting only on the official websites of cities and statistical authorities), completeness (for each indicator, data is available for at least 95% of cities), and relevance – compliance with SDGs. Indicators with low confidence were eliminated[13].

The SGM Agency's website presents a rating of sustainable development of Russian cities for 2021. There are 4 groups of leading cities: millionaire cities, regional centres, cities of the Moscow region (9 cities with populations of 100-250 thousand and 250-500 thousand people), and cities of the oil and gas industry.

There are also 4 groups of cities in the lower part of the rating or outsider cities: single-industry towns of the Urals and Western Siberia; industrial centres without the status of single-industry towns; cities of Crimea and the Caucasus; regional centres of the republics of Southern Siberia[14]. In 2022, the rating base of the SGM agency included 19 cities located in the Central Federal District. But there are no small towns in this ranking.

Nevertheless, the existing ratings do not assess the sustainability of small towns and medium-size urban areas. Moreover, they do not allow us to draw conclusions about the socio-economic situation in the vast majority of Russian cities. According to V. Fauser and A. Smirnov, the main reason is poor presentation of

[12] *The official website of the Ministry of Construction of Russia. The urban environment quality Index by cities and the regions of the Russian Federation, 2023. 60 p. Source: https://minstroyrf.gov.ru/docs/364202/?clear_cache=Y (accessed on 09.12.2024)*

[13] *SGM Rating Agency. Ratings of sustainable development of Russian cities. Source: https://www.agencysgm.com/ratings/ (accessed on 02.12.2024)*

[14] *Rating of sustainable development of Russian cities for 2021. Issue 10. March 2023. Source: https://www.agencysgm.com/upload/iblock/e41/e415a35b5b954ac379c1284c8ea8bf65.pdf (accessed on 02.12.2024)*

demographic and labour indicators. The authors propose the index of demographic and labour sustainability of cities, calculating it on the example of the North regions. By their research, this index is decreasing from the largest and large cities to medium-sized, and from medium-size urban areas to small towns [6, p. 94].

On March 21, 2023, the VII Annual Conference 'Sustainable Development of Cities and Regions: Challenges of Long-Term Planning' was held in Moscow at the HSE.

Currently, the concept of sustainable development of regions, municipalities, and enterprises is complemented by the ESG agenda. Indeed, SD ideas can be used most intensively in the management of cities, because they are the main centres of environmental, economic, social, and other problems. At the same time, they are the places of concentration of the majority of residents, designed to ensure their needs and a decent quality of life [5, p. 53].

ESG rankings of Russian regions are becoming popular (the rating of the National Rating Agency, NRA, the rating of the rating consortium RAEX, ACRA, etc.) [1]. Moreover, the ESG-ranking of the regions of the Central Federal District by the Centre for Sustainable Development and ESG Transformation at the Moscow State Institute of International Relations – MGIMO'2023 is based on indicators for achieving the UN Sustainable Development Goals.

Among the 17 UN Sustainable Development Goals (SDGs), in terms of the problems of the small towns, we consider SDG 11 indicators 'Sustainable cities and human settlements', as follows:

– housing conditions: the proportion of the number of families received housing and improved their living conditions among the families registered as needing housing; the number of citizens resettled from the housing stock unsuitable for habitation;

– communal amenities: the proportion of the total area equipped with water supply; the number of public buses per 100,000 people;

– favourable urban environment: the proportion of cities with a favourable environment from the total number of cities (urban environment quality index – above 50%);

– bus accessibility: the share of buses equipped to transport low-mobility groups of the population in the total number of buses;

– financing of cultural heritage: funds have been allocated for the preservation of cultural heritage sites; funds have actually been disbursed for the preservation of cultural heritage sites;

– clean air: the proportion of trapped and neutralised pollutants in the total amount of pollutants discharged from stationary sources; the proportion of the area of green spaces within the city limits in the total area of urban land within the city limits;

– city lighting: the proportion of the length of illuminated parts of city streets, driveways, and embankments in the total length of city streets, driveways, and embankments.

In the MGIMO ranking'2023, the places among the regions of the Central Federal District (CFD) were as follows (the place among 85 regions of the Russian Federation is indicated in parentheses)[15]:

– the top 20 regions are: Moscow city (1), Voronezh region (5), Lipetsk region (7), Moscow region (11), Yaroslavl region (12), Belgorod region (15), Kaluga region (16), Ryazan region (17);

– the top 30 includes: Tula region (21), Vladimir region (26), Tver region (27);

– middle-class regions are Kostroma region (40), Smolensk region (41), Tambov region (59), Kursk region (56);

– the lowest rankings are in the Orel region (72), the Ivanovo region (62), and the Bryansk region (61).

A methodology for compiling ESG ratings/rankings of Russian cities is under development.

In the methodology of the RAEX rating consortium, calculations are based on data from Rosstat of Russia, the Unified Interdepartmental Information and Statistical System (EMISS), and the website citylifeindex.ru, websites of city authorities. Sometimes a low rating of cities in terms of E, S, and G components depends on the insufficient information.

For instance, the North-Western Federal District ranked the highest ESG rating – 99% of its cities have

[15] *MGIMO Ranking of the regions of the Russian Federation-2023, October 12, 2023. 47 p. Source: https://mgimo.ru/upload/2023/10/russia-esg-ranking-23.pdf (accessed on 02.12.2024)*

a high, very high, and the highest level. The lowest ranking is in the Southern Federal District: 71% of cities is an acceptable level. In the Central Federal District, an acceptable, high level, and a very high level is 29% each; the highest one is 12% (Table 6).

Table 6 – The share of cities in the Federal Districts, by the levels of the ESG assessment,

Federal districts	ESG assessment levels			
	acceptable	high	very high	the highest
North-West	0	22	33	44
Uralsky	17	17	33	33
Far Eastern	27	36	9	27
Siberian	20	30	30	20
South	71	0	14	14
North Caucasian	71	14	0	14
Central	29	29	29	12
Privolzhsky	36	29	36	0

Source: RA expert. Sustainable development, 2023[16]

The following cities have the highest ESG rating (top 15): Anadyr, Blagoveshchensk, Veliky Novgorod, Irkutsk, Kemerovo, Krasnodar, Lipetsk, Murmansk, Naryan-Mar, Salekhard, Stavropol, Syktyvkar, Tambov, Khanty-Mansiysk, Yuzhno-Sakhalinsk. 3 small towns are the administrative centres of the autonomous districts in the North of Russia:

– Anadyr is the administrative centre of the Chukotka Autonomous Okrug; the population is 13.0 thousand people;

– Naryan-Mar is the only city and the administrative centre of the Nenets Autonomous Okrug; the population is 24.3 thousand people;

– Salekhard is the administrative centre of the Yamal-Nenetsk Autonomous Okrug; the population is 13.0 thousand people;

According to the analysis of the Central Federal District (CFD) rating, Belgorod, Orel, Ryazan, Smolensk, Tver are ranked the highest; Bryansk, Voronezh, Ivanovo, Kostroma, Tula are ranked high; Vladimir, Kaluga, Kursk are ranked acceptable.

– According to the E-component (ecology), Lipetsk (4th place) is in the top 10 cities; Kaluga (77th place) is in an anti-rating.

– According to the S-component (social policy), there are no cities from the Central Federal District ranked TOP 10. The anti-rating includes Kostroma (74) and Kursk (75). Ivanovo and Tula are the leaders in providing children with the childcares.

– According to the G-component (effective management), Voronezh, Kostroma, and Lipetsk are ranked TOP 10 in the Central Federal District. The outsider is Vladimir (75th place).

The analysis of regulatory legal acts affecting the formation of goals and objectives, priorities for the development of Russian cities, has shown the following: the assessment of the effectiveness of the activities of senior officials (governors) of the regions of the Russian Federation includes the indicator 'environmental quality' (by the Methods-2019 and 2021). The second indicator is 'the share of cities with a favourable environment' (in the Methodology-2019) and 'the quality of the urban environment' (in the Methodology-2021).

Therefore, there are no ratings/rankings of sustainable development and ESG assessment of small towns yet.

The development of the urban economy is one of the priorities of the business model for VEB.RF. Investments in it in the coming years will amount to about RUB 1 trln. SBER and WEB.RF launched the ESG index of cities and regions. By the end of 2023, the ESG index covered 85 regions and 218 cities of the Russian

[16] *RA expert. Sustainable development. 2023. ESG-assessment of Russian cities: new transformation. Source: https://raexpert.ru/researches/sus_dev/esg_city_development _2023 /#method (accessed on 09.12.2024)*

Federation[17].

The ESG index of cities and regions includes 16 factors. The calculation assess data in terms of green energy, environmental protection, water and forest resources, education, culture, accessible environment, investment, digitalisation, small and medium-sized businesses, etc. They use both official statistics and the opinion of residents of a city or region. The data is updated annually.

The ESG Alliance calculates an index for assessing the living standards in small towns and medium-size urban areas in Russia (with a population of less than 100,000 people). Currently, the Index includes 120 cities in 46 regions of the Russian Federation with a total population of 6.8 mln people. The assessment of the living standards in the cities of the Index was correlated by 70 indicators, grouped into 11 key areas. We calculated the index considering 4 main types of indicators:

statistical data;
information from open online sources;
requested data from regional authorities;
the results of a sociological study among employees of Alliance companies.

Moreover, we provided a comprehensive assessment of the living standards. The methods used were as follows:

objective indicators (characterising objective factors of the living standards; those were independent on the perception of residents and are based on factual data: statistical, geoanalytic results, website data, etc.);

subjective indicators (survey data to obtain missing data, for example, the average travel time from home to work; residents' perception of living standards factors; value judgments, for example, 'How satisfied are you with the choice of sports opportunities in a locality?').

As a result, a comprehensive profile was formed for each locality[18].

Indeed, there was established a digital service The Alliance platform[19], and identified the clusters of cities: Arctic, affluent cities, developing small towns, developing medium-sized cities. The developing small towns include Galich, Novovoronezh, Rostov, Udomlya, Yuryev-Polsky, etc.

This Index is important for VEB.RF, senior management, and federal executive authorities, local and regional administrations, the population, business, and the expert community (Table 7).

Table 7 – Index of Quality of Urban Living, different target audiences

Regions	Index Value
WEB.RF	– Prioritisation and localisation of investment projects; assessment of effects – The construction of a competence centre for urban development: identification, promotion, and implementation of the best practices – Development of high-demand product solutions – Information and analytical support for regional and municipal authorities
Senior management, federal executive authorities	– In terms of the national projects – In terms of the global agenda, including the achievement of the SDGs – International experience

[17] *SBER and WEB.RF launched an ESG index of cities and regions. Source: https://www.sberegaem-vmeste.ru/news/sber-i-vebrf-zapustili-esg-indeks-gorodov-i-regionov (accessed on 09.12.2024)*

[18] *The ESG Alliance has launched an Index for assessing the quality of life in small and medium-sized cities in Russia. Source: https://esg-a.ru/ru/press-center/esg_alyans_zapustil_Indeks_ocenki_kachestva_zhizni_malyh_srednih_gorodov_rossii. (accessed on 09.12.2024)*

[19] *The Alliance platform. Cities. Russian Federation. Source: https://cities.RussianFederation/esg_index?pageType=INDEX (accessed on 02.12.2024)*

Regions	Index Value
Local and regional administrations	– Identification of competitive strengths and weaknesses, including the foreign cities – Implementation of the best practices of urban development
Population, business, experts	– Choosing a city for living, recreation, and business

Source: Authors

Conclusions

The research dwells on a methodological basis for calculating indices and rankings of the development of Russian cities, including their sustainable development. The paper considers the rankings by WEB.RF, ESG Alliance, Expert agencies, SGM, etc. Since 2013, the SGM rating agency has been compiling a sustainable urban development rating based on SD principles and international experience. MGIMO conducts a ranking of the regions of the Russian Federation (MGIMO'2023) in terms of the Sustainable Development Goals, including SDG 11 'Sustainable cities and human settlements'. The urban environment quality Index is calculated by the Ministry of Construction of Russia. The RAEX rating consortium makes an ESG assessment of Russian cities. SBER and WEB.RF launched an ESG index of cities and regions. The ESG Alliance calculates an index for assessing the quality of life in small towns and medium-size urban areas in Russia (with a population of less than 100,000 people).

An analysis of the urban environment quality index calculated by the Ministry of Construction of Russia on the example of small towns in 17 regions of the Central Federal District, showed the following: the 15 small towns with a population of 5-25 thousand people (151 in the Central Federal District) have a range of scores for a conditionally comfortable climate 30. It indicates a significant difference in the level of comfort of living in small towns within the same region. The small towns with a population of 25-50 thousand people (there are 60 in the Central Federal District) have a range of points scored for a conditionally comfortable climate with a difference of more than 30 points is in the Moscow, Smolensk, Kaluga, Vladimir, Tambov, Tula, Yaroslavl, Belgorod, and Voronezh regions. There are only 16 small towns with up to 5,000 people in the Central Federal District. Hence, it is necessary to implement a special policy for the socio-economic development of small towns, including the development of their territories and infrastructure.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR'S CONTRIBUTIONS

Alla B. Berendeeva – conceptualization; supervision.
Olga O. Korobova – writing – original draft.

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Digitalisation as a new vector of domestic enterprises development

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ORIGINAL ARTICLE

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Abstract. The article explores the role of digitalisation as a key vector in the development of domestic industrial enterprises within the framework of the modern economy and the transition to Industry 4.0. It analyses the impact of digital technologies on production efficiency, competitiveness, and the structural transformation of manufacturing processes. Particular attention is paid to the implementation of digital tools such as artificial intelligence, big data, cloud platforms, and cyber-physical systems, as well as their influence on business performance. The paper also addresses major institutional and economic challenges faced by Russian enterprises, including insufficient R&D funding, outdated equipment, lack of qualified personnel, and cybersecurity risks. The research highlights the best domestic practices in digital transformation, using leading metallurgical companies as case studies (e.g. Severstal, NLMK, MMK), and assesses their technological strategies and investments in IT infrastructure. The importance of coordinated efforts between state policy and corporate strategy is emphasised, especially in the context of geopolitical constraints and technological sanctions. Ultimately, the study substantiates the necessity of a systematic approach to industrial digitalisation as a means of increasing productivity, reducing production costs, and enhancing long-term sustainability. The practical significance lies in the identification of mechanisms to support digital transition across industrial sectors of the Russian economy.

Keywords: digitalisation; digital development; production efficiency; digital transformation; R&D investment

JEL codes: O33, L60, J24

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Introduction

Industry 4.0, characterised by the integration of digital technologies, the Internet of Things (IoT), big data, and artificial intelligence, is a significant stage in the development of industry. This process transforms production and provides new opportunities to increase the competitiveness of domestic industry worldwide.

The term 'Industry 4.0' means the fourth industrial revolution or the transition to total automated digital production. Moreover, the processes are controlled by intelligent systems in real time and in constant interaction with the external environment with the prospect of integration into a global industrial network of things and services[1]. Therefore, the global industrial networks, the Internet of Things, the transition to renewable energy sources, neural networks, 3D printers, biotechnology, artificial intelligence, etc. are being actively introduced.

Industry 4.0 is the result of the consistent development of technology and production followed by the previous industrial revolutions. It is necessary to consider the main stages of Industry 4.0 implementing.

– The 1st Industrial Revolution – Industry 1.0 (late 18th century – early 19th century): the transition from an agrarian economy to the industrial production, the development of transport. These changes resulted in a factory production and urbanisation, which became the basis for further technological changes.

– The 2nd Industrial Revolution – Industry 2.0 (the second half of the 19th century – the beginning of the 20th century): mass-line production, electrification, railways, differentiation of labour. These changes have contributed to formation of new industries and increased production.

– The 3rd industrial revolution – Industry 3.0 (the end of the 20th century, 1970 – current period): the

[1] *Russian oil and gas technologies. A study by Rockwell Automation and IDC identified industrial digitalisation trends in the EMEA region. Source: https://www.rogtecmagazine.com/%D0%B8%D1%81%D1%81%D0%BB%D0%B5%D0%B4%D0%BE%D0%B2%D0%B0%D0%BD%D0%B8%D0%B5-rockwell-automation-%D0%B8-idc-%D0%B2%D1%8B%D1%8F%D0%B2%D0%B8%D0%BB%-D0%BE-%D1%82%D1%80%D0%B5%D0%BD%D0%B4%D1%8B-%D1%86%D0%B8/?lang=ru (accessed on 15.10.2024).*

development of electronics, automation, robotics, the use of information and communication technologies (ICT). These achievements caused the significant changes in production management and logistics.

Therefore, Industry 4.0 is a logical continuation of previous revolutions, combining their achievements and adapting them to the digital economy. It provides the new opportunities for increasing the efficiency, flexibility, and sustainability of production.

Nowadays, there are many scientific publications on digitalisation and digital technologies. Indeed, a lot of scientific papers concern with the analysis and assessment of the readiness of industrial enterprises for digital transformation. They are as follows: S.A. Bannikova, E.D. Vaisman, M.P. Galimova, A.Yu. Lamentova, D.A. Lyubimenko, V. Mitina, K.A. Spiridonova, O.P. Shevchenko, etc. In their works, scientists focus on methods for assessing the level of digitalisation of enterprises and offer practical tools for diagnosing their readiness for change. Additionally, they analyse the impact of human capital and corporate culture on the process of digital transformation, emphasising the importance of personnel training and the innovative environment, examines the risks associated with the transition to digital technologies, etc. Indeed, many foreign researchers consider the industrial digitalisation as it is the international trend. They are as follows: Abdalla S., Barney J. B, I. Borreca, S. Di Lauro, etc. In their works, foreign authors dwell on the impact of market conditions on the process of digital transformation, the implementation of production management systems based on big data and the Internet of Things (IoT), emphasising the importance of data analytics to improve the efficiency and competitiveness of enterprises, etc. In general, their works provide a comprehensive approach to availability of the industrial enterprises for digital transformation, and serve as the basis for further researches.

The purpose of the work is to determine the impact of digital transformation on the domestic industry, identify the best domestic practices in the use of digital technologies for providing business efficiency and the prospects for digitalisation of Russian industrial enterprises in terms of ensuring their production efficiency.

Main part

Indeed, the new challenges require the maximum efficiency and global competitiveness of the enterprises. For many years, Russia has adhered to an export-based economic model. However, to ensure national sustainable development, it is necessary to form a digital economy. The following documents have been developed:

– Decree of the Government of the Russian Federation on July 28, 2017 No. 1632-r "On Approval of the Digital Economy of the Russian Federation Program"[2];

– National Program "Digital Economy of the Russian Federation" (approved by the Presidium of the Council under the President of the Russian Federation for Strategic Development and National Projects Protocol No. 16 on December 24, 2018)[3];

– Decree of the Government of the Russian Federation on 02.03.2019 No. 234 "On the Management System for the Implementation of the national program "Digital Economy of the Russian Federation"[4];

– Decree of the President of the Russian Federation on 07.05.2018 No. 204 "On National Goals and Strategic Objectives for the Development of the Russian Federation for the period up to 2024"[5].

Moreover, digitalisation is one of the key trends in the development of domestic enterprises. Industrial digitalisation is the process of an enterprise's transition to automated digital production, controlled by smart systems. It requires transferring the data into an accessible digital environment.

The digitalisation of industry or Industry 4.0 will ensure an increase of production efficiency indicators,

[2] Decree of the Government of the Russian Federation on July 28, 2017 No. 1632-r "On Approval of the Digital Economy of the Russian Federation Program". Source: https://www.garant.ru/products/ipo/prime/doc/71634878/ (accessed on 10.03.2025);

[3] The National Program "Digital Economy of the Russian Federation" (approved by the Presidium of the Council under the President of the Russian Federation for Strategic Development and National Projects, Protocol No. 16 on December 24, 2018). Source: https://base.garant.ru/72190282/. (accessed on 10.03.2025).

[4] Decree of the Government of the Russian Federation on 02.03.2019 No. 234 "On the Management System for the Implementation of the national program "Digital Economy of the Russian Federation". Source: https://base.garant.ru/72190034/ (accessed on 10.03.2025).

[5] Decree of the President of the Russian Federation on 07.05.2018 No. 204 "On National Goals and Strategic Objectives for the Development of the Russian Federation for the period up to 2024". Source: https://base.garant.ru/71937200/ (accessed on 10.03.2025).

production of new types of products, the quality of design and manufacturing, a reduction in production costs, etc.

Digitalisation is one of the main trends of modern development and competitiveness. Nevertheless, the implementation and application of digital technologies in the Russian economy are extremely heterogeneous. It is due to the specifics of the industrial sector, concerning with the high cost of digital solutions, insufficient financing and development of automated process control systems, depreciation of fixed assets, high technological complexity of production, a shortage of qualified personnel, etc.

However, the significant share of the public sector, competition, sanctions complicates its rapid development [2].

Moreover, it contains several key problems [3]:

1) The industrial sector is not sufficiently motivated to participate in innovative development. The domestic scientific and technical innovations are also limited. Figure 1 shows a comparison of the top 10 world countries in terms of domestic costs on R&D, purchasing power parity. Source: compiled by the author according to the data of the National Research University "Higher School of Economics"[6].

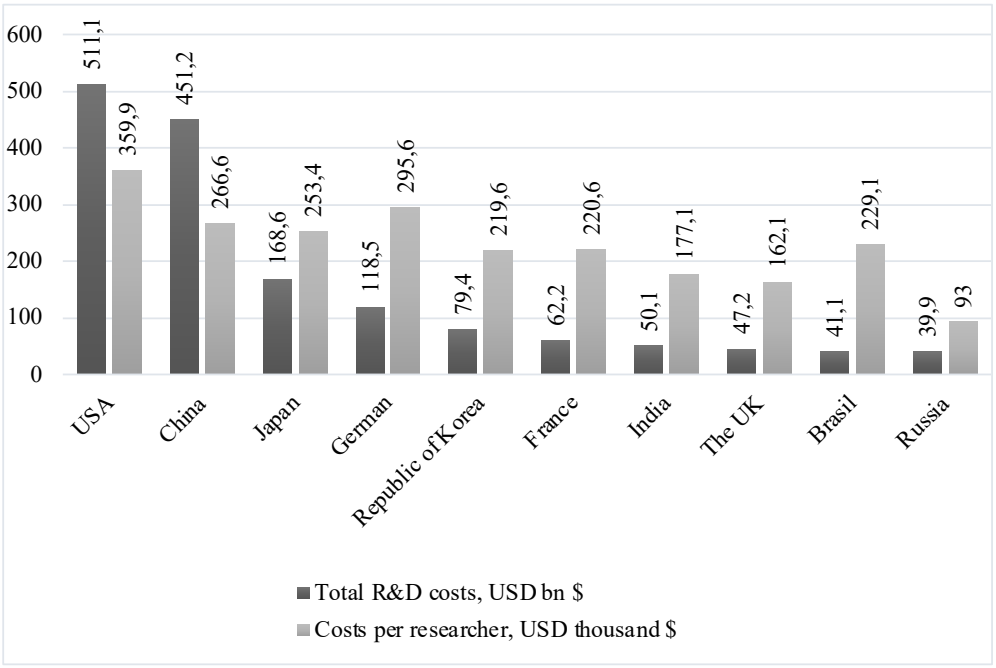

Figure 1. Research and development costs, countries

Source: Ranking of the World's Leading Countries by R&D Expenditures[7]

Russia ranked 10th in terms of R&D costs; compared to foreign, the domestic manufacturers investments are significantly lower. Despite the correspondence of the vector of development of Russian industrial enterprises with the corresponding trends of developed countries, the Russian industry lags industrially and financially [4]. Russian R&D costs are RUB 39.9 bn, which is approximately 2% of the country's GDP. Indeed, Russia has the lowest cost per researcher among the leading countries in terms of R&D costs. It might cause outflow of scientists to other countries with higher level of this particular cost. It is due to the specifics of the industrial sector, concerning with the high cost of digital solutions, insufficient financing and development of automated process control systems, depreciation of fixed assets, high technological complexity of production, a shortage of qualified personnel, etc[8]. The digitalisation requires significant financial investments in technology, software, and personnel training. Sometimes, it is unachievable for small and medium-sized

[6] *Institute for Statistical Research and Economics of Knowledge of the National Research University of HSE. Ranking of the World's Leading Countries by R&D Expenditures. Source: https://issek.hse.ru/news/221864403.html (accessed on 15.10.2024).*

[7] *Institute for Statistical Research and Economics of Knowledge of the National Research University of HSE. Ranking of the World's Leading Countries by R&D Expenditures. Source: https://issek.hse.ru/news/221864403.html (accessed on 15.10.2024).*

[8] *Mitin, V. Digitalization of large enterprises: expectations, results, obstacles, impact of COVID-19. Source: https://www.itweek.ru/digitalization/article/detail.php?ID=216701 (accessed on 15.10.2024).*

enterprises.

2) Regulatory barriers. The government plays a significant role in the industrial production markets. Today, the administrative resource is one of the most necessary innovations in the industry, capable of quickly and effectively improving the work of the enterprises. Moreover, the imperfect legislation provides obstacles to the introduction of innovative technologies and methods.

3) Cyber threats and data security. An increasing of digital technologies implementation caused higher risk of cyberattacks and data leakage. Indeed, the companies should invest in cybersecurity to protect their assets and information.

4) Absence of qualified personnel. Many enterprises have a shortage of specialists with the necessary knowledge and skills in data analytics, programming, cyber security, and project management.

5) Outdated equipment and infrastructure: many industrial enterprises use outdated equipment impossible to be upgraded to implement modern digital technologies. Indeed, upgrading of the equipment requires significant investments.

However, successful transition to digitalisation in the domestic industry requires an integrated approach in terms of the participation of both business and the state. Therefore, the high technological and financial risks are associated with the digitalisation of industry. Nevertheless, the industrial managers consider digital technologies mostly as the opportunities than the threats. According to a study by Rockwell Automation in collaboration with IDC[9], 75% of Russian industrial enterprises plan to develop comprehensive digital transformation roadmaps by 2023. Moreover, increase state support for the digitalisation of industrial enterprises is planned. It involves the introduction of promising digital technologies.

Despite these challenges, the government plan to spend RUB 451.8 bn on digitalisation within the framework of the national Digital Economy project. The introduction of digital technologies will increase the production efficiency of enterprises by 45-55%, and reduce the time of market product enter by 20-50%. According to the McKinsey Global Institute, the government investments in digital technologies in the manufacturing sector will result in an annual increase 1.3 – 4.1 trln. RUB in the GDP[10].

The main trends of digital development in the Russian industry are: the cloud platforms for data systematisation and storage; robotisation of standard operations; introduction of artificial intelligence to improve the efficiency of enterprises; cyber security networks to ensure the secure of corporate information; hyperautomatisation; the use of digital twins – virtual models that allow ones to do test runs and identify defects before production itself, etc. [1].

Digital technologies are diverse. Nevertheless, their maximum effect is achieved with their integrated application, which ultimately will transform the enterprises. Therefore, digitalisation is an opportunity to increase the competitiveness of an enterprise, in particular, by increasing the level of production efficiency. Digitalisation increases the speed of decision-making, minimises the human impact, and makes the production operations flexible[11]. It helps to predict the results, and improve the quality of products. It provides a higher competitiveness and increased profits of the enterprise.

Digitalization of production addresses the following challenges:

– increase in production efficiency;
– rational use of resources;
– reducing the cost of production.

Today, one of the most significant issues of domestic enterprises is increasing of production efficiency. As its growth is one of the key goals of the Decree of the President of the Russian Federation.

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[9] Russian oil and gas technologies. A study by Rockwell Automation and IDC identified industrial digitalisation trends in the EMEA region. Source: https://www.rogtecmagazine.com/%D0%B8%D1%81%D1%81%D0%BB%D0%B5%D0%B4%D0%BE%D0%B2%D0%B0%D0%BD%D0%B8%D0%B5-rockwell-automation-%D0%B8-idc-%D0%B2%D1%8B%D1%8F%D0%B2%D0%B8%D0%BB%-D0%BE-%D1%82%D1%80%D0%B5%D0%BD%D0%B4%D1%8B-%D1%86%D0%B8/?lang=ru (accessed on 15.10.2024).

[10] How Steel Went Digital: Metallurgists Map the Path to the Digital Transformation of the Economy. Source: https://www.gosrf.ru/news/41011/ (accessed on 15.10.2024).

[11] Digitalization of industry: challenges, advantages of implementation. Savings Business Software. Source: https://sberbs.ru/announcements/cifrovizaciya-promyshlennosti-zadachi-preimushestva-vnedreniya (accessed on 15.10.2024).

By 2024, production efficiency in medium-sized and large enterprises of the basic non-primary industries (BNO) was expected to increase by at least 5% per year. However, since 2022, the social, financial, and economic sanctions have been imposed on the Russian economy. It complicates the improvement of territorial and structural efficiency in the medium and long term. Production efficiency in Russia has been changing recently under the sanctions and COVID-19. In 2020 it decreases by 0.4%; in 2021 it increased by 3.7%; in 2022, according to Rosstat, it decreased by 3.6% compared to 2021, in 2023 it recovered by 1.7%. In Russia, a huge personnel shortage forces businesses to implement new measures to attract and retain staff.

Therefore, improving production efficiency is of crucial importance due to staff shortages and rising salaries, increased production costs, and the unavailability of Western technologies and industrial equipment. To stable production efficiency increase, it is necessary to attract investments, introduce various innovations, and improve the quality of human capital through the development of the education system and the formation of a scientific environment [6].

Moreover, it is necessary to study the methods of modernisation of production processes, control their formation, improve, and regulate all changes in the enterprise. Today, the most effective tool for attracting, retaining, and motivating employees is employee compensation package. It allows the employee to avoid the risk of inflation, and increase the level of employee efficiency[12].

The metallurgical industry has a significant impact on the development of the national economy. The innovations and IT are key components of increasing the efficiency of enterprises and affecting the transformation of production and business[13]. To determine a correlation between the level of efficiency and the level of wages, it is necessary to analyse data of the Mining and Metallurgical Trade Union of Russia[14]. The analytical grouping of metallurgical enterprises by the level of production efficiency and average salary is shown in Figure 2.

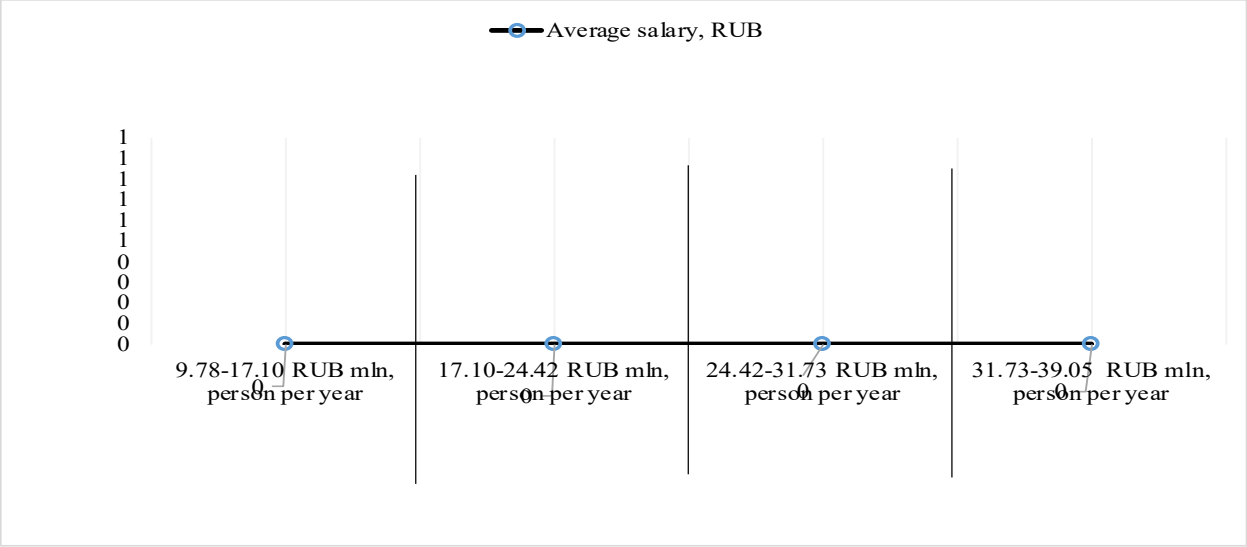

Figure 2. Dependence of production efficiency of metallurgical enterprises on the level of average wages
Source: Author

However, it is ineffective to increase salaries by 10% or 20% annually as it reduces the profitability of the business. According to the chart, the average wage does not directly correlates with the growth of production efficiency. Indeed, production efficiency is influenced by the employee's salary level, an individual approach

[12] *Institute for Statistical Research and Economics of Knowledge of the National Research University of HSE. Ranking of the World's Leading Countries by R&D Expenditures. Source: https://issek.hse.ru/news/221864403.html (accessed on 15.10.2024).*
[13] *Russian oil and gas technologies. A study by Rockwell Automation and IDC identified industrial digitalisation trends in the EMEA region. Source: https://www.rogtecmagazine.com/%D0%B8%D1%81%D1%81%D0%BB%D0%B5%D0%B4%D0%BE%D0%B2%D0%B0%D0%BD%D0%B8%D0%B5-rockwell-automation-%D0%B8-idc-%D0%B2%D1%8B%D1%8F%D0%B2%D0%B8%D0%BB%D0%BE-%D1%82%D1%80%D0%B5%D0%BD%D0%B4%D1%8B-%D1%86%D0%B8/?lang=ru (accessed on 15.10.2024).*
[14] *The Mining and Metallurgical Trade Union of Russia. Source: https://www.gmpr74.ru/news/zarplata-metallurgov-i-gornyakov-razbor-s-pristrastiem (accessed on 15.10.2024).*

to enterprise development, innovative production, the effective team work, new technologies and equipment, etc.

Therefore, it is necessary to introduce new factors to increase production efficiency. The introduction of digital technologies will improve the efficiency of Russian companies in various industries. And digitalisation is an opportunity to increase the competitiveness of an enterprise, in particular, by increasing the level of production efficiency.

Currently, many enterprises have already completed the first stage of digitalisation –automation of technological processes. The next step is to implement smart solutions in all stages of the production. Therefore, AI and robotics are becoming the main factor of the digital transformation.

The digital reform should provide significant support to metallurgical enterprises, help to rationalise the production and use of resources, both natural and human ones. However, the introduction of digital technologies into a metallurgical industry is quite complicated. According to experts, the automation and robotisation in metallurgical industry will increase. It will optimise transportation, automation of production management and financial flows, inventory, etc. These innovations are quite difficult to implement, but they will ensure the digitalisation of the metallurgical production. Moreover, the metallurgical enterprises have already launched the process. Those IT projects are as follows:

1) PAO Severstal, Cherepovets, the Vologda region, Russia

It is one of the first metallurgical enterprises starting its transition to digitalisation. In 2024, Severstal spent RUB 10 bn for the implementation of IT projects. Subsequently, the company's investments in IT have doubled in five years[15]. The company has already held the following events:

– the company was the first in the Russian metallurgy to implement an SAP-based logistics management system, which reduced road transportation by 15%;

– transition to electronic document exchange;

– the computer modelling services for customers;

– the run an online store allows the enterprise to sell almost 2.5 mln tons of steel, which is approximately one third of the total sales;

– implementation of end-to-end metal traceability systems;

– the enterprise established a separate division – Severstal Ventures – to develop venture capital projects in terms of new production technologies and materials. Those became a partner of Severstal, SBERBANK Accelerator and 500 Startups;

– modernisation of Yakovlevsky GOK, Yakovlevsky district, the Belgorod region, Russia includes establishing of Digital Mine. The existing low-precision positioning system has been replaced by the modern Strata system. In the future, it will provide the opportunity to control the employees and equipment in the mine, communicate via digital voice telephony and launch unmanned loading and delivery vehicles.

2) Magnitogorsk Iron and Steel Works PJSC, Magnitogorsk, the Chelyabinsk region, Russia

The enterprise is one of the industry leaders in terms of the implementation of digital technologies and IT projects:

– transfer of Magnitogorsk Iron and Steel Works CIS to Oracle E-Business Suite R12 platform;

– development and implementation of an automated production planning system at Magnitogorsk Iron and Steel Works PJSC;

– implementation of the Energy management platform project;

– implementation of a mathematical model to improve the procurement of raw materials;

– the use of software robots in routine production processes;

– supplying frames for transporting metal products with RFID tags to automatically track their transition and transportation.

3) NLMK Group, Lipetsk, the Lipetsk region, Russia

The digital transformation of production is a key aspect for developing the implementation of the

[15] *Severstal Doubled Its IT Investments Over Five Years. Source: https://severstal.com/rus/media/archive/severstal-udvoila-obem-investitsiy-v-it-za-5-let-/ (accessed on 15.10.2024).*

company's strategy, which can make the company the most efficient one. Digital technologies help to offer customers unique products, reduce injuries and environmental footprint, etc.:

– iT strategy has been developed;

– implementation of artificial intelligence systems;

– the start of the innovation laboratory to analyse the technologies of the virtual and physical world;

– introduction of modern computer technologies such as Big Data, machine learning and artificial intelligence (AI);

– implementation of a 3D employee positioning system in complex production facilities.

4) Metalloinvest Management Company LLC, Moscow, Russia:

– In 2018, the enterprise spent RUB 3 bn in projects related to the implementation of an integrated management system;

– SAP S4/HANA software product development;

– Megafon software for online workflow monitoring;

– Application of computer technologies for mining engineering and geological modelling.

5) Mechel PJSC, Moscow, Russia:

– the formation of the Mechel-Infotech IT team for the development and implementation of digital projects;

– implementation of the 1C:ERP software.

6) Evraz PLC, Moscow, Russia:

– the use of an automated monitoring system for mining equipment in the quarries of EVRAZ;

– organisation of surveying of EVRAZ coal mines using drones;

– implementation of a system for optimising the technological process of iron smelting at blast furnace No. 7, EVRAZ;

– automation of the steel purging process in EVRAZ converters;

– development of a system for mathematical modelling of production processes at EVRAZ enterprises in Siberia.

Indeed, all the leaders of the metallurgical industry are actively involved in the process of digital transformation of production. Severstal, Magnitogorsk Iron and Steel Works PJSC, and NLMK have achieved great success in digitalisation. These enterprises have the necessary infrastructure and software to implement and invest the digitalisation of production. Severstal PJSC is a leader in digital transformation and actively invests into development of production[16].

Nowadays, there has been a growing interest in investing in major projects aimed at modernising production facilities and introducing new technologies. Nevertheless, to achieve sustainable growth, it is necessary to address a number of problems, such as a shortage of qualified personnel and low production efficiency. One of the main reasons for low production efficiency in the Russian metallurgy industry is the shortage of qualified specialists. According to research, a significant number of employees do not have the necessary knowledge and skills to work with modern equipment and technologies. It resulted in a decrease in the efficiency of production processes and an increase in costs. Low production efficiency is also associated with outdated management methods and insufficient automation of processes. Many enterprises continue to use traditional approaches, which does not allow them to compete effectively in the global market. Increasing production efficiency is becoming critical to ensure competitiveness at the rising costs for raw materials and energy resources.

One of the important consequences of digitalisation and robotisation of production is the reduction of employees replaced by machine labour to perform routine operations. There is an acute shortage of personnel in Russia. 85% of Russian companies have a shortage of employees. However, there is a program to attract high-qualified specialists from countries with a low living standards. The main advantage of robots is a higher speed and quality of operations, resulting in higher work efficiency.

[16] *Severstal: the path to digitalization. Source: https://vmeste.severstal.com/expert/severstal-put-k-tsifrovizatsii/ (accessed on 15.10.2024)*

Digitalisation is a powerful tool for addressing these problems. The introduction of modern IT and automated control systems can significantly improve production efficiency. Moreover, digital solutions ready to optimise processes, improve resource planning and management, and reduce equipment downtime. Additionally, digitalisation ensures the professional development of employees through trainings based on modern technologies. The virtual simulators, online courses, and other educational platforms allow employees to get knowledge for working in a digital transformation environment.

Currently, the key research challenges of the industry are connected with the integration of generative AI into robotics.

– Perception. Development of algorithms and sensors (cameras, LIDAR, etc.) capable of accurate and reliable interpretation of the world and prediction of object behavior. Development of architectures providing reliable, energy-efficient recognition and predictive behaviour of large sets of objects, including in non-deterministic conditions.

– Interaction. Development of advanced control algorithms, grips, and other equipment for communication. Integrating advances in materials science to design for flexible and sensitive sensors and controllers.

– Mobility. The development of robots capable of moving quickly, safely, and efficiently everywhere. The ability to adapt to changing conditions and dynamic environment.

– Learning and adaptation. Development of advanced machine learning algorithms and equipment that can allow robots to learn from their experiences and make decisions based on this learning.

– Human-robot interaction. Development of advanced control algorithms and equipment that will allow robots to communicate with humans and respond to their behaviour.

Therefore, the introduction of robotics and digital technologies is changing business processes increases their efficiency. Moreover, using robots to perform routine and repetitive tasks allows people to perform more complicated and intelligent work. It is potentially will increase the production efficiency. Consequently, digitalisation of the economy ensures increasing of GDP, the regional competitiveness in the market of goods and services, improving the living standards, and formation of the global digital space.

Conclusion

Indeed, the economic development in terms of digitalisation provides many threats and risks. To avoid them, it is necessary to introduce modern methods and tools of information protection, implement legal regulation, ensure information security, attract public financing of scientific and technological innovation, modernise the education system, and implement state and regional programs to support high-tech production.

However, the increasing of production efficiency is a quite complex task. The digitalisation of industry is extremely relevant. It includes many methods positively affecting the model of the enterprise work in long-term. The competent transformation to digitalisation and totally automated digital production allows us to ensure the sustainable development of the metallurgical industry.

We considered Industry 4.0 and the digitalisation of industry, identified the main risks, problems, and made recommendations for digital transformation of the enterprises, considered real cases of the use of digital technologies by domestic companies. The practical significance of the research concerns with the author's proposal to consider digital tools and technologies for increasing production efficiency. The research determined the impact of digital transformation on the domestic industry, identified the best domestic practices in terms of digital technologies. It will provide their higher business efficiency and the prospects for digitalisation of Russian industrial enterprises in terms of ensuring their production efficiency.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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Assessment of the Effectiveness of the Import Substitution Program (A Case Study in the Mushroom and Truffle Cultivation Industry)

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ORIGINAL ARTICLE

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Abstract. The article assesses the outcomes of the import substitution program in agriculture over the past decade, based on the analysis of functioning results of mushroom and truffle cultivation industry. It reviews the main measures of state support for agricultural producers, such as financial subsidies, preferential loans and tax incentives. Special attention is paid to the assessment of competition in the industry through the calculation of market power indices, including the concentration index, the Herfindahl-Hirschman index and the Hall-Tideman index. It has been found that the implementation of this program from 2014 until now has led to several significant outcomes. Firstly, it stimulated active growth in domestic mushroom industry by providing financial subsidies, preferential loans, tax incentives, and infrastructure support, which allowed Russian producers to expand their capacities and improve product quality. Secondly, the implementation of this program has made it possible to almost completely eliminate foreign suppliers from the market, shifting market dominance to domestic companies. At the same time it was determined the implementation of this program didn't let to avoid the dependence on foreign technologies which is currently a new challenge for the industry requiring further adjustments to state support measures for national production. The findings reveal that while the program succeeded in replacing imported products, long-term sustainability requires investments in domestic technological capabilities. The continued technological dependence creates barriers to technological independence and highlights the need for a new phase of the program focused on developing domestic technological capabilities and maintenance infrastructure to ensure long-term sustainability and competitiveness in the sector. The article concludes with recommendations for improving future policy directions, including greater support for domestic innovation, machinery manufacturing, and staff training.

Keywords: import substitution; government support; agriculture; mushroom and truffle production; market power concentration indices

JEL codes: L11

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Introduction

The relevance of this study is due to the significant changes that have taken place in the Russian mushroom cultivation industry over the past decade, including under the influence of the import substitution program that was launched in 2014. Understanding the role and the impact of government support on the industry is crucial for optimizing support measures and identifying opportunities and challenges for the further development of the mushroom industry in particular, and the agricultural sector in general. As global geopolitical instability and sanctions have increased, the need for self-sufficiency in agricultural production has become a strategic priority for Russia. According to Rosstat, by 2023, the share of agricultural products of domestic production has increased by more than 30% compared to 2013, largely due to the policy of import substitution[1]. These shifts underscore the urgency of assessing the program's long-term impact and the sustainability of current growth, especially in the context of ongoing technological dependence.

The aim of the study is to assess the impact of the import substitution program on the mushroom cultivation market in Russia, analyze changes in the structure of the industry, and identify potential challenges that may hinder the further growth of domestic production in this industry. To achieve this aim, general scientific methods such as comparative analysis, statistical analysis, synthesis and generalization were

[1] *Agriculture in Russia. 2023: Stat.sat./Rosstat – From 29 M., 2023. – 104 p.*

employed, as well as economic and mathematical methods such as the calculation of concentration indices, the Herfindahl-Hirschman Index and the Hall-Taidman Index). These methods allowed for a detailed assessment of the degree of monopolization and competition in the industry, identification of key players and structural changes in the market over the past 10 years.

The question of market concentration assessment is addressed in the article by O.Y. Chelnokova, which presents a methodology for applying the Herfindahl-Hirschman Index to analyze industry markets. This method is used in the present study to assess the level of competition in the mushroom sector, as it provides an objective measure of market dominance by individual firms [1].

Gavrilenkov and Struchenevsky examine the shift from an innovation-based model to an import substitution policy. They argue that without a strong foundation in domestic technologies and R&D, the model may prove unsustainable in the long term [2].

The work by E.Z. Golosman and S.A. Volchenkova addresses the chemical industry and emphasizes that catalysts for import substitution are not only business support measures but also include systemic development of science and technology [3].

The article "Import Substitution in Action" presents sectoral examples illustrating both the successes and challenges of implementation. While effective localization efforts are noted, problems with quality and price competitiveness are also identified [4].

The article "Import Substitution is Working" provides a review of the initial outcomes of import substitution programs across various sectors, including agriculture. It highlights that results were largely achieved through import restrictions and subsidies for domestic enterprises [5].

The prospects of import substitution in the modern economy are analyzed by V.V. Klyushin and I.I. Romanets, who stress the need for strategic planning and achieving technological independence as long-term objectives [6].

The work by V.A. Kulagin discusses the criteria for effective import substitution. The author emphasizes that the success of the policy depends on a combination of government support and market-based incentives. Special attention is given to performance indicators such as technology localization, employment growth, and the increase in domestic production [7].

N.V. Obolensky shares practical experience in implementing import substitution in the field of higher education, highlighting the importance of workforce training and academic support for industrial projects [8].

In their 2024 study, L.V. Rakhlina and T.V. Volkova examine the key problems that hinder full-scale import substitution: technological backwardness, lack of infrastructure, and workforce shortages. Nevertheless, the authors argue that with sufficient political will and coordinated efforts, a sustainable transition to independent domestic production is achievable [9].

I. Shirokova focuses on the investment aspect of import substitution programs. The article stresses that without modernization of equipment and the development of domestic production of components, dependence on foreign technologies will persist [10].

The issue of import substitution in the agro-industrial complex, as well as the assessment of market concentration and industry competitiveness, is widely covered in contemporary academic literature. The study by M.I. Svishcheva analyzes the dynamics of mushroom production, export, and import in Russia. The author emphasizes that before the implementation of the import substitution program, the market was heavily dependent on foreign supplies, particularly from Poland. The work includes relevant statistical data and demonstrates the positive impact of state support on the growth of domestic production, making it important for analyzing structural shifts in the industry [11].

The study by L. Yu. Urazaeva and I.A. Galimov proposes a mathematical model of import substitution that considers production capacity, investment, and localization indicators. This research allows for the formalization and forecasting of state policy effectiveness [12].

Consequently, the reviewed literature demonstrates that import substitution is considered both from an economic and institutional perspective. Special attention is paid to assessing competitive market structures,

the effectiveness of government support, and the need for technological modernization-making these sources essential for studying the transformation of the mushroom industry.

Main part

Until 2014, the Russian mushroom industry was underdeveloped and could not compete with foreign suppliers. The market was dominated by imported products, which accounted for 85% of the total volume of mushrooms and truffles sold in the Russian market. Most of the mushrooms came from Poland, Belarus and Lithuania. For many years, Poland remained the main supplier of fresh champignons to Russia, with a share of 98% in total imports in 2013 [11]. Both a lack of domestic production and a low level of technology in domestic enterprises caused this.

Due to the sanctions imposed by Western countries in 2014, Russia adopted an import substitution policy in various sectors of the economy, including agriculture. The agricultural development program aimed to reduce dependence on foreign products by developing the Russian agro-industrial complex. The total amount of funding for the 2014-2020 program was 18, 5059.3 million rubles, including 75, 297 million rubles from the federal budget, 46,001.9 million rubles from the consolidated budgets of the constituent entities of the Russian Federation and 63,760.4 million rubles from extra-budgetary sources[2].

The state program for the development of agriculture and the regulation of agricultural products, raw materials, and food markets included a set of measures aimed at ensuring the sustainable development of the Russian agro-industrial complex, covering a wide range of support measures shown in Figure 1.

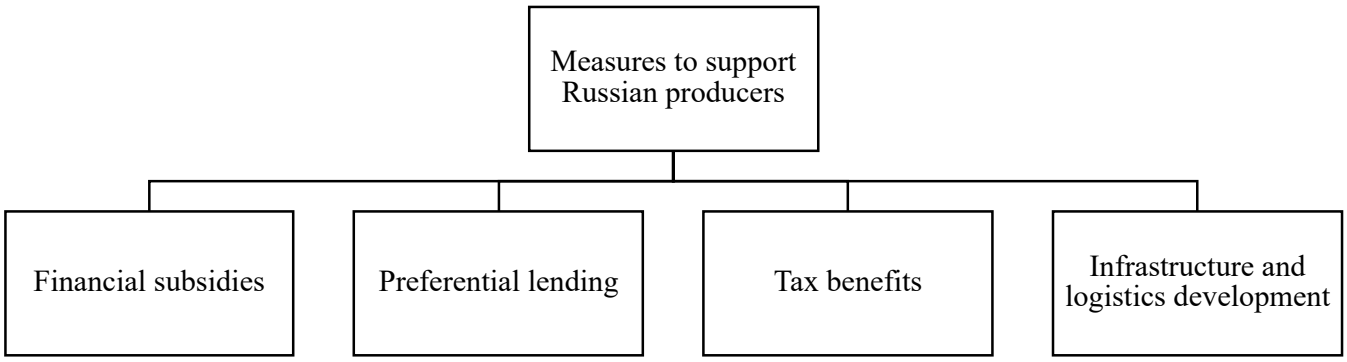

Figure 1. Measures to support Russian agricultural producers

Source: Author

One of the key forms of support was the provision of financial subsidies to agricultural producers. These subsidies were aimed at compensating for part of the costs that farmers and agricultural enterprises incur in the production process. In particular, it concerned the costs of purchasing agricultural machinery, seeds, fertilizers, and the modernization of production facilities. The main purpose of the subsidies was to reduce the financial burden on agricultural producers. This allowed them to not only offset some of the costs, but also stimulate production growth. In the mushroom industry, subsidies were used to modernize equipment and introduce new technologies, which made it possible to improve and increase the volume of domestic products on the market.

Another important mechanism was the provision of preferential loans to agricultural producers. These loans allowed farmers and agricultural enterprises to obtain the necessary financial resources on favorable terms. The preferential loan rates significantly reduced the financial burden on agricultural producers, enabling them to invest in the development, modernization and expansion of their operations. For example, loans were used to purchase machinery, build and renovate warehouses and other production facilities, which was important for mushroom production enterprises seeking to improve product storage and processing capabilities. In addition, government guarantees on these loans decreased the risks for banks, increased the availability of financing for farmers.

The program also provided tax benefits for farmers. Agricultural enterprises could take advantage of

[2] *Decree of the Government of the Russian Federation of April 15, 2014 No. 315 "On Amendments to the State Program for the Development of Agriculture and Regulation of Agricultural Products, Raw Materials and Food Markets for 2013-2020"*

these tax breaks, which helped them reduce their tax burden and contributed to the financial stability of agricultural producers. In the mushroom cultivation industry, tax incentives helped to reduce the cost of doing business, giving companies more opportunities to reinvest in the development of their production and the purchase of necessary equipment.

One of the most important aspects of the state program was the support and enhancement of agricultural infrastructure, which included the construction and modernization of roads, establishment of warehouses, and development of a system for storing and processing agricultural products. Improving the infrastructure was crucial for the efficient operation of agricultural enterprises, as it helped lower transportation and storage costs. In the field of mushroom cultivation, these measures have contributed to creating more efficient supply chains, which has significantly accelerated the delivery of goods from producer to consumer and increased competitiveness in the market. Infrastructure development also included the establishment of regional sales markets, which was especially important for small and medium-sized farms, including mushroom producers, as it allowed them to not only increase their profitability, but also reduce their dependence on large retail chains.

The program provided for the creation of a system of state regulation of foreign trade and the domestic agricultural market to reduce the impact of external factors on domestic producers. It also included measures to improve conditions for Russian exports of agricultural products, including subsidies for transportation, stimulating the supply of agricultural products abroad and the development of export infrastructure, which helped strengthen the position of Russian producers in international markets, reducing their dependence on imported products.

To give a more accurate assessment of the impact of the import substitution program on the mushroom production market, we will assess the level of competition within the industry in 2013 and 2023. We will calculate the following indicators to measure the concentration of market power and monopolization of the industry):

– The concentration index (the sum of the market shares of the largest firms), is calculated according to the formula[3]:

$$CR_k = \sum_{i=1}^{k} Y_i \quad (1)$$

where Y_i is the market share of company i;
k is the number of companies for which this indicator is calculated.

– The Herfindahl-Hirschman index is calculated using the formula [1]:

$$HHI = \sum_{i=1}^{k} Y_i^2 \quad (2)$$

– The Hall-Tideman index is calculated using the formula:

$$HT = \frac{1}{2(\sum_{J-1}^{n} rx_i)-1} \quad (3)$$

where n is the number of firms in the industry;
r is the industry rank of each firm (in descending order, the largest firm has rank 1);
xj is the share of the output owned by each company, in %.

As mentioned above, in 2013, the share of Russian enterprises in the mushroom production market was only 15%, the rest was occupied by foreign suppliers, in particularly Polish companies, which effectively monopolized the industry with 83.3% of the market. To calculate the concentration of domestic producers, we identified the 10 largest players in the industry based on revenue for 2013 (Table 1).

According to the table, in 2013, several major players dominated the mushroom production market in Russia. However, domestic products accounted for only 15% of the market, with the rest being represented

[3] *The Central Bank of the Russian Federation. Information and analytical material "On the coefficients of market concentration" by G. Gambarov. - Text: electronic // URL: https://www.cbr.ru/Content/Document/File/158262/02_DS.pdf (date of request: 03/15/2025).*

by foreign supplies. The industry leader among Russian producers, Agrotechmarket LLC, controlled 9% of the domestic mushroom supply market with revenues of 987,261,000 rubles. The shares of other Russian companies were insignificant, ranging from 1.8% to 0.2%.

Table 1 – Leaders of the Russian mushroom growing industry for 2013

Company	Revenue for 2013, Rub.	Market share, %
Agrotechmarket LLC	987 261 000	60
Project Griby LLC	201 692 000	12
NGC Kashira LLC	158 719 000	10
Orix LLC	135 473 000	8
Agroprom LLC	44 946 000	3
TPK "Discoros-Tyumen LLC	24 320 000	1
Agrocombinate"Ecofud" LLC	21 954 000	1
Agrotechnologia LLC	21 787 000	1
KFC Tuymazyagrogrib LLC	20 118 000	1
Penta LLC	20 028 000	1

Source: Author

Next, we will analyze the level of competition in the mushroom industry among Russian producers[4], for which we will calculate the corresponding concentration coefficients (Table 2).

Table 2 – Assessment of the competition level in mushroom and truffle cultivation in 2013

Indicator	Value	Interpretation of the result
The Concentration index	82%	High concentration
The Herfindahl-Hirschman Index	39%	High concentration
The Hall-Tideman Index	20%	High concentration

Source: Author

The assessment of the competition level in 2013 showed that the Mushroom and Truffle Cultivation industry in 2013 was characterized by a high degree of concentration. Domestic companies controlled only about 15% of the market, with the rest of the market being occupied by imported products. The 82% concentration index indicates that most of the market share (82%) is concentrated among the largest companies, which, in turn, limits competition among small and medium-sized domestic producers. The Herfindahl-Hirschman index of 39% confirms this high concentration, as an index value above 0.25 indicates the predominance of several major players in the market, which narrows the competitive opportunities. The Hall-Tideman index of 20% additionally confirms the high degree of concentration and demonstrates the strong influence of the largest players on market processes.

To calculate the concentration indicators, we will identify the 10 largest players in the industry by revenue for 2023 (table 3).

Table 3 – Leaders of the Russian mushroom cultivation industry for 2023

Company	Revenue for 2023, Rub.	Market share, %
Mushroom Rainbow LLC	5 220 135 000	32
Voronezh Champignon LLC	4 798 342 000	29
Master Mushroom LLC	1 603 964 000	10
Mushroom Company LLC	1 060 008 000	6

[4] *While it would have been more accurate to make this calculation considering foreign producers as well, the difficulty in obtaining data on their revenue during this period prevented us from doing so..*

Company	Revenue for 2023, Rub.	Market share, %
Russian Mushroom LLC	1 038 868 000	6
Sibagroholding LLC	734 455 000	4
NGK Kashira LLC	697 451 000	4
Aigies Agro LLC	627 474 000	4
RM Group LLC	323 328 000	2
Penta LLC	20 028 000	1

Source: Author

Table 3 shows the market share distribution among the top ten players in the industry. The clear leader is the Mushroom Rainbow Company with 32% of the market and revenue of 5,220,135,000 rubles. Voronezh Champignon is in the second place, which, despite significant production volumes, controls 29% of the market with revenue of 4,798,342,000 rubles, which is 3% less than the leader. Master Mushroom takes the third place and demonstrates good results, with revenue of 1,603,964,000 rubles and 10% market share. Other companies like Mushroom Company and Russian Mushroom have significantly smaller market shares, which indicates a higher level of competition among small and medium-sized businesses in this industry.

It is important to note that Mushroom Rainbow maintains a high degree of market control, which gives it competitive advantages in pricing, distribution and innovative technologies. Nevertheless, the presence of such players as Voronezh Champignon, with a similar level of market share, creates conditions for intense competition, which requires the company to constantly modernize production facilities and develop marketing strategies.

Next, we will calculate the concentration of market power as of 2023 (Table 4).

Table 4 – Assessment of the competition level in mushroom and truffle cultivation in 2023

Indicator	Value	Interpretation of the result
The concentration index	71%	High concentration
The Herfindahl-Hirschman Index	20%	High concentration
The Hall-Tideman Index	20%	High concentration

Source: Author

The assessment of the competition level in the Mushroom and Truffle Cultivation industry, as presented in Table 4, shows that the market has a high degree of concentration. The concentration index of 71% indicates that the top ten firms control most of the market, which is confirmed by the dominant position of several major players. In turn, the Herfindahl-Hirschman index of 20% also indicates a high concentration, which is typical for industries where several large companies have significant market influence. The Hall-Tideman index, also equal to 20%, confirms the data on high concentration and competition, where top companies have a significant impact on market processes. The top ten companies control 71% of the market, which creates certain barriers to entry for new players, as well as increases the level of competition among existing businesses.

Thus, the study showed that the mushroom growing market in Russia has experienced significant changes over the past ten years, and one of the most important factors that led to them was the import substitution program launched in 2014.

One of the most notable aspects of the transformation is the increase in market volumes. In 2013, the total revenue of the top ten companies was only 1.6 billion rubles, while in 2023 this figure had increased to 16.4 billion rubles. This significant rise indicates a multiple expansion of the market and the development of production. The import substitution program, aimed at stimulating domestic production and reducing dependence on foreign supplies, has played an important role in this process. With the increase in market value, production has also grown in volume significantly. This fact can be confirmed by a decrease in the

level of monopolization of the industry and higher competition, enabling better product quality and price optimization in the market.

In parallel with the elimination of foreign producers, the import substitution program created an opportunity for several new major domestic players to enter the market. One of these companies is the Mushroom Rainbow company, a leading producer and supplier of fresh champignons on the Russian market with a production volume of more than 32,000 tons of fresh champignons per year[5]. Thanks to government support, Mushroom Rainbow has built a full-cycle production facility: from the production of compost and soil cover for champignon cultivation to the supply of products to retail outlets. The company gained a strategic advantage, allowing it to control a significant part of the production and distribution process.

In addition, Voronezh Champignon LLC took the second place in terms of revenue in 2023, increasing its revenues to 4.8 billion rubles. The emergence of new market leaders, along with the growth of existing players, was the result of the successful implementation of the import substitution program. It created favorable conditions for new companies offering innovative solutions and enhanced the investment attractiveness of the industry.

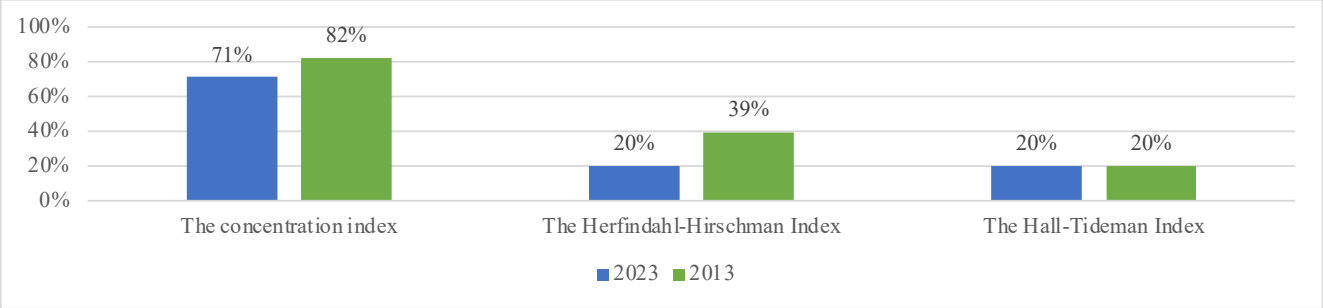

Figure 2. Dynamics of competition indicators over 10 years

Source: Author

The comparison of data on the concentration and market concentration indices in 2013 and 2023 reveals significant changes in the mushroom cultivation market in Russia. In 2023, the concentration index decreased from 82% to 71%, indicating a slight weakening of the dominance of the largest players and an improvement in market competition. The Herfindahl-Hirschman index also decreased from 39% to 20%, which confirms a decrease in concentration and greater market diversification. Nevertheless, the Hall-Tideman index remained at 20%, which indicates that the market continues to be concentrated among several major players, while competition remains at a high level.

Thus, over the past decade, the industry has grown and become more competitive, but there is still a high concentration of market shares in the hands of several companies, which poses a challenge. This high market concentration creates barriers to entry for new market participants, making it difficult to enter the market and reducing overall competition. As a result, this can lead to price monopolies, as the largest players control prices increase the cost of products for end users.

Having described the positive changes, it should also be noted that one of the main challenges facing the Russian mushroom industry now is the obsolescence of equipment and related difficulties in maintaining, repairing, and replacing it. For example, despite the active development of production, Russian companies, including industry leader Mushroom Rainbow LLC, continue to use European technologies and equipment, in particular, Dutch full-cycle technology, which increases production efficiency, but creates dependence on foreign supplies and technologies.

Consequently, the import substitution program has reduced dependence on imported products, but it has not solved the problem of dependence on foreign technologies and equipment. Existing equipment requires regular updates and highly qualified maintenance, which is a significant barrier to further growth. Under the conditions of sanctions and restrictions, access to Western technologies is becoming more and

[5] *The official website of Mushroom Rainbow - Text: electronic // Mushroom Rainbow: [website]. - URL: https://gribnaya-raduga.ru / (date of request: 03/15/2025)*

more problematic, and high maintenance and modernization costs are becoming an obstacle for many manufacturers.

Thus, in order to ensure the long-term sustainability of the mushroom industry, it is essential to not only support the development of domestic producers, but also solve the problem of creating and implementing domestic technology, as well as building our own production facilities and maintenance infrastructure. Measures that consider these factors should be incorporated into the list of amendments made to the state program for the development of agriculture and regulation of agricultural products, raw materials and food markets for 2013-2020 on April 15, 2024.

Conclusion

As a result of our research, we can conclude that the Russian mushroom market has seen significant changes in the last ten years. Until 2014, the market was dominated by imported products, and production was not well developed. However, government support measures have enabled domestic companies to replace imported goods. Now, domestic companies occupy 90% of the market, while foreign companies mainly provide equipment, technology, and consulting services.

At the same time, another challenge in the industry has emerged – the obsolescence of equipment and the difficulty of maintaining and replacing it, due to Russian manufacturers' continued use of European equipment and technology for mushroom production. For instance, the Mushroom Rainbow company implements full-cycle production using Dutch technology, which creates significant obstacles to further industry development in terms of maintenance, repair, and spare parts procurement.

Thus, the import substitution program has successfully solved the problem of replacing imported products, but it has not eliminated dependence on foreign technologies. This has become a new challenge for the industry, requiring adjustments to the measures of state support for domestic production.

Based on the study findings, we recommend a shift in the focus of state support toward technological sovereignty in the agricultural sector. In particular, subsidies and grants should prioritize domestic equipment manufacturing, research and development, and the creation of a national competence center for mushroom cultivation technologies. Moreover, future policy measures should incorporate mechanisms for workforce development and vocational training to reduce operational dependency on foreign service providers. Forecasts suggest that by 2030, the domestic mushroom industry could fully cover internal demand and enter international markets, provided that challenges related to technology and infrastructure are addressed. The results of this study can be used to adjust government agricultural policy, inform strategic planning in the agro-industrial complex, and serve as a reference for private investment decisions in the sector.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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