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ГОСУДАРСТВЕННОЕ И МУНИЦИПАЛЬНОЕ УПРАВЛЕНИЕ

ФИНАНСОВЫЙ МЕНЕДЖМЕНТ

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The Concept of Scientific Management of Sustainable Development of Modern Domestic Economy

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ABSTRACT

This article shows the results of research, analysis and systematization of historical information, scientific works, and regulatory and legal documents in the subject area under consideration in order to synthesize the Concept of scientific management of sustainable development of subjects of modern domestic economy.

The results of the work are based on a systematic approach and the scientific and practical experience of the authors. The results of a retro-perspective analysis of management science through the prism of scientific and technological development of Russia in the XX–XXI centuries are presented. The forecast indicators of Russia's socio-economic development in the field of achieving technological sovereignty are shown. Theoretical and practical significance of the work done consists in the formation and presentation to the scientific and business community of promising conceptual directions of sustainable development of economic entities through the development of adaptive strategy; deployment of industry clusters; introduction and commercialisation of innovative technologies; differentiated application of elements of scientific management; formation and development of social capital, taking into account the requirement of protection from cyber threats in the era of industries 4.0 and 5.0.

Keywords: sustainable economic development; scientific management; innovative technologies; industry cluster; scientific and technological development; lean production

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INTRODUCTION

The demand for a general concept of managing the activities of economic entities that is relevant to modern trends is due to the need to ensure their sustainable state and development.

We consider domestic enterprises and organizations as economic entities, the aggregate performance indicators of which influence the dynamics of development of the national economy in the region of presence and the State as a whole.

As a whole, the management of enterprise is a single process, within which the subject of management influences the object of management to implement the subject of management and obtain target results of activity against the background of the influence of internal and external environmental factors (*Fig. 1*). As a system of organizational elements, we visualize strategic goals, organizational structure, production process, technologies (production secret know-how), labour jobs, and production factors.

To single out an effective promising technology for managing the sustainable development of subjects of the domestic economy, we conducted a research of modern trends in science and practice within the context of transformation of the socio-economic paradigm in the 20th-21st centuries.

In the period of 1917–1991, our country was one of the world leaders in the main macroeconomic and social development indicators, as well as a leader in industrial and space power [1]. The reform of the scientific organization of labor (SOL) in the USSR is closely related to the state policy and the level of scientific and technological development. *Table 1* shows the key events that, in our opinion, determined significant results in the development of national scientific organization of labor.

After the collapse of the USSR and the change of its socio-economic paradigm, scientific, educational, production and technological systems had a hard time of degradation with transition to the practice of import of foreign advanced technologies in exchange for raw materials. This period is characterized by decline of science and production, as well as by deterioration in the quality of the education system. Over time, the latter was even interpreted primarily as a service. There was a loss of common ideological valuable guidelines. This led to formation of a model of consumer behavior, within the framework of which society perceives aspects of the surrounding reality in monetary associations and does not seek to contribute to sustainable development of

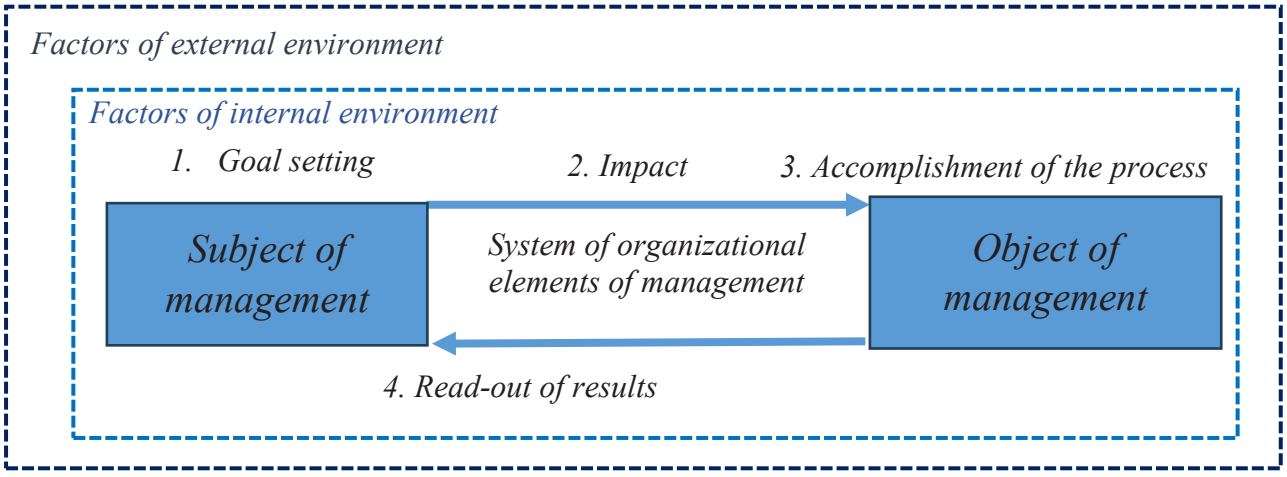

Fig 1. **The author's interpretation of the general concept of management**

Source: compiled by the authors.

Table 1

USSR: Influence of scientific and technological development on the progress of scientific organization of labor

State Leaders Historical milestones [2]	Key Events in the Field of Scientific and Technological Development	Highlights of Scientific Organization of Labour
Vladimir I. Ulyanov (Lenin) (1917–1924) 7 years Foundation of scientific organization of labor [4]	Decree on "Regulations of inventions"[a] [3]	Freedom of technical creativity announced
	Decree on "Electrification of the R.S.F.S.R (GOELRO Plan)"[b]	Electric power industry is launched to lay the foundation for the economy
	Establishment of the Central Institute of Labor	Scientific, social engineering and research institutes were created
	1st and 2nd Conferences on Scientific Organization of Labour[c]	General concepts, definitions and tasks in the field of scientific labor
Iosif V. Dzhugashvili (Stalin) (1924–1953) 29 years The period of industrialization [2]	1st and 3rd Five-Year Plans for the socio-economic development of the State (1928–1942)[d]	Growing productivity, mashrooming factories. Education and patriotism propagated.
	Political repressions. Scientific Organization of Labour shut down. (1936–1938)[c]	Shift towards administrative-command management, development of planned economy. Political propaganda strategy.
	World War II (1939–1945) The Great Patriotic War (1941–1945)	The surge of productivity due to increased output, reduced stoppages, and overtime work
	Rapid expansion of military-industrial complex (1942–1944) [5]	The USSR surpassed Germany in the average annual production of military equipment and weapons
	4th –5th Five-Year Plans for national socio-economic development (1946–1955)[d, e]	Revival of economy. Growing nuclear potential
Nikita S. Khrushchev (1954–1964) 10 years Scientific and technological development	6th –7th Five-Year Plans for national socio-economic development (1956–1965)[d, e]	The first in history launch of a satellite and a flight into space. Development of electric power industry: commissioning the world's first nuclear power plant in Obninsk
	Foundation of infrastructure for the development of high-quality education, science, production [2]	Mshrooming educational and scientific centers to lay foundation for scientific and technological progress
Leonid Brezhnev (1964–1982) 18 years Inertial development	8th Five-Year Plan for national socio-economic development (1966–1970)[d, e] [8]	Launch of the first Soviet moon-rover
	9th Five-Year Plan for national socio-economic development (1971–1975)[d, e] [9]	Mechanization and automation of labor. Growing share of raw materials in economy (oil and gas)
	Commissioning electric power facilities	Escalation of electrification

Table 1 (continued)

State Leaders Historical milestones [2]	Key Events in the Field of Scientific and Technological Development	Highlights of Scientific Organization of Labour
Yury Andropov (1982–1984) 2 years Strengthening of law and order	10th Five-Year Plan for national socio-economic development (1976–1985) [d,e] [10, 11]	Building of networks of hydroelectric power stations, factories, railways (Baikal-Amur Railroad)
		Anti-Corruption policy, strengthening labor discipline
Mikhail Gorbachev (1985–1991). 6 years Perestroika	12th-13th Five-Year Plans for national socio-economic development (1986–1995) [d,e] were not fulfilled due to the launch of "perestroika of economic system" [1, 12]	Collapse of the USSR, change of the socio-economic paradigm: the formation of a market economy is generated

Source: compiled by the authors.

Notes: a — Decree of the Council of People's Commissars of the RSFSR of 30.06.1919 "On inventions (Regulations)". URL: https://istmat.org/node/38265?ysclid=lzcg916fjq749274310 (accessed on 04.02.2024);

b — Decree of the Council of People's Commissars of the RSFSR dated 06.07.1921 "On the management of public electric power stations of the RSFSR approved the GOELRO plan developed in 1920 (State Plan for the Electrification of Soviet Russia)". URL: https://istmat.org/node/46277?ysclid=lzcgc65gin927151257 accessed on 04.02.2024);

c — 100 years of the GOELRO plan. Kommersant. URL: https://www.kommersant.ru/doc/4626294?ysclid=lsoaq3mjxd792527994 (accessed on 15.02.2024);

d — The Federal portal of the history of Russia. Five-Year Plans (introduction of five-year plans for the development of the national economy). URL: https://histrf.ru/read/articles/piatilietki-vviedieniie-piatilietnikh-planov-razvitiia-narodnogho-khoziaistva-event; Thirteen times five. From the history of the Soviet Five-Year Plans. URL: https://histrf.ru/read/articles/trinadtsat-raz-po-piat-iz-istorii-sovietskikh-piatilietok (accessed on 31.01.2024),

e — Five-year plans. The Great Russian Encyclopedia. URL: https://bigenc.ru/c/piatiletnie-plany-10bb59?ysclid=lzig5asex0290622305 (accessed on 30.01.2024).

professional communities, as well as the region of presence and the state, as a whole, through creative activities.

Since the 2000s, the vector of Russia's development has been aimed at restoring national scientific and technological spheres by means of borrowing foreign practices, integrating into the global scientific-educational space, production and technological chains.[1,2]

Starting from 2016, Russia entered the current reality of the 4th Industrial Revolution (industry 4.0),[3] within which it faces transformation of the global paradigm with deployment of robotics in

[1] Resolution of the Government of the Russian Federation of 20.05.2023 No. 1315-r "On approval of the concept of technological development for the period up to 2030". URL: https://www.garant.ru/products/ipo/prime/doc/406831204/?ysclid=lzcgxiqt8n295796765

[2] Critical technologies provide current solutions to solve the most important production problems in the creation of high-tech products (in the field of microelectronics, machine tool building, bioengineering, materials processing and others). Cross-cutting technologies are considered to be promising technologies of inter-industry significance that determine the future potential in the economy and individual industries in the medium span of time (artificial intelligence technologies, new materials, quantum computing and communications, energy storage, communication systems and space systems).

[3] Industrial revolutions (new industries) represent a transformational change in the global paradigm via the introduction of technological innovations and make an impact on a significant increase in productivity. To date, three industries, so to say, passed the no-return point and have become obsolete: water-and-steam-energy-powered mechanization of production (employed since 1784), the emergence of assembly lines and the establishment of electrification (since 1856), automation of production using electronics, the development of computers and the Internet (since the 1960s). The current industry is called 4.0 and at present, there are forecasts that the humanity enters the phase of industry 5.0 in the near future [6].

production, implementation and rapid development of machine intelligence. The 2020 pandemic triggered the applied use of digital technologies: remote employment with personal computers, online platforms, contactless interaction services. It is predicted, that society will enter the period of the 5th Industrial Revolution (industry 5.0) to pass potentially the point of singularity, after which there will be a rapid and uncontrolled penetration of artificial intelligence technologies in all spheres of socio-economic activity. Geopolitical situation determines the speed and volume of implementation of the critical mass of developments in the field of technological innovations, which are in line with such trends as digitalization, energy efficiency and decarbonization [7].

Currently, the management conditions of economic entities are characterized by a high uncertainty of the external environment and a shortage of available resources. At the same time, the priority of Russian national socio-economic development is aimed to ensure technological sovereignty for sustainable development during the period of deglobalization and transformation of the global paradigm [7]. The solution to such critical problem deals with the achievement of certain indicators, which determine the level of progress in the field of three interrelated target benchmarks,[4] namely:

[4] Resolution of the Government of the Russian Federation of 20.05.2023 No. 1315-r "On approval of the concept of technological development for the period up to 2030".

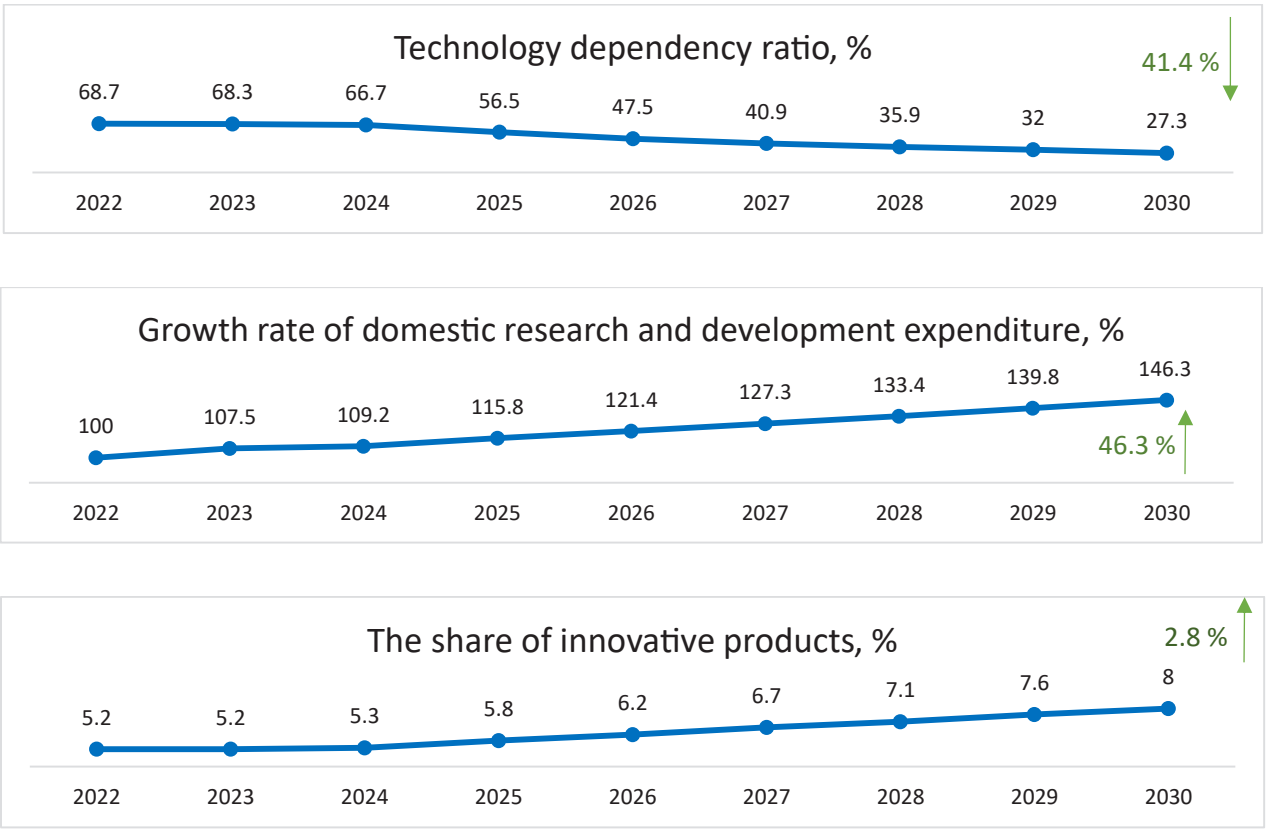

Fig. 2. **Forecast of the dynamics of key indicators of technological independence of the Russian Federation in terms of technology reproduction**

Source: compiled by the authors according to the Decree of the Government of the Russian Federation dated 20.05.2023 No. 1315-d "On approval of the concept of technological development for the period up to 2030". URL: https://www.garant.ru/products/ipo/prime/doc/40683 1204/?ysclid=lzcgxiqt8n295796765 /

1. Reproduction of critical and cross-cutting technologies[5] taking into consideration of the possibility of forming a mutually beneficial partnership with friendly states. *Fig. 2* shows the forecast of the dynamics of key indicators defining the target benchmark. Analysis of the presented data allows us to conclude, that the condition to achieve technological sovereignty requires, and first of all, a decrease in technological dependence of Russia by increasing expenditures of economic entities to run research and development of innovative products.

2. Growth of investment and innovation activity of organizations. Investment and innovation activity are perceived, as a system of targeted actions to provide economic entities with highly effective technologies, advanced equipment, new scientific and practical knowledge using investment resources. *Fig. 3* indicates the forecast of dynamics of key indicators characterizing this

URL: https://www.garant.ru/products/ipo/prime/doc/406831204/?ysclid=lzcgxiqt8n295796765

[5] Critical technologies provide for the current solution to the most important production problems in the creation of high-tech products (in the field of microelectronics, machine tool building, bioengineering, materials processing and others). Cross-cutting technologies are considered to be promising technologies of inter-industry significance that determine the future potential in the economy and individual industries in the medium span of time (artificial intelligence technologies, new materials, quantum computing and communications, energy storage, communication systems and space systems).

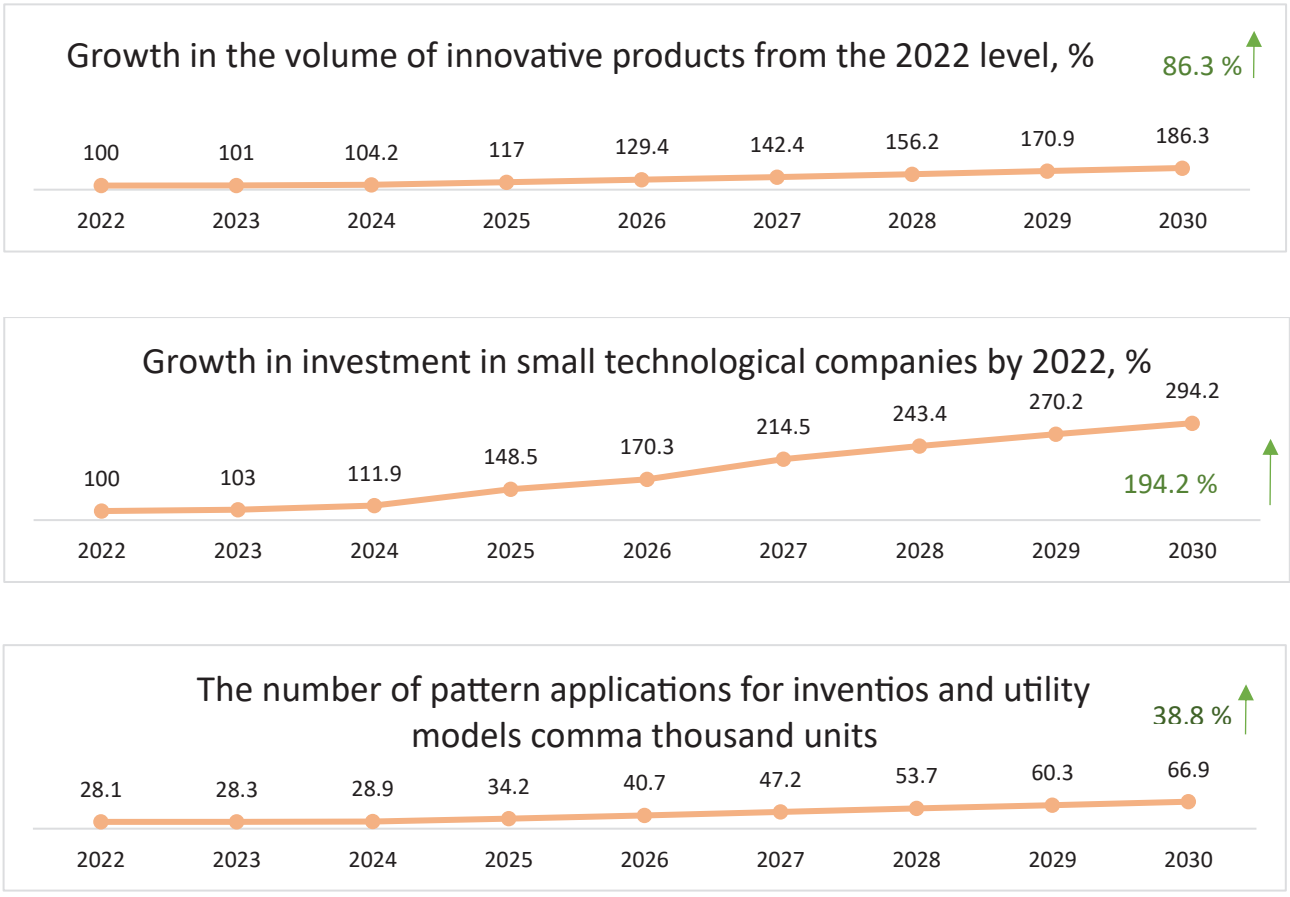

Fig. 3. **Forecast of the dynamics of key indicators of technological independence of the Russian Federation in terms of investment and innovation activities**

Source: compiled by the authors according to the Decree of the Government of the Russian Federation dated 20.05.2023 No. 1315-d "On approval of the concept of technological development for the period up to 2030". URL: https://www.garant.ru/products/ipo/prime/doc/40683 1204/?ysclid=lzcgxiqt8n295796765/

Fig. 4. **Forecast of the Dynamics of key indicators of technological independence of the Russian Federation in terms of formation of infrastructural conditions**

Source: compiled by the authors according to the Decree of the Government of the Russian Federation dated 20.05.2023 No. 1315-d "On approval of the concept of technological development for the period up to 2030". URL: https://www.garant.ru/products/ipo/prime/doc/40683 1204/?ysclid=lzcgxiqt8n295796765/

target benchmark. Analysis of their values shows that the basis of technological sovereignty is a significant increase in the volume of innovative products, which is achieved by increasing the volume of investments in small technological organizations. At the same time, domestic innovative tehnologies are subject to patenting.

3. Modernisation of production assets to form a quality infrastructure for research and development of innovative technologies. *Fig. 4* presents a forecast of the dynamics of key indicators characterising the third target benchmark. The analysis of their values indicates a tendency to increase of domestic technological innovations in all sectors of the economy in the domestic and international markets

RESULTS

On the basis of our research we have worked out a conceptual approach of sustainable development of economic entities in the era of current (4.0) and prospective (5.0) industries, taking into consideration the trends of deglobalisation, high uncertainty and turbulence of the global paradigm, including the following directions (*Fig. 5*).

Fig. 5. **Directions of sustainable development of economic entities**

Source: compiled by the authors.

1. The first direction: ***Strategic Management for Sustainable Development*** is based on the scheme of development strategy adaptive to potential short and long-term changes in the external and internal environment of the research object, such as:

- Analysis of markers and trends of objective and prospective reality.
- Conducting expert strategic sessions with the use of foresight modelling method.[6]
- Organisational design and modification of organisational elements aimed to increase the systemic value of manufactured products along with creation of development strategies for some of them and formation of product portfolios.
- Preventive monitoring of values of strategic performance indicators. To develop the strategy, it is necessary to define dynamic panels of significant indicators in the activity.
- Updating the development strategy in functional areas of activity and all hierarchical levels of management of the object of research (participation of experts is required).

2. The second direction: ***Deployment of clusters in all sectors of the national economy to revive technological sovereignty.***

Within the frameworks of clusters, it is possible to recreate complete production chains of in-demand final products within the state borders. This direction contributes to development of import

[6] Foresight modelling (from English term foresight) — it is a technology to building a concept of development of the research object, a set of measurable long-term goals and ways to achieve them, which is provided by an expert method through the team work [9].

substitution. The implementation of the cluster approach can lay the foundation for more active investments and innovation activities for the regional economy. In such event, it is necessary to develop a system of integrated management of the latter[7] on the scale of industry clusters, which is due to the need for effective coordinated use and development of the potential of the involved entities [10].

The structure of such investment and innovation cluster should include advanced research centers, which are capable to carry out the volume of work dealing with implementation of investment and innovation projects, as well as effectively interact with production companies, which definitely ensure implementation of their innovation priorities [11].

[7] Investment and innovation activities within the framework of an industry cluster presuppose a system of targeted actions to provide regional industry entities with innovative and effective technologies ("production secrets", machines and equipment, devices, tools and accessories, scientific and practical competencies) using investment resources.

3. The third direction: ***Intensification of investment and innovation activities for development, application and commercialization of innovative technologies,*** which allows to ensure a progressive development of economic entities on the life cycle curve of the organization via the implementation of investment and innovation policies in terms of development, application and commercialization of technologies (*Fig. 6*).

In this case, objects of implementation are the following: technological solutions (production secret know-how), generated and upgraded means of production (equipment, machines, tools, devices), information technology (software products, achievements in the field of artificial intelligence), theoretical and practical competencies (in the field of training and consulting programmes), new technologies from the external environment (based on the results of their study, research and adaptation).

We have identified alternative sources of innovative technologies of commercial potential in the internal and external environment of organisations (*Fig. 7*).

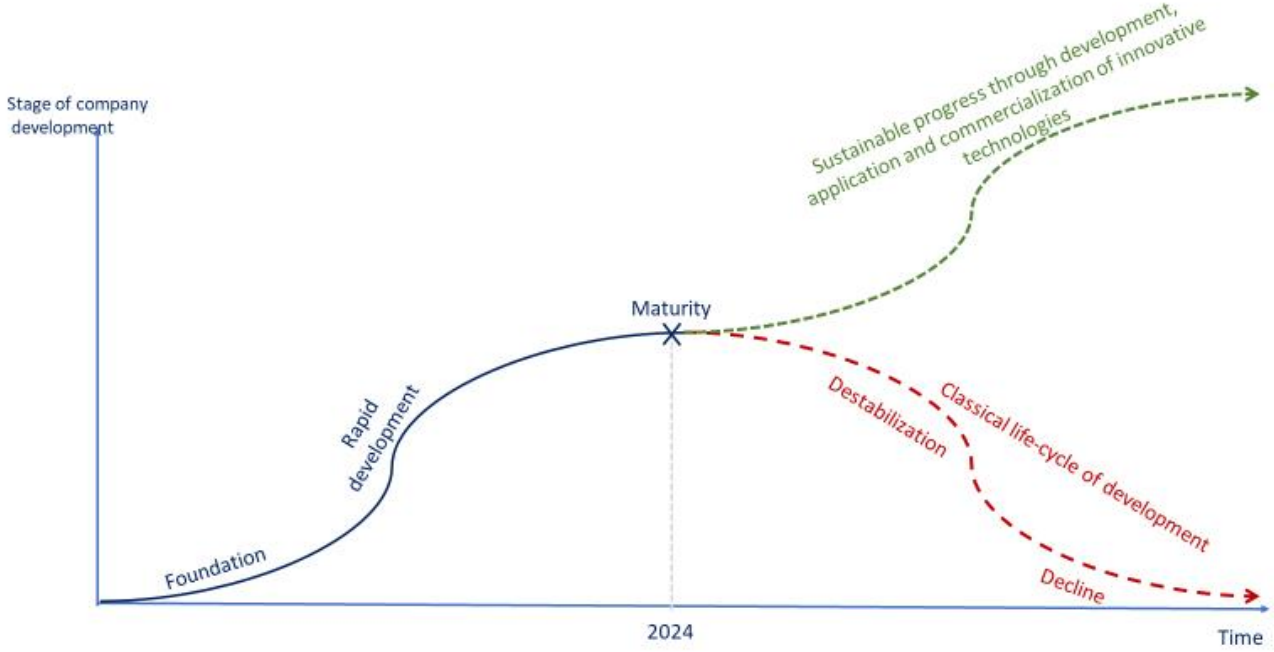

Fig. 6. **Development of economic entities through the implementation of investment and innovation policy**

Source: compiled by the authors.

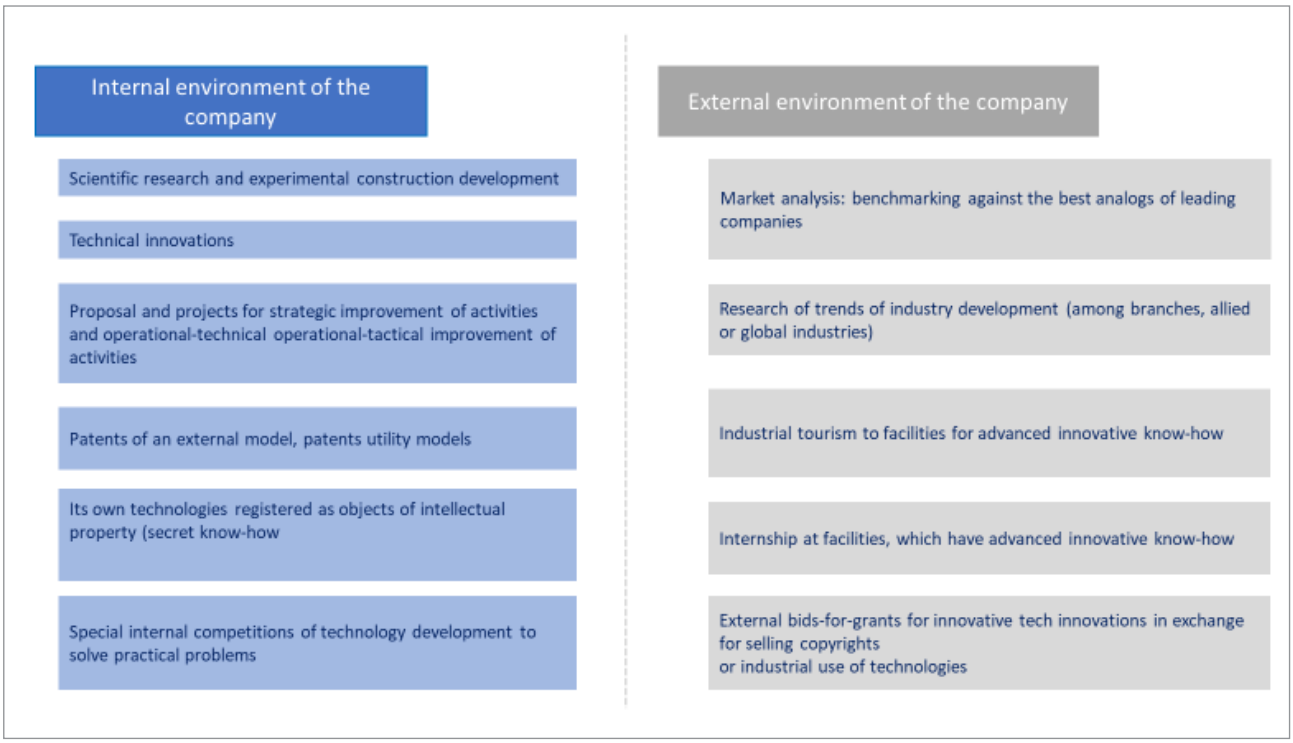

Fig. 7. **Sources of innovative technologies**

Source: compiled by the authors.

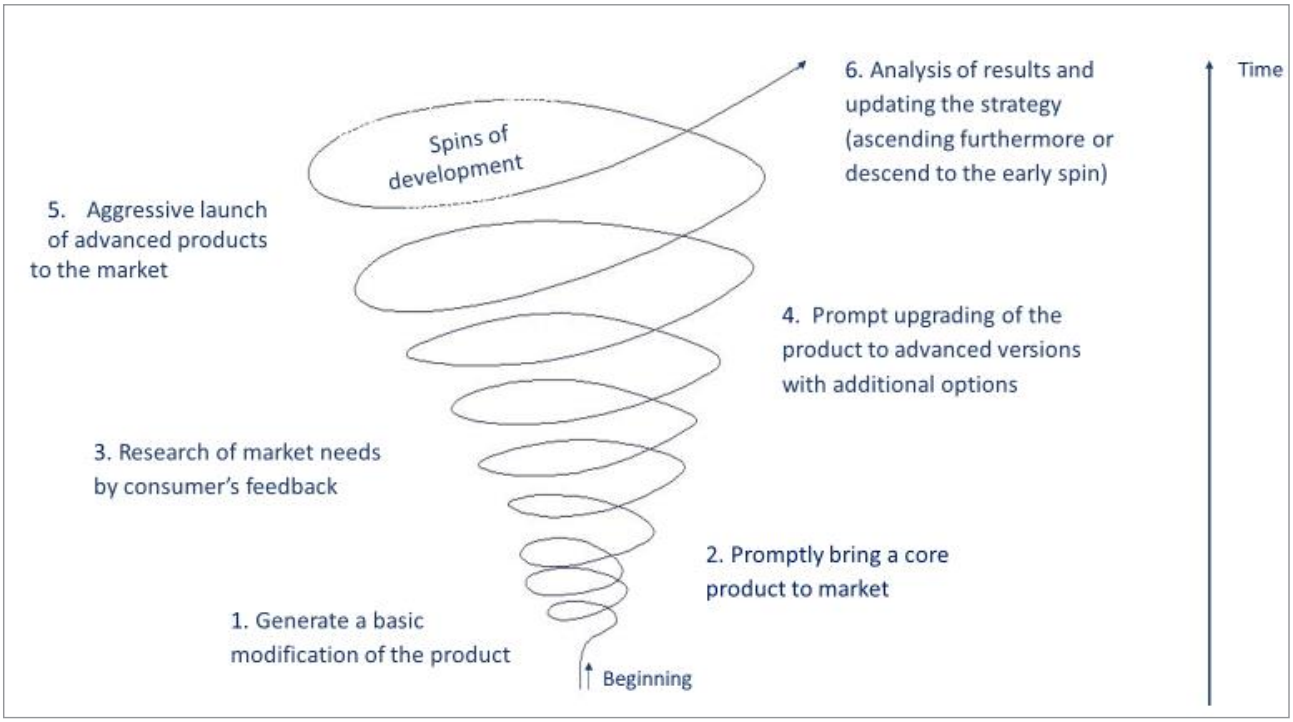

Fig. 8. **Principles of commercializing innovation technology**

Source: compiled by the authors based on [12].

Fig. 8 presents the following key principles: generating and commercial use of innovative technologies (products) — see the diagram of the ascending spiral of development accordance with the approach of researcher E. Ries.

We have conducted a comparative analysis of alternative options of employment labor factors of production in the process of development of innovative technologies (*Table 2*), which may be in demand primarily in the course of implementing innovations and investment activities in large corporations of vertically integrated structures.

The key areas of implementation of investment and innovation policy are the following:

- technological knowledge (secret production know-how);
- developed and upgraded means of production (equipment, machines, tools);
- information technologies (software products, developments in the field of artificial intelligence);
- theoretical and practical competencies (training programs, consulting);
- new technologies from the external environment (based on the results of study, research and adaptation).

These directions provide the following opportunities: competitive advantages by means of use of advanced technologies, additional profit via their

Table 2

Comparative analysis of alternative options for development and commercialising innovative technologies

Options	In-house structures of the company			Outsider or outsource company
	Company of strict hierarchy	"Freedom islands" [12]	Integrated structure	
Description	A functional unit is set up in the company to manage the entire lifecycle from development to commercialization of startup	Project-based temporary activities for specific startups, with experts and units of the company	A structural unit is set up in the company to launch, keep records of startups with experts from other divisions	A subsidiary daughter company or independent legal entity provides the opportunity to implement new types of activities, operates with high efficiency of decision-making, mobility of activities, less control from supervisory authorities. At the same time, it is necessary to verify the source of financing, means of investment of innovative activities to work out aspects of legal and financial interaction with such company.
Good option: reason	Formalized functionality, predictable result, direct controllability	High quality of specialized knowledge	Combines advantages and eliminates disadvantages of a tough hierarchy with "Freedom Islands"	
Bad option: reason	Limited competence in the field of specialized issues	No direct levers of control in a bureaucratic organization, reduction of quality due to distraction to the main type of activity	Risks of leakage of sensitive information must be curbed and eliminated in advance, which is of the potential benefit for the company and system of incentives for experts must be defined	

Source: compiled by the authors.

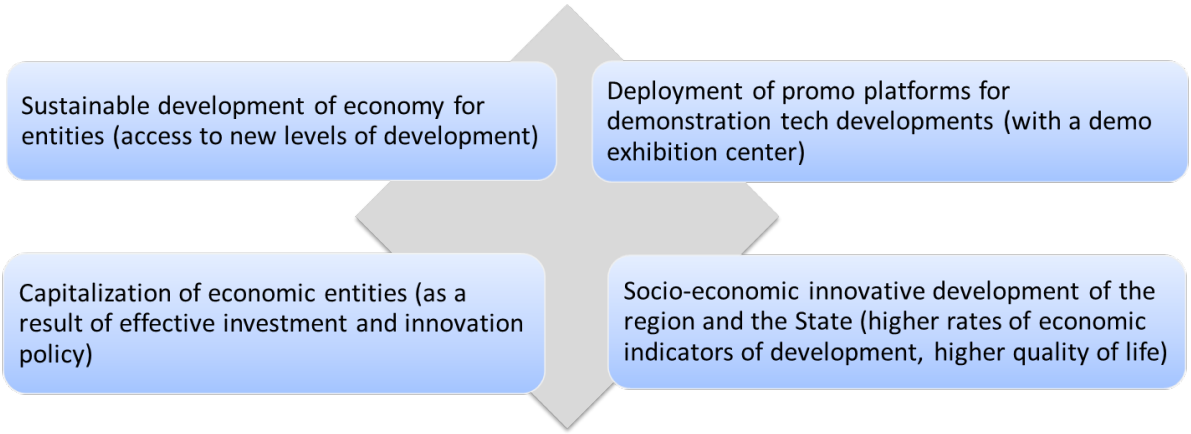

Fig. 9. **Prospective results of the development of innovative technologies**

Source: compiled by the authors.

commercialization and strengthening technological sovereignty of the State. Prospective results of such enterprises ensure development through the implementation of investment and innovation policy in the field of innovative technologies, as it is presented in *Fig. 9*.

4. The fourth direction: ***Differentiated scientific approach towards the management activities of economic entities*** (depending on the type of management object) — is characterised by variability and includes the following methods or types of approaches:

- system approach analyses managing formation and implementation of development strategy (with the foresight modeling method to balance the factor of high uncertainty and variability of the external environment);
- contingency approach analyses management with tactical plans of measures within the framework of projects for sustainable development;
- process approach of management for economic entities in implementation of production processes is based on technologies to ensure a sustainable state and development to balance the factor of limited resources.

5. The fifth direction: ***Introduction elements of lean production (taking into account specific features of economic entities) as a modern formalized technology of scientific management organization.*** Lean production in modern Russia is a highly effective concept, that combines scientific technologies for research and analysis of business processes in the organization. It also has a set of practical tools to improve its activities (taking into account the requirements of minimizing non-production losses, maximizing product values and increasing the degree of customer focus through the disclosure and use of the potential of production factors) [7] (*Fig. 10*).

As a result, organizational elements are redesigned in view of both the provision of maximum value, or utility of the process from the point of view of consumer to consumers of the process) within the framework of operations eliminated which consume enterprise resources, but do not add value from the customer's point of view. A system of interaction between the same-type productions entities must be developed for optimization of changes in production processes.

In this case, it is necessary to take into account specific features of the organization's activities (which are characterized by the presence of a single center and management model). The key features are the following:

- organization and management structure;
- type of production processes and type of manufactured products (services rendered and work performed);
- level of specialization and consistency of processes;
- geographic location of the organization.

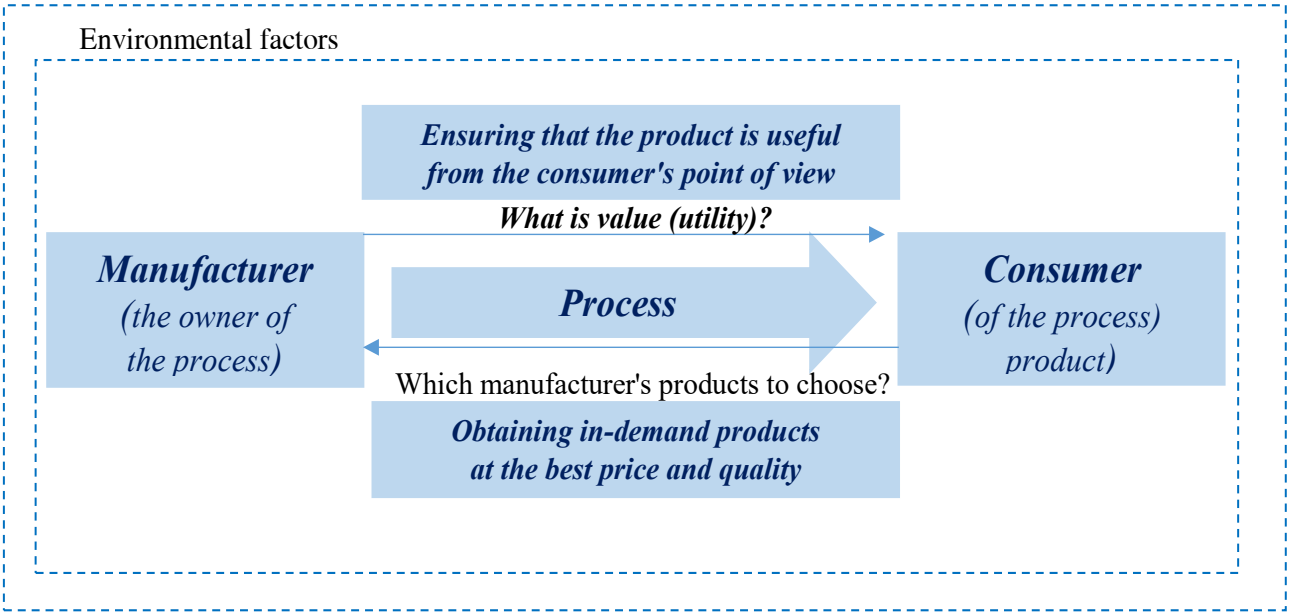

Fig. 10. **View on implementation of production processes via aspects of lean production**

Source: compiled by the authors.

6. The sixth direction: **Development of social capital in order to ensure effective economic entities by increasing the level of effectiveness in the use of production factors**.

The possibility of prospective sustainable long-term development of any considered business entity is conditioned by an effective use of production factors. At the same time, the key indicator of the enterprise's ability to effectively expand its business is the availability of high-quality human resources with a single system of values and the way of thinking, which means, that employees perform their professional duties to work as productively as possible to achieve their goals.

The main task of a manager at any level of management is to activate labor resources through the correct use of human potential and its development. To achieve this result, it is necessary to run a continuous educational process of the economically progressive-minded population with all-round knowledge elaborated from pedagogy, andragogy and neuropsychology etc. within the framework of uniform national high-value guidelines [8].

7. The seventh direction: **Managing the development by means of intensification of technological development and implementation.** Economic entities operate in extremely unpredictable times in the face of uncertainty about the future and worldwide transformations of the global paradigm. At the same time, digital technologies are rapidly developing everywhere. During the Coronavirus pandemic (specifically, starting from 2020), the global population started a widespread transition to remote work, as well as massive development of online platforms and contactless services for interaction between consumers and contractors. Currently, there appeared a critical mass of technological innovations based on digitalization. High-quality implementation of this area implies the need to create mechanisms for protection against attendant cyber threats in all areas of socio-economic activity.

CONCLUSIONS

Based on the abovementioned, one can come to the conclusion, that in order to ensure sustainable development, it is advisable for economic entities to use the concept of scientific management of

sustainable development proposed by the authors of the study, namely, in the following way:

- elaborate an adaptive strategy for sustainable development;
- intensify investment and innovation activity regarding formation, application and commercialization of innovative technologies;
- use modern high-efficiency technologies (including cluster policy, elements of scientific management, lean production) to improve the efficiency of introduction of existing production factors, as well as to ensure scientific and technological independence;
- provide continuous training, education and development of high-quality labor resources;
- ensure safe application of technologies in the era of industries 4.0 and 5.0.

It is necessary to take into account the feasibility of modifications, as well as boundaries and areas for application of the elements of scientific management concept for sustainable development of economic entities regarding the types of production, their geographic location, specific features of internal organizational elements and the impact of environmental factors.

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Order Management in the Era of Customization

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ABSTRACT

The economic growth and development of the country largely depends on success in the main industries, where mechanical engineering plays a key role. The economies of different countries rely on industrial enterprises that satisfy people's needs through the production of goods and services. To ensure competitiveness in a dynamically changing market, continuous improvement and development of enterprises is required. In the current conditions, mechanical engineering enterprises increasingly need to adapt to each individual customer, which in turn forces them to rebuild enterprises to the parameters typical for single or small-scale production. The production process is the joint work of tools, equipment and personnel through which products are produced. The complexity of the process of releasing new products is due to the involvement of a large number of departments involved in this process. Order execution is based primarily on the management of production systems. One of the most important processes in enterprise management is the order management process. The purpose of this study is to determine the methods of optimizing the order management process and reducing the influence of the internal cooperation factor on the increase of the period of its implementation at machine-building enterprises. As a methodological basis such general scientific methods as analysis, synthesis, comparison and contrast were used. As the information base, the article analyzes the works of modern authors who consider the issues of order management and such an element of the organizational structure as internal cooperation between departments, their influence on the internal processes of the enterprise and the timing of order execution. The features of the planning process for a single type of production are considered. In the course of the work, the main reasons for the shift in previously determined order completion dates, the most important indicators for order fulfillment, the peculiarities of the planning process at the unit type of production were considered, as well as the most frequently encountered problems during project implementation were identified. In connection with the trend towards changes and development of enterprises, in terms of changes in order management processes for customized products, an increase in the number of created enterprises and an increase in the share of customized products, a conclusion was made about the relevance of studying the order management process in a single type of production at machine-building enterprises. Conclusions are drawn about the need for further study of the issues under consideration. The materials can be used in companies in the real sector of the economy, in administrative structures and in the educational process.

Keywords: effective management; order management; internal cooperation; machine-building enterprise; customization

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INTRODUCTION

The economic growth and development of the country largely depend on the success of the main industries, where the key role is played by mechanical engineering [1]. Enterprises that provide satisfaction of the needs of the population through the production of goods and services require constant improvement and development to maintain competitiveness in the dynamically changing market conditions.

The complexity of the process of producing new products is due to the involvement of a large number of departments, and the quality and timely execution of the order is primarily based on the management of production systems.

The article analyses the works of modern authors considering the process of order management and such an element of the organisational structure as internal cooperation between different services of the enterprise, its influence on the functioning of the business entity and the terms of order fulfilment.

CUSTOMISATION IN MECHANICAL ENGINEERING

Classification by type of production is based on data on volumes, assortment, nomenclature of manufactured products and frequency of their change, as well as the degree of employability of workplaces [2].

According to the Russian Federation Government Order No. 2436-o,[1] dated 09.09.2023, the specialised machine building industry is characterised by a high concentration of production and is represented by more than 60 enterprises in 30 constituent entities of the Russian Federation. Most of them are located in the Chelyabinsk, Bryansk, Leningrad, Tver and Yaroslavl regions.

Output indexes (excluding 2020) have been increasing in 2019–2022; the industry is currently in a state of intense growth. The production index in 2022 was 120%, and the average for the period 2019–2022 was 109% annually. In 2022, the output of Russian specialised machinery amounted to RUB 71.1 billion.[2]

As the industry is oriented towards the domestic market, the share of exports in total output is less than 1%; in 2022, USD 0.01 billion worth of products were shipped abroad, which is 39% more than in 2021; the share of Russian producers in the domestic market was 24% and is continuously growing. The share of Russian producers in the domestic market was 24% and is continuously growing.

According to Rosstat data,[3] industrial production volumes in December 2023 increased by 2.7% as compared to the same period of 2022 and by 9.7% as compared to November 2023. Overall, industrial production in 2023 increased by 3.5% year-on-year (*Fig. 1*).

Manufacturing industries in 2023 consistently showed high growth rates: production volumes grew monthly by more than 5.0% year-on-year. Growth was 10.5 and 10.8 per cent in Q2 and Q3, respectively, but the growth rate slowed to 7.8 per cent in Q4. In December 2023, the index increased by 5.1 per cent relative to December 2022 and by 11.0 per cent relative to November 2023. *Table 1* shows positive dynamics in such industries as manufacture of finished metal products (except machinery and equipment), manufacture of machinery and equipment (not included in other groupings).

A significant number of mechanical engineering companies have a single type of production, which in turn does not guarantee the repeatability of placing a similar order for a customer in the future. Today, manufacturers need to adapt individually to each counterparty, and this necessitates the

[1] Order of the Government of the Russian Federation No. 2436-o dated 09.09.2023. URL: http://publication.pravo.gov.ru/document/0001202309130024 (accessed on 16.03.2024).

[2] Order of the Government of the Russian Federation No. 2436-o of 09.09.2023.URL: http://publication.pravo.gov.ru/document/0001202309130024?index=70

[3] Dynamics of industrial production in 2023 Rosstat (official site). URL: https://rosstat.gov.ru/folder/313/document/231621 (accessed on 16.03.2024).

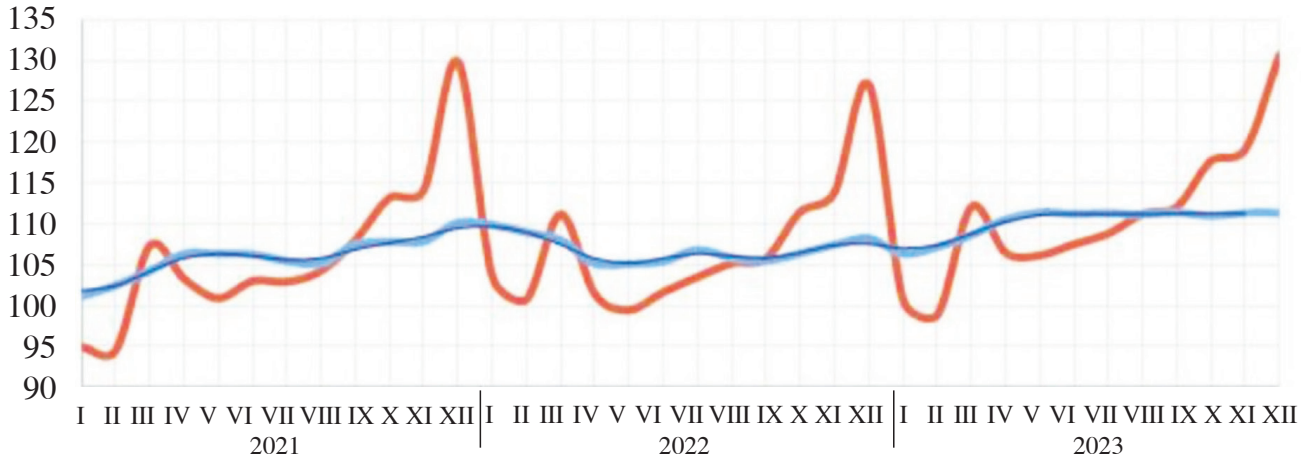

Fig. 1. **Industrial production index as % of the average monthly value in 2020**

Source: compiled by the author based on Rosstat data "Dynamics of industrial production in 2023". URL: https://rosstat.gov.ru/folder/313/document/231621 (accessed on 16.03.2024).

Table 1

Production indices for certain types of main manufacturing industries[a]

Type of manufacturing production	December 2023, as % of		2023, in % to 2022
	December 2022	November 2023	
Manufacture of fabricated metal products (except machinery and equipment)	113.1	119.2	127.8
Manufacture of machinery and equipment not included in other groupings	96.4	136.1	104.5

Source: compiled by the author based on Rosstat data "On industrial production in 2023". URL: https://rosstat.gov.ru/storage/mediabank/10_31–01–2024 (accessed on 16.03.2024).

Note: a — the indices are calculated in accordance with the Official Statistical Methodology for calculating the index of industrial production based on data on the dynamics of production of the most important representative goods in physical terms, assessed in prices of the base year 2018. The structure of gross value added by type of economic activity in the 2018 base year is used as weights.

need to change the order management process to take into account the parameters inherent to the single production type [3]. Industry entities that manufacture products for stock, for the most part, do not take into account the wishes of customers and create products with standard characteristics. Customised production means expanding the number of nomenclatures and variations of finished products. However, customised production is associated with individual production processes, in particular with difficulties in coordinating manufacturing and assembly procedures when production capacity is limited. As a result of the variability of output volumes, capacity utilisation becomes inefficient [4].

Due to the increasing interest of customers in products that satisfy their individual needs, there is a trend of enterprise development, which consists in reorganising order management processes for customised (i.e., tailored to individual preferences) products. The authors of [5], who studied the impact of customisation on the performance of enterprises, argue that investment in it will increase as customised goods become the most

preferred on the market. Thus, M. Abraham, R. Archacki, J.E. González and S. Fanfarillo, who study personalisation in retail, find that the amount of investment in customisation to ensure productivity growth among the best companies is 0.9% of turnover and will increase to 30% in the future; for the others it will be 18% of turnover [6].

Due to the aspiration of existing production companies to develop in line with the above trend, as well as the increasing number of established enterprises specialising in customisation, we can conclude that it is relevant to study the process of order management at the unit type of production as applied to economic entities of the machine-building industry.

RESEARCH RESULTS

Order management as a process

Current planning and management literature associates customised manufacturing with unit production, associated with complexity and high costs. The author of the article [7] considers unit manufacturing based on modern technologies that allow the production of goods with different characteristics without high changeover costs. The emergence of new opportunities has contributed to the view that there is a need to change the attitude towards unit production, which in turn should affect the management of the latter. Batch production of goods can be favourable to companies that do not want to overstock their warehouses in a volatile market. The model, when the production of goods is planned to be customised, forces the company to actively search for prospective customers, which does not allow the allocation of fixed costs to some stable volume of finished goods [7].

Within the framework of analysing scientific works, different interpretations of the concept of "order management" should be highlighted. Modern authors define it as a process, a logistics function, a cycle in the order structure. This allows us to conclude that there is no unified approach to the problem of order management.

In [8] the researchers consider the issues of the order flow process — those that are newly accepted must be accompanied by the creation of a new technological process, despite the existence of developments on similar products. Since efficiency is not characteristic of all departments, data on similar decisions previously made in different industries are not made public and, consequently, are not analysed by the enterprise as a whole [8].

In order to successfully position itself on the market, a modern industrial company must monitor and respond to changes in customer preferences in a timely manner. The emphasis should be shifted towards the most promising and profitable orders. D.V. Vyshegorodsky and M.V. Shishkin speak about the need to form a database of incoming orders to determine the possibility of their realisation at the price offered by the customer, within the agreed time frame with maximum profit for the company [9].

Order fulfilment is based primarily on the management of production systems, which largely depends on the planning of the machine-building enterprise (strategic, tactical, and operational).

The leading role from the point of view of science and practice today is played by operational processes, in particular, attention is paid to the operational capabilities and structures of the organisation [10]. In [11], the order management process is presented as a change in the state of the product from the moment when it was accepted to the actual transfer of the finished product to the customer. Let us use some definitions applied by the author [11]:

- process is a successive change of states of an object, event or phenomenon;
- a sub-process is any part of the process, allocated in a certain way and having the right to exist;
- a functional management task (FMT) is a set of actions to fulfil one management function within a given subprocess.

G.G. Levkin considers order management as a logistic function, and an order as a formalised

unit of information flow.[4] According to the author, the main tasks in the order management are as follows:

- fulfilment of obligations to the customer in a qualitative and timely manner;
- increasing the efficiency of work with counterparties;
- reducing the timeframe for fulfilment of obligations.

G. G. Levkin singles out the coordination of logistics processes at different stages of material flows as the most important direction for improving the efficiency of order fulfilment, as well as the need for timely provision of information to the buyer.

Yu. S. Ronzhina uses such a tool as dynamic modelling in her research [12]. The principle of model building is based on the formation of a functional logistics cycle consisting of "Order Management" and "Order Fulfilment". The input to the cycle is the customer's order with its requirements and wishes for products. The output is the expected results of logistics operations. Order management, according to this paradigm, begins after its receipt and formation and represents the function of expert assessment of the possibility of manufacturing this product. Effective management implies accepting orders based on production potential and in agreement with the customer: it is necessary to refuse or accept orders that are known to be impossible to fulfil, subject to approval of probable deadlines. The application of this kind of dynamic model should ensure the sustainable development of the industrial enterprise.

In organisations with a single type of production, the order management process is the optimal management of each of a set of consecutive sub-processes (concluded in the interval between order acceptance and its shipment from the warehouse), taking into account the complex interrelationships between them. Their duration in the course of development and execution of each individual order determines how flexible the company is and how ready it is for organisational and production changes (*Fig. 2*).

The success of most of the organisation's business processes and, as a consequence, the time frame for task execution, counterparty satisfaction and loyalty, and ultimately the company's profitability, will depend to a large extent on how well the customer order management process is established.

This study considers lead time as a key criterion for optimising the order management process, which in turn is the basis for shaping the workload of the company (*Fig. 3*).

Planning of order fulfilment, according to the authors of the article [13], is carried out in accordance with the regulations of production of a separate product by drawing up a shift assignment, through which the control of production units is carried out. The order is considered as a subject of financial and economic relations, an object of investment of owners' funds; its effective management is the key to achieving the stated goals and indicators by the enterprise. Fulfilment of orders with the required quality and on time will provide the organisation with a leading position in the market. Y. S. Rezanova and E. V. Belyakova, considering the tools of order management, conclude that there are no such tools to satisfy the interests of market agents (both manufacturer and customer) [14]. Defining the order as a number of related processes, starting from the moment of its acceptance and up to the shipment of products, these authors emphasise that often industrial enterprises with the order-based type of production violate the terms of its execution, do not provide the required quality, ignore customer requests. They also note that effective order management should start with the creation of a system of indicators and understanding of the logical relationship between them [14].

[4] Levkin G. G. Logistics of distribution. Study guide. Moscow: Direct-Media; 2024. 253 p.

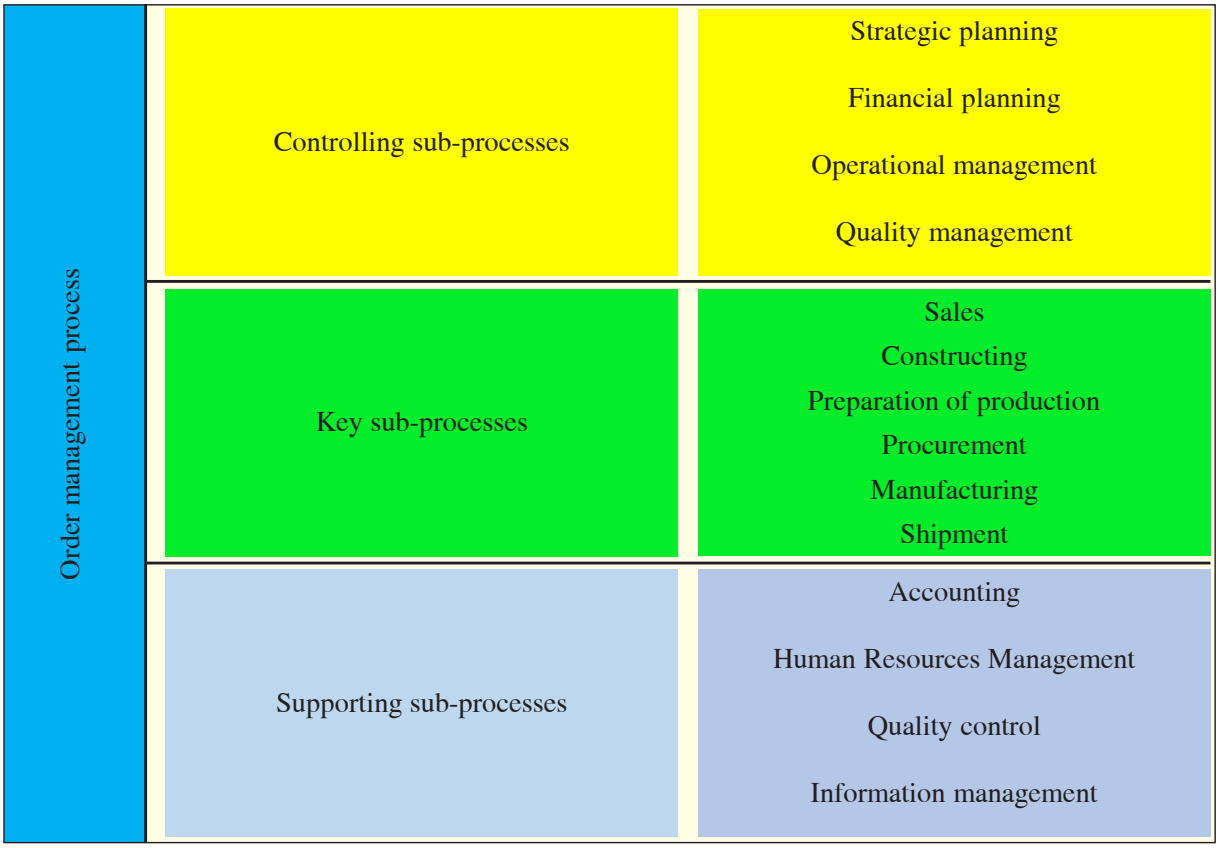

Fig. 2. **Order management process structure**

Source: developed by the author.

Fig. 3. **Order management process**

Source: developed by the author.

Internal cooperation in the order management process

In the course of order management, the head of the enterprise and heads of departments perform the function of organisation and control. The classical scheme, in which the control of work performance is carried out through operational and planning meetings, has proved to be ineffective due to the large number of controlled items. Accordingly, the quality of reporting information is reduced, which, in turn, affects the effectiveness of decisions made.

Order fulfilment time is one of the key parameters, and one of the reasons for its increase is poor cooperation between the company's divisions, called "internal". When striving to perform local tasks by individual employees, the whole algorithm of the order management process is not taken into account, which can negatively affect the work of related structures of the organisation. However, when several of them are involved in the fulfilment of one task, there is a blurring of obligations for its fulfilment and the interest of each individual unit in its completion is lost — the responsibility is shifted to other services of the enterprise.

In case of duplication of task fulfilment by employees of different departments, similar documents accompanying its fulfilment appear, which further increases inconsistency of actions and leads to internal conflicts.

The order flow sequence can be represented in the form of the following scheme (*Fig. 4*).

According to *Fig. 4*, the algorithm of order implementation looks quite simple, but in reality, there is a sufficient number of difficulties and problems in this chain.

For example, the chief designer's department has included in the product specification such a purchased component (or material) that the purchasing department will not be able to supply in the required time; or the technological equipment is designed with excessive requirements to the accuracy of its manufacture, which increases the duration and cost of its production. It happens that the departments determining the causes of defects in a particular product shift the responsibility for determining the causes to each other, which again increases the time of order implementation.

In order to eliminate this misalignment of actions, it is necessary to consider the services involved in the process from the perspective of a supplier and a customer. In the context of this concept, the customer is an official who requests the required information (product or service) from a supplier within the company in order to fulfil his/her functions. The functioning of this kind of co-operation requires a detailed description of both roles (*Table 2*).

If we characterise order management as a process that ensures the activity of the enterprise through the performance of certain algorithms by employees, then cooperation between employees is its essence. Thus, the author of [15] states that the structure of production in workshops is characterised by a variety of technological links and specialisations, which generates interaction between functional links, and the unit can act simultaneously as a consumer and supplier of products (services, raw materials). Production structures of this type are called business units.

Modern researchers mostly consider the issues of cooperation between departments and communication of employees without taking into account their influence on the enterprise processes. However, there are works in which internal co-operation is considered as a factor influencing the construction of business processes. For example, the authors of the publication [16] define cooperation as coordinated activity of participants to achieve joint goals and objectives and argue that within the enterprise it directly affects the creation of business processes, the results of the organisation's work and the achievement of its goals. In the absence of coordination of actions, internal processes

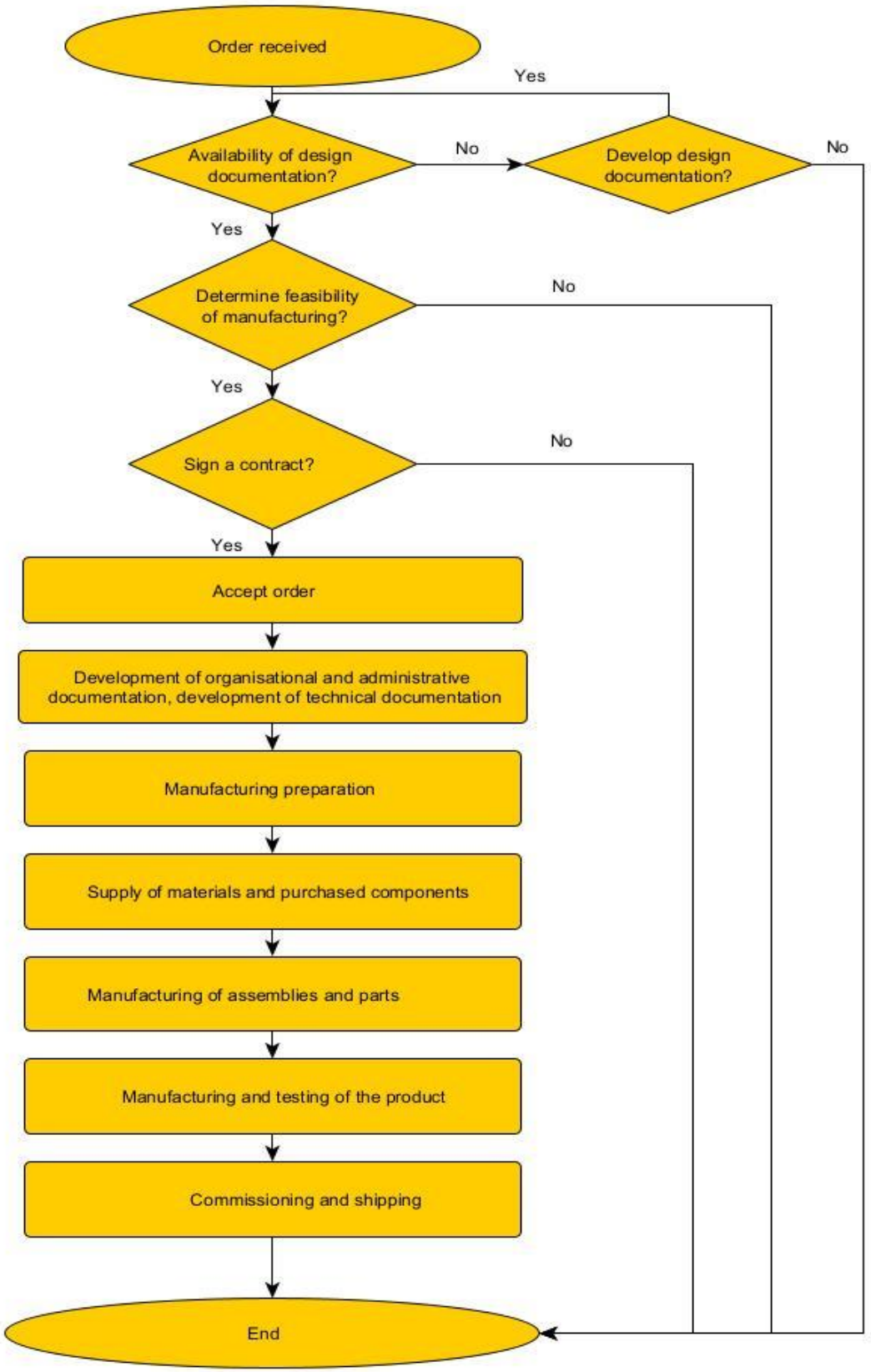

Fig. 4. **Order processing algorithm**

Source: developed by the author.

Table 2

Roles of client and supplier in internal cooperation

Client's responsibility	Supplier's responsibility
Informing the supplier of your needs	Keeping the client aware of their needs, providing them with services (products, raw materials) in a timely manner
Setting realistic requirements, taking into account the supplier's resources and constraints	Providing services, products, raw materials of proper quality
Providing feedback by pointing out positive and negative aspects of performance	Informing the client about the lack of sufficient data to fulfil the request
Communicating to management issues that have not been resolved in the customer-supplier relationship.	Informing the management of problematic issues that have not been resolved in the customer-supplier relationship.

Source: developed by the author.

run spontaneously, which leads to conflicts and misalignment, and also becomes the cause of inefficiency in fulfilment of planned tasks by the enterprise. Researchers in the above-mentioned work also consider interpersonal and intergroup aspects of interaction. Thus, informal relations affect the effectiveness of communication between employees. A number of organisational factors affecting effective cooperation between units are also highlighted. Management may overlook organisational difficulties because they are unaware of their existence [16]. It can be emphasised that interaction is understood as the process of development and exchange of information between units and employees, considered in the current work as internal cooperation.

At present, specialists assess the problems of communication between subdivisions and communication between employees from several points of view, and in the course of studying the works of modern authors, no unambiguous recognition of internal cooperation as a factor affecting the order management process at the enterprise as a whole was found.

Order lead times and production planning

Order fulfilment is always limited by deadlines that depend both on the productivity of the joint work of many structural units of the organisation and on the performance of each of them separately. The activity of any unit is conditioned by the presence of individual tasks and available constraints for their fulfilment, which affects the timing of the product output (*Fig. 5*).

Product manufacturing begins with the development and approval of organisational and technical documentation necessary for the orderly distribution of deadlines and areas of responsibility between the participants in the production process. At this stage, possible errors are identified, a list of purchased components and materials, requirements for warranty periods, etc. is drawn up. After the design documents are elaborated, technological documents are formed, on the basis of which lists of required materials and components are created, and the procedure of purchasing of all necessary materials and components is started. Identification of future suppliers is a rather labour-intensive process that requires organisation of

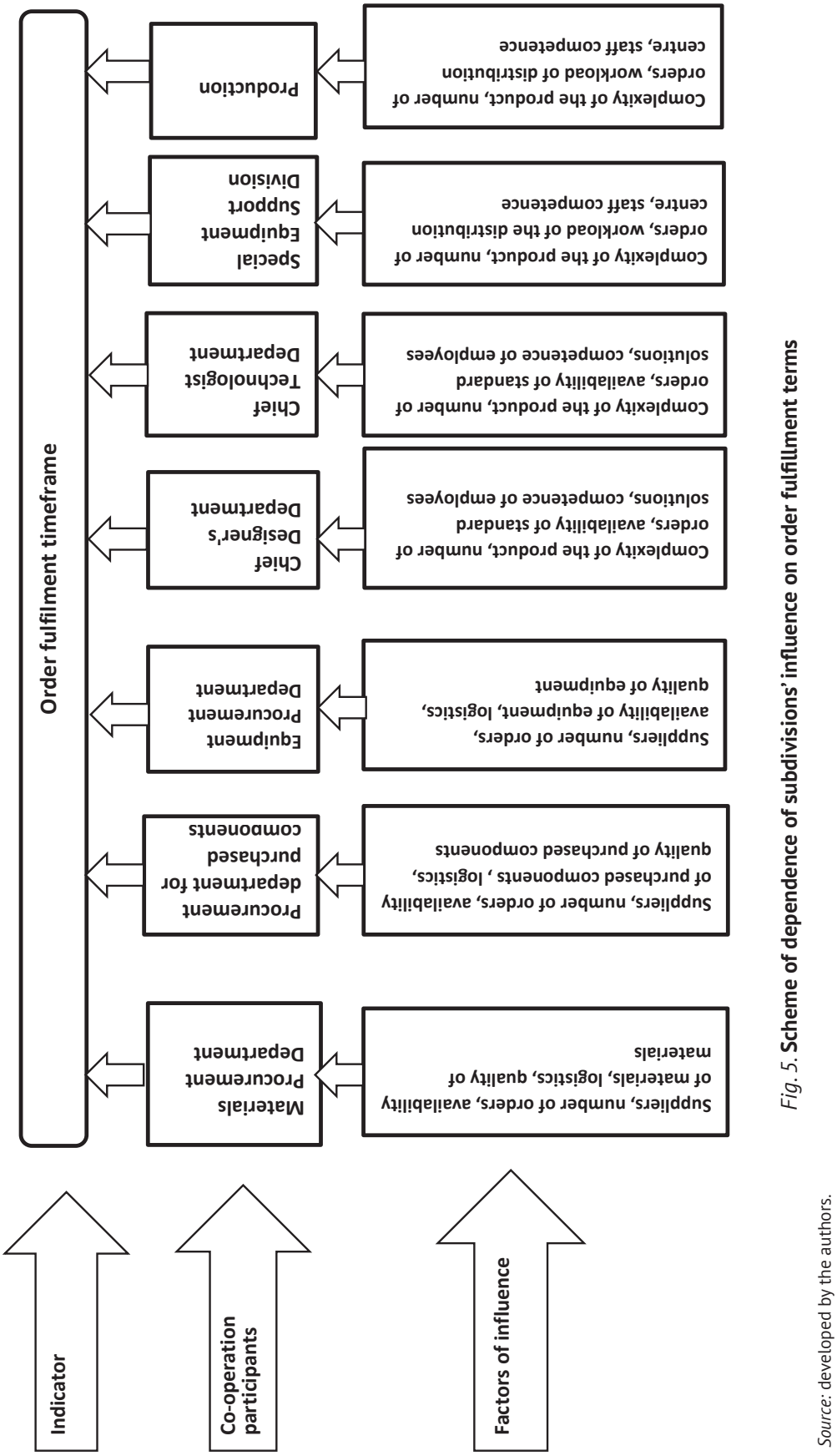

Fig. 5. **Scheme of dependence of subdivisions' influence on order fulfillment terms**

Source: developed by the authors.

tenders on an electronic platform, after which supply contracts are concluded.

The experience of the manager is often the only tool in determining the timeframes for work, which are very tentative and biased in this approach.

There are several main reasons for shifting the previously defined timeframes for order fulfilment:

- lack of coordinated actions between subdivisions (insufficient internal co-operation);
- high degree of bureaucratisation;
- biased methodology of forming the deadline for order fulfilment, taking into account the needs of all divisions;
- variability of processes involving people (impossibility of precise planning);
- insufficient focus on the result on the part of all participants in the processes.

Many modern specialists who have analysed the problems arising in the course of order management, called the planning stage one of the most important and considered the application of various tools to improve its effectiveness [10, 12, 17]. Researchers emphasise that the timeliness of product release increases the number of interested customers, as a consequence of which the production volume increases, which has a positive effect on economic indicators.

G.I. Galieva refers to the work of Harvard University employee R. Suri, who identified the five most important indicators in terms of order fulfilment [18]:

- external duration of order fulfilment is the time available for monitoring by external contractors of the production system;
- internal order fulfilment duration is the time required for the order to travel all the way through the enterprise;
- stated order fulfilment time — the time that sellers agree with the buyer;
- planned order fulfilment time — an indicator used in the planning systems of production enterprises (MRP, ERP);
- supplier fulfilment time — the time it takes for your order to move from the supplier to the customer's disposal.

As can be seen, time is the main criterion for successful order management. Its production time at the acceptance stage is often overestimated, as it is determined based on the subjective opinion of the heads of departments involved in the production process. It should be noted that there are also situations when the estimated production time is insufficient. This is due to various factors. For example, in case of unsatisfactory technological development of the product, the equipment cannot provide the required accuracy of manufacturing, bottlenecks appear at individual work centres due to the absence (or impossibility to apply) to a particular product of appropriate means of technological equipment. Deviations from the established time limits also occur due to late delivery of purchased components and materials. Correction of consequences caused by errors in the design of assemblies and parts also adversely affects the product release dates.

Internal lead times directly depend on a properly designed management process, namely, minimising problems caused by cooperation between production units and the use of modern technologies (in particular, digitalisation). Some researchers consider methods of control and labour organisation that rely only on human resources to be ineffective [19]. Automatic Enterprise Management Systems (AEMS) are implemented for order management. Various models of AEMS include similar algorithms that evaluate the possibility of order fulfilment based on such parameters as cost and lead time of products, their quantity, quality, individual customer requirements, as well as simple logistics tools (in terms of purchasing of goods and materials). However, such a system is not able to take into account the change of conditions in case of abnormal situations, and therefore the accuracy of planning will be reduced.

V.M. Yachmeneva and Z.O. Osmanova consider the need to apply new methods and techniques in management to ensure the transition to a new

technological mode. In their opinion, the introduction of digital technologies is not a guarantee of success [20]. The work of A.A. Cherepashkov and P.A. Samoilov reflects the fact that reducing labour intensity does not always provide the best result. It is necessary to take into account the indicators that characterise the quality of performers' work when using automated systems and innovative interfaces. Scientists note that currently there are no such algorithms that could ensure the guaranteed integration of digitalisation elements and effective management of enterprises [21].

According to the authors of [22], the following problems often arise in the implementation of projects:

- change of objectives during the course of project implementation;
- lack of resources necessary for the successful implementation of the project;
- incorrect estimation of the duration and cost of work fulfilment;
- inaccurate preliminary assessment of possible project risks;
- inefficient organisation of project control and reporting;
- incomplete or unreliable information on the implementation of project activities.

The researchers suggest that in order to compensate for risks, when approving the consolidated plan of the enterprise, resources (namely, their volume expressed in value) should be planned and allocated to projects. Also, in order to reduce possible risks, it is necessary to create an insurance fund. The optimal allocation of resources, despite their linear dependence on the project, is a complex task. Operational management of several projects is impossible without controlling sub-processes during their execution. However, despite the use of project management tools in fulfilling the tasks of creating product samples, there is a violation of deadlines and exceeding the planned budget. Such situations are caused both by the lack of awareness when making managerial decisions and uncertainty associated with the risks of external and internal changes. According to the results of the analysis, the authors [22] concluded that the errors of performers can cause direct losses, ranging from 10 to 20% of the adopted budget value.

CONCLUSIONS AND RECOMMENDATIONS

As a result of the analysis, the tendency of development of machine-building enterprises with a single type of production, one of the main purposes of which is to meet the needs of customers in customised products, has been revealed. An important element in the transition of an organisation to this type of activity is the order management process. The article outlines different approaches to order management, proposes the author's version of the definition of this concept as a number of interrelated subprocesses within a single entity.

When considering the structure of order management, the terms of its fulfilment are singled out as one of the main parameters. The correctness of the choice of this indicator as a key one is confirmed by the arguments of modern researchers, whose works are considered by the author of this article. The concept of internal co-operation as one of the factors causing the change of planned timeframes in the order management process was introduced; other significant reasons for shifting the previously defined timeframes of order fulfilment were studied and defined, such as:

- high degree of bureaucratisation;
- lack of an objective methodology for forming the order fulfilment period taking into account the needs of all divisions;
- human factor as an obstacle to accurate planning;
- lack of equal focus on achieving the result on the part of all participants in the process;
- changing objectives during the course of the project;

• lack of resources required for the successful implementation of the project;

• incorrect estimation of the duration and cost of the work;

• inaccurate preliminary examination of possible project risks;

• inefficient organisation of project control and reporting;

• incomplete or unreliable information on the implementation of project activities.

To optimise the order management process and reduce the impact of the above factors, it is proposed to:

• to digitalise the processes of management and information exchange;

• to apply automated control and monitoring systems adapted to a single type of production;

• optimally distribute resources, create an insurance fund;

• use methods of mathematical modelling when receiving and planning order terms;

• implement managerial innovations;

• make managerial decisions based on process-based order management.

The results of this study will allow optimising the order management process, contributing to the reduction of the impact of internal cooperation on the increase in the order lead time at machine-building enterprises. Unfortunately, there is not enough analytical information in open sources to study this factor in detail, and the available information is fragmentary. In this regard, there is a need to continue the research on the impact of individual methods and algorithms on order management, as well as the study of tools to minimise the negative effects caused by inconsistency of actions during internal co-operation.

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Institutional Bases for The Formation of the Subject of Aviation Infrastructure Management in the System of Ensuring the Sustainability of the Northern Sea Route

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ABSTRACT

The development of the Northern Sea Route (NSR) infrastructure is one of the priority areas of managerial thought in the development of the Arctic zone of the Russian Federation. Commercial use of high-latitude caravan routes in the waters of the NSR should significantly change the situation with the organization of logistical maritime flows around the Eurasian continent. Ensuring uninterrupted traffic along with fulfilment of the conditions of urgency of delivery and cargo safety form the category of stability of the NSR functioning. Its northern part runs exclusively in domestic seas, and ensuring regular vessel traffic is Russia's priority task in the competition for transporting cargo from east to west (and back) by sea. The movement of ships along the NSR falls directly under the authority of the management of Rosatom State Corporation, while the management of the infrastructure that ensures the continuous movement of transport along the NSR is carried out collegially. At the same time, such an important aspect as the management of the infrastructure complex supporting the movement of container ships with transit cargo has been assigned to three components of a single management entity: the Ministry of Transport of the Russian Federation, the Ministry of the Russian Federation for the Development of the Russian Far East and the Arctic, and Rosatom Corporation, without clearly defining the boundaries of responsibility for interdepartmental management decisions. To date, this approach has already caused a series of organizational and technical difficulties. The aim of the study is to identify the rational organization of the infrastructure of the management subject, allowing to ensure the sustainability of the movement of passenger and cargo ships throughout the water area of the NSR; it is based on such scientific methods as induction, systematization, grouping Key results of the work may be in demand both in the course of scientific research in the field of infrastructure development in the regions of the Arctic zone of the Russian Federation, and in the framework of improving the existing management system of aviation infrastructure of these territories.

Keywords: management system; institutional approach to management; NSR management; NSR infrastructure

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INTRODUCTION

Ensuring the sustainability of traffic along the Northern Sea Route (NSR) routes implies unanimity of opinions on options for solving a multitude of issues, but those that affect federal interests remain open. The majority of unresolved (and unresolvable) problems fall within the sphere of interagency competences.

Modern scientists pay enough attention to the organisation of traffic and support of ships on the Northern Sea Route — this topic is widely covered in mass media. The Russian Federation Government Order No. 2115-o dated 01.08.2022 "On Approval of the Northern Sea Route Development Plan for the Period until 2035"[1] (hereinafter — Order No. 2115-o) states that from 2027 container ships will play a separate role in organising traffic along this sea route. This is about using the transcontinental opportunities of the shortest northern (high-latitude) routes in the Northern Sea Route, which unite the East and West of the Eurasia continent.

These routes are extremely complex, and their operation implies additional requirements to the organisation of work of the subject of continental infrastructure management.

Since the purpose of this study is to solve a number of problems related to the rationalisation of the process of managing the movement of ships along various routes in the Northern Sea Route, the author of the article had to solve the following tasks in the course of his work:

- to reveal the composition and organisation of the Northern Sea Route infrastructure development management institutions;
- identify the specific features of management objects in the Northern Sea Route infrastructure;
- identify inconsistencies in the planning of development and formation of infrastructure responsible for the movement of ships along the Northern Sea Route.

[1] Order of the Government of the Russian Federation No. 2115-o dated 01.08.2022. "On Approval of the Northern Sea Route Development Plan until 2035". URL: http://publication.pravo.gov.ru/Document/View/0001202208040008

METHODOLOGY

The research used the methods of induction; data systematisation to summarise the principles of interrelation and interaction of subsystems and elements included in the subject of Northern Sea Route development infrastructure management; grouping of theoretical approaches to the institutional principle of building the subject of Northern Sea Route infrastructure management. The main objective was to create such conditions for ship traffic, in which passengers and cargoes could count on operational support from the continent in the event of unforeseen situations.

The difficulty in operating the Northern Commercial Route is related to its geographical latitude. The organisation of year-round sustainable use of the Northern Sea Route has yet to be addressed, while also addressing the challenges of ensuring accessibility of high-traffic vessels through the use of Arctic aviation facilities and capabilities.

Several hundred billion roubles have already been invested in the construction of the newest icebreakers of the Leader series, capable of overcoming difficult ice conditions at high latitudes (75–77th degrees of northern latitude) in any season.

In this regard, a number of issues arise that are not disclosed in the governmental decrees defining the set of structural units that are responsible for managing the development of the Northern Sea Route along its entire route. In particular, the conditions for the operation of Arctic aviation technical facilities in the overall system of infrastructure support for the movement of passengers and cargo along the Northern Sea Route have not been defined. Such decisions should be made on the basis of interagency co-operation, which is difficult due to the limited timeframe for the implementation of the federal project and the strictly targeted financing of all its components.

It is important to note that in the current study the sustainability of the Northern Sea Route

should be understood as the organisation of the activities of all its subsystems, the implementation of which will allow passengers and cargo to move along the NSR routes without stopping and in accordance with the approved schedules regardless of changes in the external environment.

The main sources of legislation assigning to various state structures the scope and measure of responsibility for the implementation of management decisions were the Resolution of the Government of the Russian Federation "On Approval of the Rules of Navigation in the Northern Sea Route" and Order No. 2115-o.[2]

Separate problems of aviation infrastructure support development were raised in the works by O. G. Karpovich and A. I. Shlafman [1–3]. These authors showed the necessity of attracting the resources of domestic civil aviation to support the movement of passenger and cargo transport along the Northern Sea Route.

The works of A. A. Atroshenko [4], L. N. Babkina [5], and A. S. Buyanov [6] are devoted to general problems of regulating the development of this waterway under current conditions (including the management system). As for theoretical and methodological issues, E. P. Bashmakova and M. V. Ulchenko described the regional peculiarities of the Northern Sea Route infrastructure formation for the western territories of the Arctic zone of the Russian Federation [7]; K. P. Danilin and M. V. Ivanova [8], A. I. Ilyinsky [9] — pain points and organisational and economic problems that may arise during this process. D. A. Radushinsky [10] considers the difficulties of implementing investment projects related to the NSR infrastructure, and I. A. Toimentseva [11] — considers the interrelation of the Northern Sea Route transport system with other forms of transport organisation in the Arctic zone of the Russian Federation and their interdependence.

Modern foreign authors, such as H. Ahn [12], B. Scott [13], In. K. Lim [14], consider the improvement of aviation infrastructure as a priority direction of transformations in the implementation of state programmes.

The importance and prospects of the development of the transport artery under consideration is comprehensively reflected in the articles by V. V. Vasilieva [15], O. Y. Krasulina [16], Yu. Yu. Litvina [17].

The object of this study is organisational solutions to ensure the sustainability of passenger and cargo traffic following the Northern Sea Route, and the subject of this study is the theory and practice of creating a management structure for the implementation of infrastructure projects at the state level.

The Northern Sea Route traffic management system has been transformed with enviable regularity over the last century — in particular, the components of the property complex have been actively changed in order to ensure both greater reliability of vessel movements and information support for management decisions taken.

Until 1946, the Northern Sea Route was under the jurisdiction of the "Main Administration of the NSR", then, between 1953 and 1964, its management was transferred to the Ministry of Marine Transport of the USSR. From 1964 to 1970 there was a serious regrouping of the managed objects, which resulted in the formation in 1970 of the Administration of the Northern Sea Route under the Ministry of Marine Transport of the USSR [15]. In the interval from 1991 to 1993, traffic issues along the Northern Sea Route were under the control of the authorities of the regions where the property components of the Northern Sea Route were located.

2013 was the year of the waterway's ideological revival — a new Administration of the Northern Sea Route was established under the Federal

[2] Resolution of the Government of the Russian Federation of 18.09.2020 No. 1487 "On Approval of the Rules of Navigation in the Northern Sea Route Water Area". URL: https://rostransnadzor.gov.ru/documents/categories/79/document/3805 (accessed on 20.05.2024).

Agency for Marine and River Transport, which later became part of one of the structures of Rosatom State Corporation — the Federal State Budgetary Institution "Main Administration of the Northern Sea Route" ("GlavSevmorput" = "MainNorternSeaRoute").[3]

This Federal State Budgetary Institution received broad powers to organise, plan, record, control and analyse ship traffic along the Northern Sea Route (*Fig.*).

To date, Rosatom's forces have effectively implemented transportations along the southern routes of the Northern Sea Route, which provide resource supply to the territories of the Arctic zone of the Russian Federation in the context of interregional interests. These routes are conditionally divided into eastern and western corridors by the Taimyr Peninsula.

It should be noted that the Northern Sea Route has another important purpose — it is an alternative when it comes to delivering cargo from Asia to Europe (the direct option is via the southern seas and the Suez Canal). Its availability is due to the peculiarities of the globe structure and the technical development of the Russian icebreaker fleet designed for transcontinental transportations.

At the same time, the time saving of cargo delivery from the southern provinces of China to European ports is measured not in hours and minutes, but in days (up to a week), and it is achieved due to high latitude traffic in the Northern Sea Route waters along the 75th degree of northern latitude and to the north. Both shippers, consignees and carriers, as well as Russia as a country in whose territorial waters the northern part of the Northern Sea Route routes passes, are interested in organising such communication.

As of the beginning of 2024, icebreaker-supported vessel traffic from Murmansk to the Taimyr Peninsula and from the eastern border of the latter to the Bering Strait is quite regular at low latitudes (50–100 km from the continental coast). And the majority of cargo traffic passes through straits of shallow (up to 20 m) depth in the eastern part of the Northern Sea Route under the Novosibirsk Islands.

A set of problems, ways to resolve them and prospects for the development of traffic along the Northern Sea Route were fixed in the Strategy for the Development of the Arctic Zone of the Russian Federation and National Security until 2035 (hereinafter — the Strategy). In particular, the document states that "the importance of the Northern Sea Route as a transport corridor of global significance used for the transport of national and international cargoes will increase as a result of climate change and the development of year-round navigation throughout the entire water area of the Northern Sea Route".[4]

The Strategy also states that "the fulfilment of the main objectives in the field of infrastructure development in the Arctic zone is ensured through the implementation of the following measures[5]:

a) integrated development of seaport infrastructure and maritime shipping lanes in the waters of the Northern Sea Route, Barents, White and Pechora Seas;

b) establishment of a maritime operations headquarters to manage navigation throughout the entire water area of the Northern Sea Route;

c) unification of transport and logistics services provided in the waters of the Northern Sea Route on the basis of a digital platform designed for paperless registration of multimodal transport of passengers and cargo".

[3] Resolution of the Government of the Russian Federation of 18.09.2020 No. 1487 "On Approval of the Rules of Navigation in the Northern Sea Route Water Area". URL: https://rostransnadzor.gov.ru/documents/categories/79/document/3805 (accessed on 20.05.2024).

[4] Decree of the President of the Russian Federation of 26.10.2020 No. 645 "On the Strategy for the Development of the Arctic Zone of the Russian Federation and National Security until 2035". Section II, p. 5, item "d". URL: http://www.kremlin.ru/acts/bank/45972 (accessed on 20.05.2024).

[5] Ibidem. (version of 27.02.2023 No. 126). Section III, p. 10, item "e"; ibid. Section III, para. 13.

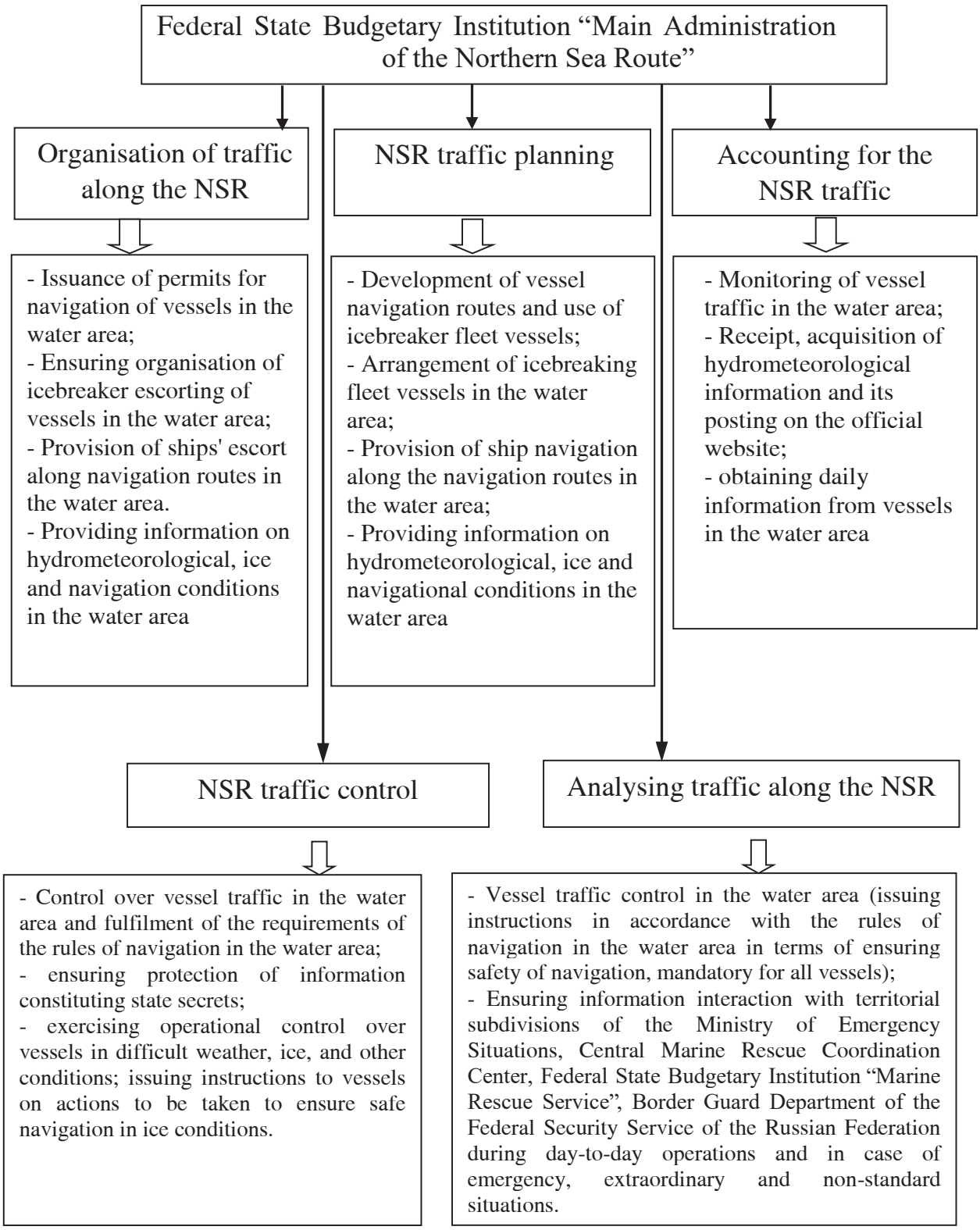

Fig. **Traffic control functions along the NSR implemented by the Federal State Budgetary Institution "Main Directorate of the Northern Sea Route"**

Source: compiled by the authors.

The authors of the draft law, having a broad vision, taking into account the targeting of requirements, emphasise the importance of the Northern Sea Route for transcontinental international shipping, but in defining the boundaries of the development of the infrastructure of the marine artery are limited to the interests and capabilities of regional authorities. The document does not reflect the interests of all participants of the Arctic zone of the Russian Federation and the needs of navigation.

This position appears to be limited and is not based on the experience of operating the Northern Sea Route in the last century. Thus, in the USSR, polar aviation, as an integral part of the Northern Sea Route infrastructure, in the 1930s-1960s was under the direct responsibility of the Polar Aviation Directorate of the Main North Sea Route.

"Polar aviation is a special type of military transport and civil aviation designed to provide logistics for passenger and special transport, observation flights in the polar regions of the Northern and Southern Hemispheres, originated in the USSR. Usually, such tasks are performed abroad by Air Force units. It is with the formation and development of polar aviation that the systematic study and development of the Arctic and the Northern Sea Route and Antarctic research is connected" [6, p. 27].

It is this aspect of the Northern Sea Route infrastructure development that is not adequately reflected in the reviewed Strategy.

STRUCTURE AND COMPOSITION OF THE SUBJECT OF AVIATION INFRASTRUCTURE MANAGEMENT IN THE ARCTIC ZONE OF THE RUSSIAN FEDERATION

The management system of aviation infrastructure in the Arctic zone of the Russian Federation has been fragmented — on the basis of the Decree of the Government of the Russian Federation "On Approval of the Rules of Navigation in the Northern Sea Route" and Order No. 2115[6] infrastructure development efforts have been assigned to two enlarged groups.

The first should include the federal districts, the Ministry of Transport and the Ministry of Industry and Trade, whose area of responsibility has become the solution of tasks to organise the provision of the continental territories of the Arctic zone of the Russian Federation with the necessary resources. These subjects determine the need to expand the spheres of application of civil aviation, form requests to the Federal Agency "Rosaviation" regarding the modernisation of the aviation infrastructure of the Arctic zone of the Russian Federation and set tasks for it to repair, build and commission new elements of this infrastructure.

The second group of actors managing the development of aviation infrastructure in the Arctic zone determines the need for its development in order to organise support for traffic on northern rivers and seas. This group primarily includes Rosatom, the Ministry of Eastern Development and, of course, the Ministry of Emergency Situations.

Both of these groups interact with the Federal Air Transport Agency ("Rosaviation") at the stage of ready-made solutions, forming the requirements for the work.

The needs of the management subjects of both groups are broadly divided into two components: in the western part of the Arctic zone of the Russian Federation, modern technical solutions based on the existing subsystems of aviation infrastructure are in demand, while in the eastern part, the development problems largely consist in the formation of new components of aviation

[6] Resolution of the Government of the Russian Federation of 18.09.2020 No. 1487 "On Approval of the Rules of Navigation in the Northern Sea Route Water Area". URL: https://base.garant.ru/74664152/ (accessed on 20.05.2024); Russian Government Order No. 2115-o dated 01.08.2022 "On Approval of the Northern Sea Route Development Plan for the Period until 2035. URL: https://www.garant.ru/products/ipo/prime/doc/405010751/ (accessed on 20.05.2024).

infrastructure.

OBJECTS OF AVIATION INFRASTRUCTURE MANAGEMENT IN THE ARCTIC ZONE OF THE RUSSIAN FEDERATION

"Aviation infrastructure in the Russian Federation means aerodromes, airports, facilities of the unified air traffic management system, aircraft flight control centres and points, points for receiving, storing, and processing information in the field of aviation activities, facilities for storing aviation equipment, centres and equipment for flight crew training, and other facilities and equipment used in aviation activities" [8].

In the Arctic zone of the Russian Federation, these components are supplemented by autonomous life support systems and ecological waste disposal structures, also provided with autonomous devices for supplying the necessary resources. These peculiarities of the elements of management facilities are related to the fact that in most Arctic Russian territories (where aviation infrastructure facilities are located) it is impossible to apply a comprehensive approach typical for densely populated regions of the Russian Federation.

The heterogeneous socio-economic development of the Arctic zone of the Russian Federation implies the emergence of priority solutions to ensure the autonomous operation of aviation infrastructure facilities. For example, on the coast of the Sannikov Strait, which is quite developed in terms of communications but is considered a specially protected area of the Russian Federation, additional measures to ensure environmental safety will be required.

Another peculiarity of the facilities forming the aviation infrastructure in the region under consideration is the fact that in the points of their location conditions should be created to facilitate the realisation of a variety of logistical tasks typical for the northern territories, which are divided into basic and special ones. The former include ensuring accessibility of remote ecosystems, cultural and leisure centres, and agglomerations. The latter include the provision of emergency medical care and rescue operations in difficult Arctic conditions, as well as comprehensive support for transit operations with passengers and goods.

At the same time, management objects can be divided into those *with a wide range of functions* (providing opportunities to organise regular life and economic relations in the Arctic zone of the Russian Federation) and *specialised ones*, whose activities are aimed at the implementation of special tasks related to transit procedures.

Of course, mixed solutions are also possible, but today they are more expensive from the point of view of financing organisation and require separate approaches. In turn, both special facilities and facilities with a wide range of functions require systemic management. Unfortunately, at present, the development of management objects in the system of aviation infrastructure support for the development of the Arctic zone of the Russian Federation is carried out on a declarative basis.

The condition of most of them, especially in the eastern part of the Arctic zone, could be called neglected before 2013. Thanks to the improvement of the Northern Sea Route and the expansion of the range of Northern Shipping, some facilities have received support, in particular, within the framework of the approved plans for the development of the region, the Strategy and Order No. 2115, work is underway to modernise and rehabilitate those of them that have retained basic technical solutions for handling aircraft; in the future, it is possible to build the necessary facilities from scratch.

A number of classification features of management objects are shown in the *Table 1*.

It should be emphasised that the legal and regulatory documents governing the commissioning of new management facilities

Table 1

Classification of aviation infrastructure development management facilities in the Arctic zone of the Russian Federation

By comparison criterion	Objects of management of aviation infrastructure development Arctic zone of the Russian Federation
By administrative-territorial division	Murmansk region Arkhangelsk region Nenets Autonomous District Yamalo-Nenets Autonomous District Krasnoyarsk Territory Sakha Republic Chukotka Autonomous District Komi Republic
By continental distribution	Eastern part of the Arctic zone of the Russian Federation Western part of the Arctic zone of the Russian Federation
By the need for autonomous solutions	Full autonomous life support of control facilities Priority areas for ensuring autonomy of control facilities Connection of facilities to regional network solutions
By the set of functions performed	Special purpose With a wide range of functional solutions Mixed type
By reasons of occurrence	Private initiative Federal project Regional needs
	Modernisable Renovated Built from scratch

Source: compiled by the author based on the Federal Law of July 13, 2020 No. 193-FL "On state support for entrepreneurial activity in the Arctic zone of the Russian Federation". URL: https://www.consultant.ru/document/cons_doc_LAW_357078/

contain rational solutions that contribute to the achievement of the set objectives, but are not the result of consistent planning of aviation infrastructure development.

The above-mentioned Resolution of the Government of the Russian Federation approving the rules of navigation along the Northern Sea Route[7] defines the maximum limits for the movement of icebreakers and caravans led by them along the southern, intermediate, and northern routes. At the same time, the document does not rely in any way on the possibilities of ensuring uninterrupted passage of ships along the upper routes — the remoteness of the extreme upper latitudes (up to the 8th degree of northern latitude) is so great that the probability of organising its support is questionable. This Resolution was probably drafted and approved without agreeing on the conditions for such assistance from Arctic aviation.

Such a conclusion can be reached by a modern

[7] Resolution of the Government of the Russian Federation of 18.09.2020 No. 1487 "On Approval of the Rules of Navigation in the Northern Sea Route Water Area". URL: https://rostransnadzor.gov.ru/documents/categories/79/document/3805 (accessed on 20.05.2024).

Table 2

Institutions as part of the NSR infrastructure management entity

Name of the Institute	Formats of international cooperation with states and business	Promoting the image of the NSR, competitiveness and environmental sustainability	The concept of the project to create a transarctic operator	Updating the proposals of the necessary infrastructure for the safety and efficiency of navigation, taking into account the forecast of ship traffic	Equipping of the Arctic integrated emergency rescue centers of the Ministry of Emergency Situations of Russia 9 MI 38 helicopters, 4 Mi 8 helicopters (6 points)	Preparation of proposals for the creation of operational ice reconnaissance facilities based on UAVs	Amendments to the rules of navigation in the waters of the NSR	Preparation of proposals for the development of the infrastructure of the transit container operator project based on the results of the pilot project in 2027
Ministry for the Development of the Russian Federation	+	+	+					+
State Atomic Energy Corporation ROSATOM	+	+	+	+		+	+	+
Ministry of Economic Development of Russia	+	+	+					
Ministry of Foreign Affairs of Russia	+	+						
Ministry of Transport of Russia	+		+	+			+	+
Ministry of Natural Resources of Russia		+						
Ministry of Industry and Trade			+			+		
Russian Ministry of Finance			+					
Russian Hydrometeorology and Environmental Monitoring service				+			+	
Russian Ministry of Emergency Situations					+			
Ministry of Education and Science						+		

Source: Compiled by the author based on the order of the Government of the Russian Federation dated August 1, 2022 No. 2115-r "On approval of the development plan for the Northern Sea Route for the period up to 2035". URL: http://publication.pravo.gov.ru/Document/View/0001202208040008; [2].

researcher, realising that support to ships from the continent will be provided by a helicopter fleet, the greatest range of loaded vehicles of which is 550–600 km, while the 80th latitude is 700–800 km away from the continental coast in some areas.

Order 2115-o is the last of the approved draft laws affecting the specifics of the Northern Sea Route infrastructure. This document comprehensively describes the problem of organisation, infrastructure, establishment, development, and operation of the Northern Sea Route, but it does not pay special attention to polar aviation.

RATIONAL STRUCTURE OF THE SUBJECT OF MANAGEMENT OF SHIP TRAFFIC INFRASTRUCTURE ON THE NORTHERN SEA ROUTE

A number of structures of the state apparatus (which does not include the Federal Agency "Rosaviation") are responsible for various projects on the organisation of the Northern Sea Route infrastructure (according to Decree 2115-o) (*Table 2*).

This kind of organisational solution leads to disputable situations (especially during the period of operation of the upper NSR routes), but does not exclude the possibility of using the Federal Agency "Rosaviation" as a deliberative and consultative body.

It should be noted that the institutional approach is built around ensuring the sustainability of the activities of the main operator of the Northern Sea Route — Rosatom State Corporation. As Rosatom achieves certain goals and objectives, such domestic structures as the Ministry of the Russian Federation for the Development of the Russian Far East and the Arctic, the Ministry of Economic Development, the Ministry of Natural Resources, the Ministry of Transport, the Ministry of Industry and Trade, the Ministry of Finance, the Federal Service for Hydrometeorology and Environmental Monitoring, the Ministry of Emergency Situations, the Ministry of Education and Science are being involved.

The first three of the listed ministries deal with strategic development issues, determine the prospects for setting and solving fundamental tasks that affect national economic problems requiring the use of new opportunities of the Northern Sea Route.

The Ministry of Finance joins the declared participants at the stage of forming conceptual proposals on the organisation of carriers" activities along the Northern Sea Route.

The Ministry of Emergency Situations (in isolation from other agencies) is in charge of equipping rescue teams, the places for their work along the entire route must be designed by someone. According to Decree 2115-o, the functions of the established institute for managing infrastructure support for the Northern Sea Route development do not include either such design or the need to carry out such works.

The Ministry of Industry and Trade, with the support of the Ministry of Education and Science, is assisting Rosatom with the development of UAV operation systems, but without the participation of the federal agency Rosaviation, which actually certifies such aircraft.

The Russian Ministry of Foreign Affairs is involved in the formation of a trans-Arctic operator, whose routes will go above latitude 75, which, in the absence of established support from the continent, seems risky on autonomous routes of more than 2 weeks in Arctic conditions.

Expansion of trade relations, development of such industries as mining and manufacturing in the region require accessibility of multiple territories separated from each other by many kilometres in the absence of regular highway connections.

Research and justification of new opportunities for the development of the Arctic and its riches is also impossible without the use of polar aviation, whose leading role in the realisation of interaction with remote areas and facilities remains in the shadows. At the same time, urgent issues related

to transport in this region can be solved only by polar aviation forces.

Its work is inextricably linked to the development of aviation infrastructure in the Arctic zone of the Russian Federation, the current state of some subsystems of which requires modernisation. At the same time, in order to implement many tasks in the aviation infrastructure, it is necessary to form new management objects.

On the one hand, the Administration of the President of the Russian Federation is already forcibly pushing for the implementation of a large-scale project within the framework of Order 2115-o (contributing to the development of the potential of the Arctic zone of the Russian Federation[8]), but in the work on which (using the principles of decentralisation of the management decision-making process) the essential components of the infrastructural development of the region, primarily polar aviation, are overlooked.

On the other hand, the subjects of management of infrastructure development in the Arctic zone of the Russian Federation in their current form represent a set of state agencies and state corporations with their own goals and objectives, which duly fulfil the decrees of the Cabinet of Ministers,[9] but do not take initiatives in relation to problem areas of infrastructure development, which they cannot fail to notice.

The main beneficiaries in the implementation of the project of development of the Arctic zone of the Russian Federation[10] are the federal districts, whose activities take place within the administrative boundaries. The strategic vision of measures for integrated utilisation of the infrastructure projects being built is overlooked. Thus, the problems of a limited number of small nationalities are solved, and the possibilities of exploiting the infrastructure for the development of related projects and, first of all, the Northern Sea Route are reduced.[11] Federal districts, forming the boundaries of their responsibility in this area, are immersed in solving their own, rather than interregional and interdepartmental problems.

Within the framework of the global socio-economic task of organising the movement of passengers and cargo along the Northern Sea Route, a circle of responsible ministries and agencies is being formed, united by a common idea and, accordingly, forming an independent management institution.

It follows that this subject of infrastructure project management, formed according to the institutional principle, should cover a wide list of goals and objectives for the organisation and development of the Northern Sea Route. At the same time, private problems related to the movement of passengers and cargo turn into complex ones, and the most important among them is the development of transcontinental movement of container ships.

The management of the infrastructure ensuring the functioning of this route is the responsibility of three agencies, for which the smooth movement of container ships is not a priority task. However, this problem is now acute for the new management subject, requiring in-depth study with the definition of an independent mechanism for the management of various components of infrastructure support for the movement of container ships along the Northern Sea Route. We are talking about the realisation of the transit

[8] List of instructions based on the results of the meeting on the development of Far Eastern cities (approved by the President of the Russian Federation on 07.11.2023, No. Pr-2217). Item 14. URL: https://www.garant.ru/products/ipo/prime/doc/407852303/ (accessed on 20.05.2024).

[9] Resolution of the Government of the Russian Federation of 18.09.2020 No. 1487 "On Approval of the Rules of Navigation in the Northern Sea Route Water Area" URL: https://rostransnadzor.gov.ru/documents/categories/79/document/3805 (accessed on 20.05.2024)

[10] Decree of the President of the Russian Federation of 26.10.2020 No. 645 "On the Strategy for the Development of the Arctic Zone of the Russian Federation and National Security until 2035". Section II, p. 5, item "d". URL: http://www.kremlin.ru/acts/bank/45972 (accessed on 20.05.2024).

[11] Order of the Government of the Russian Federation of 01.08.2022 No. 2115-r «On approval of the Northern Sea Route development plan for the period up to 2035». URL: https://www.garant.ru/products/ipo/prime/doc/405010751/ (accessed on 20.05.2024).

route at latitude 75–77th degrees north latitude, for which new icebreakers are being built.

Despite the obvious priority of implementing decrees and resolutions to the detriment of the obvious needs of the region's aviation infrastructure development, it is its role that is leading the way in following the instructions of these same regulations. It is the lost link that should take an independent place in the concept of development of the Arctic zone of the Russian Federation.

By using the transcontinental high-latitude route in the Northern Sea Route, the country can win the competition for cargo traffic from friendly countries such as India, Arab countries, China, and so on.

Only the high-latitude route actually reduces the length of the journey and allows the passage of modern container ships with a carrying capacity of more than 100,000 tonnes.

This route, unfortunately, falls outside the sphere of interest of both Rosatom and the Ministry of Transport. And it is the one that is not supported by helicopters from the onshore aviation infrastructure.

Rosatom State corporation has no authority to manage these facilities. In its organisational contour there are three subordinate organisations that provide activities on the Northern Sea Route: Federal state unitary enterprise "Atomflot", Federal state unitary enterprise "Hydrographic Enterprise, and Federal State Budgetary Institution "Main Northern Sea Route", but none of them is involved in aviation issues.

The Ministry of Transport, in its turn, does not consider the problems of high-latitude ship routes in the waters of the Northern Sea Route without objective information on the existence of problems on these routes, or, in other words, does not analyse the prospective traffic directions defined by Order No. 2115-o, but serves the agenda of the operator of the Northern Sea Route — Rosatom. In its turn, the Ministry for the Development of the Russian Far East and Arctic deals exclusively with the problems of its regions and coastal territories — the issues of the remote high-latitude route of ships travelling along the Northern Sea Route waters are not their core issues.

Thus, it is not clear how the urgent problems of infrastructure support of passenger and cargo traffic along the high routes of the Northern Sea Route water area will be solved in isolation from rational decisions regarding the use of polar aviation capabilities and how the subject of Northern Sea Route infrastructure management formed on the institutional principle will be able to coordinate its activities with the Federal Agency "Rosaviation". Hypothesis building and search for rational answers to these questions may become the basis for future studies.

Objectively, it is necessary to revise the interaction of the above-mentioned management institutions in favour of the creation of a monitoring centre, whose activity should consist in the analysis of promising development directions and identification of probable problems and risks on the way to the formation of the infrastructure for ship traffic along the new transcontinental sea artery, allowing Russia to become a real competitor for the implementation of passenger and cargo transportation from the east to the west of the Eurasian continent and in the opposite direction.

There is also an urgent need to activate the subject of management of this infrastructure. At the forefront is the development and rapid implementation of a unified strategic plan, including the development of its aviation component, which can both help in the implementation of major federal projects and become the foundation for meeting the needs of socio-economic systems that serve the development of the small peoples of the North and the Russian Arctic as a whole.

RESULTS

The study identifies eight institutions within the Northern Sea Route development infrastructure management entity. They are grouped around

the key objectives of the Northern Sea Route development, which are as follows:

1) defining the formats of international co-operation with the state and business in the use of ship traffic routes in the Northern Sea Route water area;

2) promotion of the image of the Northern Sea Route from the standpoint of competitiveness of the routes themselves and compliance with the principles of environmental friendliness during their operation;

3) development and implementation of the project concept for the creation of a trans-Arctic operator;

4) updating of proposals for the development of the necessary infrastructure for the safety and efficiency of navigation, taking into account the forecast of ship traffic;

5) equipping Arctic complex rescue centres of the Russian Ministry of Emergency Situations with helicopters;

6) preparation of proposals for the creation of UAV-based operational ice reconnaissance equipment;

7) amendments to the rules of navigation in the waters of the Northern Sea Route;

8) formation of proposals for the development of the infrastructure of the transit container operator project based on the results of the pilot project in 2027.

In the course of the work the author of the article has determined the composition of management subjects and the boundaries of formation of management decisions.

CONCLUSIONS

In the current system of management of the Northern Sea Route development infrastructure, the link between the aviation part of it and the relevant management entity has been lost. The Federal Agency "Rosaviation" can become such a link if this agency is initiated at the federal level to integrate into the system of institutions that form the subject of infrastructure management.

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ORIGINAL PAPER

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Principles of Formation of the Company's Ecosystem Based on Platform Socio-Economic Interactions

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ABSTRACT

The purpose of this study was to develop principles for the formation of the company's ecosystem based on platform socio-economic interactions. In the course of the work, the peculiarities of ecosystem development are analyzed and the problem of systematization of the principles of formation of the external environment of an economic entity is determined. Based on minimizing transaction costs and the completeness of the application of management functions, the basic principles of the formation of the firm's ecosystem have been developed, including client-centricity, responsiveness to changes, hierarchical structure, diversity of participants and maintaining the profile of activity The author's approaches to the creation of such an ecosystem through platform interactions, as well as the application of advanced digital and information technologies to protect personal data, expand the number of services and activities provided, and preserve competition were formed. The research used methods such as various types of analysis, structuring, and the graphical method. The information base was made up of the bibliographic database of scientific publications eLibrary. This study of ecosystems will be of interest to firms that want to make more profit with lower costs by collecting and analyzing data received from customers.

Keywords: business ecosystem; platform interactions; management; principles of formation; digital technologies

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INTRODUCTION

In today's world, there is a trend of economic actors moving towards platform interactions. Firms developing digital technologies (including digital platforms) are more efficient, and the world's largest companies use them as a base for creating ecosystems [1], the core of which (according to domestic researchers) are such communication tools as technological platforms [2].

The transformation of business in terms of ecosystem development began in the 1970s [3], therefore, the principles of their formation in economic theory and practice are not fully represented, especially in view of the development of digital technologies [4].

PECULIARITIES OF DEVELOPMENT OF THE MODERN ECOSYSTEM OF THE FIRM

Today, consumer demand has become the main driver of the economy, with firms seeking to satisfy an increasing number of customer needs. McKinsey experts predict that by 2025 the share of ecosystems in global gross domestic product will be 30%, which equates to USD 60 trillion.[1]

Among the largest international ecosystems are the US companies Google, Facebook, Amazon, and Apple, as well as the Chinese companies Tencent and Alibaba. In Russia, Sber and Yandex are considered the most prominent ecosystems.[2]

An analysis of the experience of global digital ecosystem development shows that the US is the leader in this area; ecosystems in the country are regulated through anti-monopoly legislation to avoid unfair competition. In China, which has developed a plan for the transition to digitalisation and the development of digital ecosystems, control over these processes is implemented through the state's Civil Code, as well as laws on commerce, blockchain technology and financial consumer protection. Regarding the issue of monopolistic tendencies within ecosystems, China allows the use of customer data by third-party services (e.g., to gather statistical information on customer preferences), but this requires the consent of the customers themselves.

In Russia, ecosystems of firms, which are a set of services (or platforms) that allow users to obtain a product or service within one of them, are just beginning to develop. At the moment, the legal documents regulating this area are not fully formed. Therefore, ecosystems are subject to antitrust laws and are controlled by the Federal Antimonopoly Service [5].

There are many interpretations of the term "firm ecosystem", but no clear definition has emerged in modern literature. The concept of "business ecosystem" was introduced by J.F. Moore in his article "Predators and Prey: The New Evolution of Competition", implying that it is an association of companies that develop together on the basis of new technology and work on a competitive basis to create products to meet customer needs and eventually introduce more innovations. Moore analyses the business ecosystem by examining its life cycle, which consists of four main phases: birth, expansion, leadership, and self-renewal [6]. The authors of subsequent works fully agree with the definition given by this scientist or use it as a basis for further research. Thus, R. Ebner and A. Eisenberg complemented Moore's formulation: R. Ebner describes an ecosystem as "a coherent structure of a plural set of partners who need to interact to implement a core value proposition" [7]. E. Harting and T. Asseldonk consider a business ecosystem as "a network of interdependent actors centred around a key technology for success and survival" [7].

What these definitions have in common is the interaction of different stakeholders and co-operation of firms for joint development.

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[1] Ecosystems: approaches to regulation. Report for public consultations. Bank of Russia. URL: https://cbr.ru/Content/Document/File/119960/Consultation_Paper_02042021.pdf

[2] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation'. NP "National Council of Financial Market'. URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

In most studies to date, the "ecosystem of the firm" is the object of management.

The Boston Consulting Group identifies two main categories of ecosystems: solutions and transactions. The former emphasises product development, services and coordination of participants. Examples include configurations that integrate bank cards, merchants, consumers and banks, or smart home solutions that consolidate climate, lighting, entertainment and security devices. In the transaction ecosystem, the focus is on creating interactions between vendors and customers through a single platform. For example, eBay connects independent sellers with buyers, and Uber helps passengers find available taxis. In such systems, customers can themselves act as producers, as in the Airbnb platform where tenants become landlords by offering their accommodation. Thus, this type of ecosystem is close to the recently identified trend of platform ecosystems.

CLASSIFICATION OF ECOSYSTEMS

Ecosystems can be classified as follows:

Open, where the participation of any external partner that is willing to comply with common rules and has value from the point of view of other companies is welcome (the most common type). Internal competition is not restricted [8].

Closed, the access of partners to which is limited, there is a strict regulation of the number of participants (the least common type). As a rule, there is no internal competition [8].

Hybrid, which is a combination of open and closed platform solutions.[3]

Let us define the spheres of standard ecosystems (*Fig. 1*).

Finance combines payments, savings, lending, mortgages, insurance; *information technology* includes cloud and search services, operating systems, voice assistants; *e-commerce* is a marketplace; *lifestyle* is online learning, messengers and social networks, games, books, videos, taxis [5].

Let's look at the structures of the largest ecosystems — according to *Table 1*, they are similar to each other. This is because, for example, in the financial sector, an open ecosystem can reduce a bank's margins (one of the key profitability indicators of a financial institution), while giving consumers a choice of information technologies can negatively affect sales of basic goods and services. In e-commerce and lifestyle, open ecosystem types are prevalent, allowing customers to compare company offerings.[4]

[3] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

[4] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

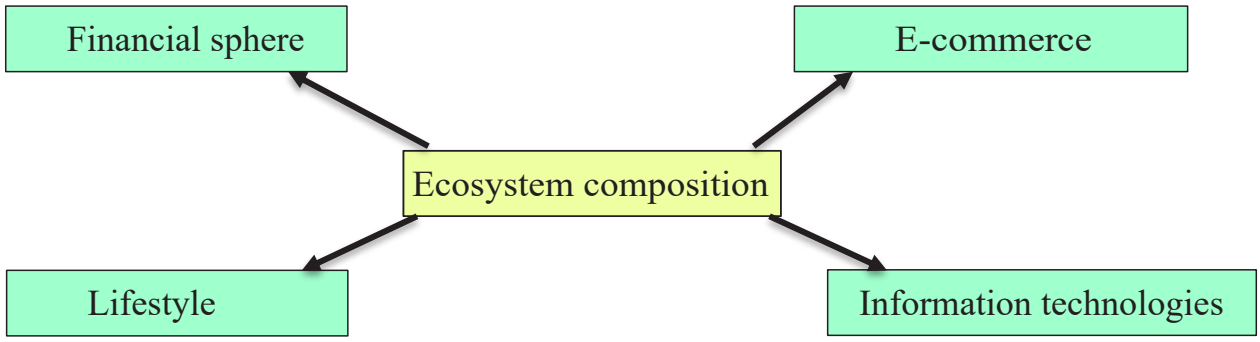

Fig. 1. **Areas of the standard ecosystem**

Source: compiled by the authors.

Table 1

The structure of the largest existing ecosystems

Ecosystem name	finance	Information technology	E-commerce	Lifestyle
Google	Closed	Closed	Open	Hybrid
Amazon	Closed	Closed	Open	Hybrid
Apple	Closed	Closed	Open	Hybrid
Tencent	Closed	Closed	Open	Hybrid
Alibaba	Closed	Closed	Open	Hybrid
Sber	Closed	Closed	Hybrid	Hybrid
Yandex	Closed	Closed	Open	Hybrid

Source: compiled by the authors.

At the same time, the firm's ecosystem includes various stakeholders who can influence the firm's activities in one way or another (*Fig. 2*).

DEVELOPMENT OF DIGITAL PLATFORMS

In the context of globalisation, there is a growing interest in a platform economy driven by technology; hence, businesses have to consider its impact when developing a company's development strategy. With information being the main competitive advantage today, companies are faced with analysing big data in one way or another. Collaboration between businesses enables the formation of a firm's ecosystem based on data collection and sharing, which creates new opportunities for business improvement. The use of digital technologies facilitates the emergence of intelligent products, blurs the boundaries between the virtual and real worlds, and opens up broad innovation perspectives [9].

Based on such technologies, digital platforms are formed, most often defined as a set of digital products, services, mechanisms and algorithms, a form of organisation of interaction between market participants, etc. [10].

Digital platforms have a great impact on the quality of life of consumers by making services available, lowering prices and expanding the range of products due to competition. But it should be

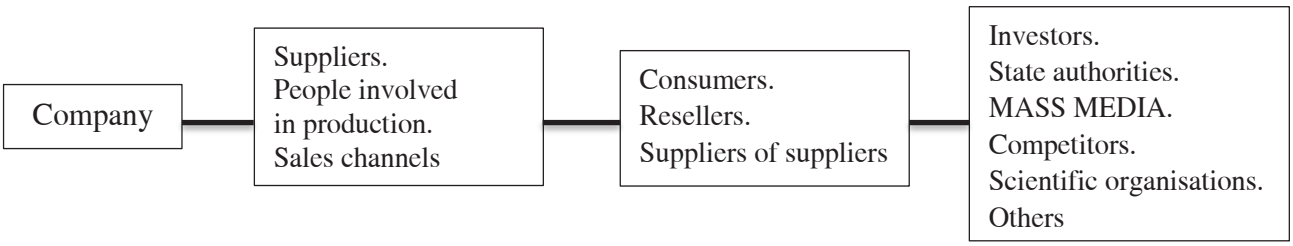

Fig. 2. **The content of the company's ecosystem**

Source: compiled by the authors.

noted that at the same time, consumer habits are being shaped. For example, the implementation of cashback or free returns on platforms has allowed the latter to identify the main approaches that allow them to expand their consumer base and subsequently their market share. Companies can remain unprofitable for a long time, as their main goal is extensive growth and brand building.[5]

If we talk about the differences of the platform ecosystem from traditional business alliances, it is necessary to highlight [5]:

- emphasis on innovativeness and speed of bringing products and services to market;
- co-operation without taking into account geographical and cultural limitations;
- cross-sector co-operation subject to the creation of intellectual property;
- development of new forms of co-operation, including flexible and short-term co-operation;
- shared and sustained value creation for all ecosystem participants.

At the same time, for successful business development it is necessary to adhere to certain principles of ecosystem building. However, it should be noted that there are no such principles when forming a firm's ecosystem based on platform socio-economic interactions [11].

RESEARCH METHODOLOGY

The object of the study is the ecosystem of the firm, and the subject of the study is the economic relations arising in the course of its formation on the basis of platform socio-economic interactions.

In the process of work such methods as system analysis of scientific articles, structuring and graphical method were applied. The information base was made up of scientific publications of the electronic library ELibrary on the topic of the study. The work algorithm can be presented in the form of the following stages: examination of previous research in this research area; formulation of the research problem, development of author's principles of business ecosystem formation on the basis of platform socio-economic interactions; discussion of ways to develop the firm's ecosystem on the basis of digital platforms.

Referring to the earlier statement that the firm's ecosystem acts as an object of management, as well as to the identified types of ecosystems, we will form the principles (including the basic principles) of the firm's ecosystem based on digital platforms. In doing so, we will rely on the five management functions identified by A. Fayol and the classification of transaction costs.

Management functions [12]:

1. Planning. It is the process of identifying strategic directions and goals for future success. It helps in identifying the necessary steps and resources to achieve the goals.

2. Organisation. It is a procedure of assigning tasks to participants in order to fulfil the set goals, helping to structure the firm's activities and dividing responsibilities among employees.

3. Coordination. Provides interaction between the employees of the company for effective performance of tasks in accordance with the set goals. This process helps the organisation to work more coherently.

4. Motivation. Involves stimulating personnel to fulfil tasks and achieve goals, helps to increase their productivity and efficiency.

5. Control. Evaluation of the fulfilment of the set tasks. Control helps to identify deviations, correct errors and improve business processes of the organisation.

Performing an analysis of management functions will allow us to most fully consider the management process associated with the formation of the firm's ecosystem.

Transaction costs. They are understood as costs arising from the conclusion of transactions

[5] Summary of answers to questions of the Bank of Russia Report for public consultations «Ecosystems: approaches to regulation». NP «National Council of the Financial Market». URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

and contracts and include the costs of searching, collecting and processing information, organising and conducting negotiations, as well as controlling the execution of agreements and providing legal protection in the execution of contracts [13].

Classification of transaction costs.

Firstly, coordination costs. They have a complex structure, which includes the costs of determining the details of the contract, market survey (to find out the needs of the buyer), as well as the costs of advertising, pricing, etc. [14].

Secondly, the costs of opportunistic behaviour. They arise both due to unfair actions (leading to violation of the terms of the transaction or its disruption) and due to actions, that lead to the intentional obtaining of unilateral benefits to the detriment of the counterparty. They also include costs of contract monitoring, insurance, legal costs, debt collection and legal fees. [13].

Thirdly, the costs of adaptation to unforeseen circumstances. Related to the adaptation of the firm to changes in internal and external factors [14].

Table 2 is a matrix of comparison of management functions and transaction costs, where "+" is the basis for the formation of the principles of the firm's ecosystem based on platform interactions (different from those used in the management of traditional companies) and a more accurate identification of the basis for building an ecosystem based on digital platforms, as well as managing it.

PRINCIPLES OF FORMING THE FIRM'S ECOSYSTEM

The interpretation of the term "principle" implies the beginning, the basis [15]. Principles serve as a foundation for the development of management methodology — they represent a set of general rules, methods, and forms of management, which are based on the knowledge and application of economic laws, regularities and the study of factors affecting the managed object [16]. It is also worth noting that with the development of society, the principles have the property to be supplemented and transformed in accordance with changing conditions and requirements. Thus, the general principles of ecosystem formation should underlie the principles of ecosystem management and be used to realise the firm's ecosystem. Let us consider the activities of successful platform ecosystems as well as academic research on the topic.

Table 2

Matrix of comparison of management functions and transaction costs

Management functions	Transaction costs		
	Costs of coordination	Costs of opportunistic behaviour	Costs of adapting to unforeseen circumstances
Planning	++		
Organisation			+
Coordination			+
Motivation			
Control	+	+	

Source: compiled by the authors.

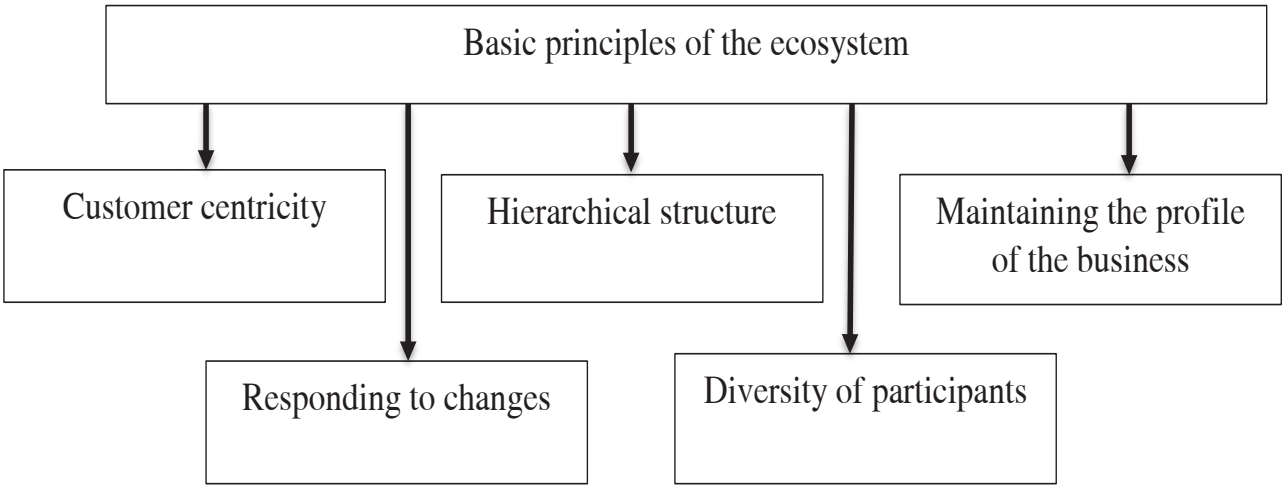

Fig. 3. **Basic principles of the ecosystem**

Source: compiled by the authors.

The academic literature identifies the basic principles of a firm's ecosystem (*Fig. 3*).

Let's comment on them.

1. Customer centricity. Business ecosystems are created in such a way as to maximise customer satisfaction. Companies collect, accumulate, and analyse data about them, which allows to make a portrait of the customer and his/her shopping basket. Consumer orientation allows developing and building complementary services [17]. For example, Yandex services: "Yandex. Navigator", "Yandex. Transport", etc., — are created on the basis of complementarity to meet the needs of more consumers (residents, couriers, taxis, etc.).[6]

2. Principle of hierarchical structure. As a rule, in a market, large players influence smaller ones — initiate alliances, regulate relations, distribute resources, etc. This model is usually referred to as hierarchical, but many authors believe that an ecosystem is built on the principle of complementarity, i.e., mutual correspondence. It consists of interconnected organisations that are interested both in long-term relationships with a large number of companies and in remaining competitive in the market — thus, cooperation and competition overlap. Such relationships are commonly referred to as competitive co-operation [18]. For example, T-bank embeds both its own products and partner services into its ecosystem through Open APIs.[7]

3. The principle of responding to changes. Currently, the speed of socio-economic and technological transformations is high, which prompts companies to conduct more detailed market analyses and develop technologies for rapid response [18]. For example, under the sanctions pressure of Western countries, ecosystem firms had to revise the list of consumers and suppliers of products for further smooth functioning. These changes also helped to reduce threats to the development of the country's economy as a whole, as "ecosystems allow to increase transparency and controllability of operations of individuals and legal entities, including in financial markets, through the

[6] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

[7] Open API — is "unlocking" or sharing the interface and features of a product for third-party developers, partners, other players in the ecosystem.

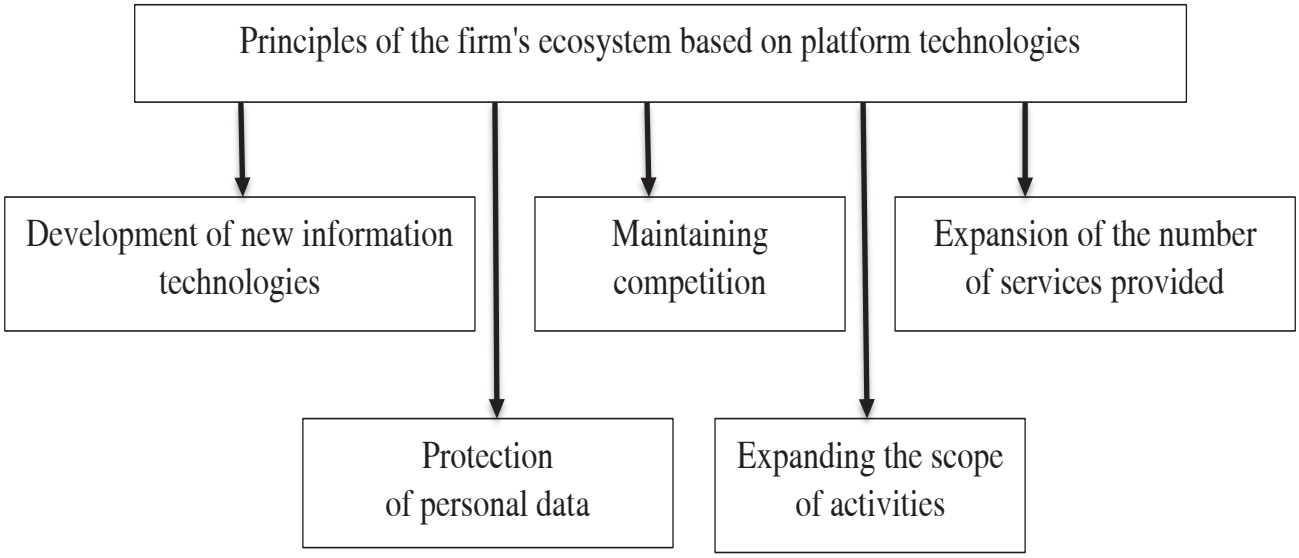

Fig. 4. **Principles of the company's ecosystem based on platform interactions**

Source: compiled by the authors.

use of a common infrastructure and common information space".[8]

4. The principle of diversity of participants. The heterogeneity of partners allows creating different combinations of relations between them, taking into account their strengths and weaknesses [18]. Thus, for example, ecosystem firms (as mentioned above) carry out their activities on the basis of interaction with stakeholders who can influence the creation of the final product to a different extent.

5. Principle of preserving the business profile. The company provides any service to the client — banking, communications or other. For a bank, the priority will always be the quality of financial services, while for a telecom operator the main task is to provide consumers with high-quality, innovative, and affordable communications. This principle is spelled out in the strategies of large ecosystems (MTS, Sberbank, etc.).

Further, in addition to the basic principles, it is useful to be guided by principles applicable to platform ecosystems (*Fig. 4*), among which are:

The principle of development of new information technologies (artificial intelligence) [18]. Due to the constant updating of digital platforms, the consumer carries out a "natural selection", in which the most innovative technologies win. For example, Mail.ru Group constantly modernises its Vkontakte project, which allows this long-standing digital platform to compete with new services.[9] Large technology firms are motivated to use artificial intelligence because they can capitalise on it by improving existing technology and producing a new product [19]: Google improves the predictive accuracy of its applications (Google maps and Google search) and Amazon improves its ability to more profitably set up targeting, i.e., a

[8] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

[9] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

set of methods to "filter" audiences that meet predefined parameters [20].

Principle of personal data protection.[10] In the era of digitalisation, identity theft is rampant, with the potential to reduce the relevance of digital platforms. In order to avoid negative consequences, companies go to great lengths every year to spend on personal data protection. For example, major business ecosystems such as Apple, T-Bank, Sberbank, Yandex, etc. are developing increasingly sophisticated authentication — for example, Apple uses a password to protect against fraud, as well as quick login by fingerprint or facial recognition.

The principle of expanding the number of services provided to better meet the needs of customers in multiple ecosystems.[11] The consumer is interested in receiving a wide range of products and services along with various loyalty programmes, cashback, etc. For example, MTS is a provider of such service areas as finance (MTS Bank), information systems (MTS), electronic communication (online shop), content (Kids developing content and MTS TV), services (MTS Music).[12]

The principle of expanding the scope of activities [8]. The organisation of ecosystems allows firms to work simultaneously in different spheres, with different products due to joint innovative developments; as a result, the consumer receives complex products. For example, in 2020, the Yandex ecosystem included more than 120 different services, and the Sberbank

[10] Ibidem.

[11] Summary of Responses to the Bank of Russia's Report for Public Consultations "Ecosystems: Approaches to Regulation". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

[12] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

Table 3

Principles of a company's ecosystem based on platform interactions

Principle	Contents
Principle of development of new information technologies (artificial intelligence)	Consumer switching to innovative technologies
Principle of personal data protection	Protection of personal data to avoid negative consequences for the company
Principle of expanding the number of services provided	Consumer's need for a single provider of the greatest number of services
Principle of expanding the scope of activities	Increasing the list of activities of the firm in order to further develop the business
Principle of maintaining competition	Supporting small businesses in the use of innovative technologies and compliance with legislation

Source: compiled by the authors.

ecosystem (oriented not only to business, but also to other spheres of life) — 75 [8].

The principle of preserving competition [21]. Since the ecosystem always includes a major market player, the innovative development of such associations is faster. There may be signs of the emergence of oligopoly or monopoly, which in the Russian Federation is controlled by the Federal Antimonopoly Service. The development of small businesses is important for the country's economy; therefore, limiting the size of ecosystems or accepting a noticeable number of small firms into them will allow small businesses to adapt to the conditions of rapid socio-economic development and maintain competition in the market. For example, in 2023, the Sber ecosystem included 85 organisations in digital interactions. Most of these services relate to small businesses, which shows a competent approach of the company, which cares about its business reputation and avoids signs of monopolisation [21].

Consider a brief characterisation of the principles of a firm's ecosystem based on platform interactions (*Table 3*). They distinguish ecosystems from other governance models and imply the creation, utilisation, and regulation of digital platforms through a close relationship between governance and technology, which further enables a product or service to be competitive in the marketplace.

AREAS OF DEVELOPMENT OF THE FIRM'S ECOSYSTEM BASED ON DIGITAL PLATFORMS

Scientific and technological progress does not stand still — new conditions for the functioning of companies are formed, thus the need for change arises. The basic principles of ecosystems can be supplemented with new ones, as presented in *Table 3*, as follows:

• The principle of expanding the number of technology products provided with multiple ecosystems complements the basic principle of customer centricity and aims to create a large platform with the ability to meet most customer needs.

• The principle of preserving competition allows large firms to comply with antitrust laws and operate on a competitive co-operative basis — in business ecosystems they work together, but also competitively, co-developing to share costs and information, and to access complementary resources and knowledge. Thus, firms co-operate in some areas to improve overall performance and compete in others for their own efficiency [22].

• The development of modern information technologies is essentially a response to external changes. Leading technology companies have played an important role in stimulating and financing such innovations. This suggests that they will continue to have no shortage of investment to develop innovative technologies and improve digital products to unify ecosystems [19].

• The principle of broadening the scope of activities and diversity of participants ensures the preparation of a maximum number of offers for consumers.

The effectiveness of an ecosystem depends on various factors [23]. With the development of the Internet, customers want to receive as many services as possible on one platform, which at the same time should be exclusive. A factor such as increasing competition in the market reduces the profitability of firms. Technologically advanced enterprises with their own ecosystems that offer the most innovative product to the consumer are a big threat in this regard. The development of data collection systems (e.g., Big Data technology) makes it possible to analyse large amounts of information about existing and potential customers. The increasing number of firms leads to market oversaturation, while reducing and limiting their potential for further development and growth.

All of the above factors reinforce the importance of monitoring the external environment, especially in terms of changes in consumer demand, competition and business process transformation.

Responding to market changes will further lead to more effective management of the ecosystem.

At the same time, we should not forget that the creation of an ecosystem is not a guarantee of business success — it requires qualified personnel to manage and contribute to the development of the company. At the same time, as the ecosystem improves, the number of companies within it grows, and therefore the scope of activities expands, the risk of a decline in the quality of management increases. It is highly likely that managers who are experts in one area are not experts in other areas.

It should also be noted that the development of ecosystems has a positive impact on the quality of life and health of employees. Firms are introducing more and more of the latest technologies into the work process, which have an impact on improving labour safety [24]. This factor helps companies to retain skilled workers who are specialists in a particular field.

The factor of ecosystem development can also include global problems, such as the COVID-19 pandemic, which became an incentive for the formation of innovative ecosystems [25].

CONCLUSIONS

In the course of this study, the following theoretical and practical results have been obtained, which may be useful for companies to maximise profits:

- peculiarities of the firm's ecosystem development were analysed and the problem of systematisation of the principles of formation of the external environment of the subject of economic activity was determined;
- on the basis of minimising transaction costs and full application of management functions, the basic principles of forming a firm's ecosystem have been developed, including client-centricity, responsiveness to change, hierarchical structure, diversity of participants, and preserving the profile of activities;
- author's principles of creating a firm's ecosystem based on platform interactions were formed, including mastering new information technologies, protecting personal data, increasing the number of services provided, expanding types of activities, and maintaining competition.
- directions for the development of the firm's ecosystem based on digital platforms are presented.

The theoretical significance of the results of the work consists in the systematisation of the principles of formation of the firm's ecosystem on the basis of platform socio-economic interactions, and the practical significance consists in the development of an applied apparatus for planning the development of the external sphere of an economic entity. Scientific novelty of the obtained result consists in the development of the principles of formation of the firm's ecosystem on the basis of platform socio-economic interactions, developing the theory of principles of formation of the external environment of the firm.

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Novoselova N.V. — justification of the choice of methodology, development of principles, analysis of theoretical provisions on the research topic, selection of sources.

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World Trends in State Regulation of the Development of Organic Agriculture and the Market of Organic Products: Experience of the USA, the EU And Russia

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ABSTRACT

The relevance of the topic of research is determined by the need to address the problems of environmental and socio-economic nature arising against the background of industrialized society, which causes interest in the development of organic agriculture and the formation of a dynamically growing market for organic products. **The purpose** of the study is to analyze the trends in the development of the global organic market and a comparative analysis of the practices of state regulation of this segment in the United States, the EU and Russia. In the course of the work such scientific methods as synthesis and deduction were used; the information and analytical base was the data of the journal "The World of Organic Agriculture" and publicly available information from the official websites of the Ministries of Agriculture of the United States and the Russian Federation, the European Commission, the Union of Organic Agriculture. The article presents the results of consideration of the dynamics of sales volumes and changes in the average per capita consumption of organic products in the world market, as well as the description of mechanisms of state regulation of organic agriculture and the organic market in the United States, the EU and Russia, highlighting their distinctive characteristics. The study of such issues allows to rationally apply foreign experience, excluding a high degree of risk when making strategic decisions in the formation of directions of development of the agrarian sector of the economy within the framework of national interests. **The results** of the study can be useful both in the development of programs for the development of organic agriculture at the level of sub-sectors of the economy, and in relation to the subjects of the Russian Federation, striving for sustainable development of the regional market of this type of products.

Keywords: agricultural policy; food policy; organic agriculture; organic products market; development prospects; state regulation

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INTRODUCTION

Global environmental problems, as well as the depletion of natural resources, including agricultural land, have necessitated the revision of traditional technologies for the production of agricultural products and final foodstuffs [1]. State policies in this area should take into account the solution of issues related to agriculture, as well as the tasks of supplying the population with food of high quality in the required volume. Improving the quality of life and ensuring environmental safety of territories and foodstuffs are among the main goals of the national policy of the world's leading countries and are "identified as a priority in the activities of the United Nations for the period up to 2030' [2, 3].

The development of the agricultural sector has always received a lot of attention, but the focus of this study is on the agricultural sector, which is called organic and is considered from the point of view of the implementation of the concept of environmental sustainability of production, and such a segment of the world food market as organic products.

The activities of agricultural enterprises adhering to such principles are mainly aimed at "reducing the intensity of natural resource use', in particular, reducing the chemical load on land and, as a result, the formation of the agricultural sector as part of the ecosystem [4].

The directions of development of organic agriculture are consistent with the objectives of its sustainable development, while taking into account the issues of achieving environmental and food security of the state, improving nutrition, improving the quality of life of the population and preserving the health of the nation [5]. An increasing number of countries approve strict requirements for the organisation of organic production, building mechanisms for its state support in accordance with national interests.

CURRENT TRENDS IN THE DEVELOPMENT OF THE WORLD MARKET OF ORGANIC PRODUCTS

Recognition of the need for the creation of organic production was formalised in the UK in 1967, when the Soil Association presented the first specialised (organic) standard containing technical conditions for quality control and origin of products, giving consumers a legal guarantee. This document contains the results of a scientific experiment lasting 20 years, the subject of which was a comparative analysis of organic, integrated, and chemical farming systems. It is worth noting that today more than 70% of UK organic produce is certified by the independent charity Soil Association.[1]

According to statistics reflected in the annual report "The World of Organic Agriculture", officially presented in Germany during the Biofach exhibition, in 2021, 191 countries represented their organic products on the world market compared to 86 in 2000.[2] Every year the number of companies producing such goods is also growing. Thus, in 2021 there were 3.7 million of them certified, which exceeds the level of 1999 by 18.5 times, indicating the dynamic development of this market. The volume of global sales of organic products is also constantly expanding. If in 2021, this market segment was estimated at 124.8 billion euros, compared to 15.2 billion euros in 1999, there is an increase of more than 8 times (*Fig. 1*) [6].

Like any other market, the organic market has its leaders. Let us present them broken down by key indicators (see *Table* below).

According to *Table*, from 2017 to 2021, Australia and Argentina were leaders in terms of turnover of areas allocated to organic agriculture (35.7 and 4.1 million hectares, respectively). In terms of the number of producers of organic products

[1] Legal and regulatory framework for organic agriculture in the world. Organic Farming Union (official website). URL: https://soz.bio/normativno-pravovaya-baza-organichesk-2/

[2] Yearbook "The World of Organic Agriculture": 2000–2023. URL: https://www.organic-world.net/yearbook.html

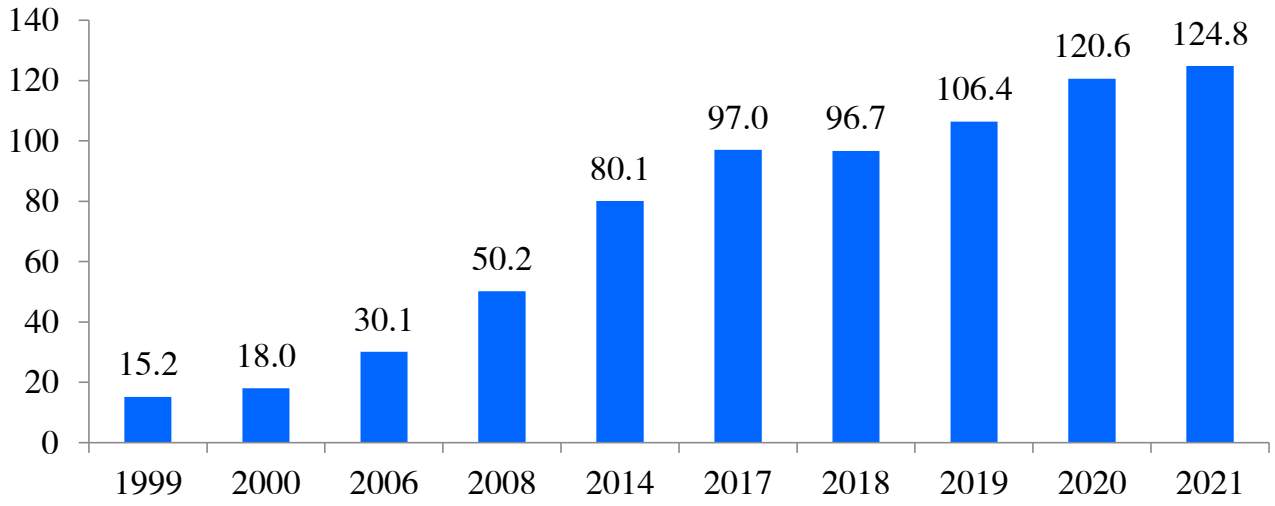

Fig. 1. **Dynamics of sales volumes of organic products on the world market, billion euros**

Source: compiled by the authors based on the data Yearbook "The World of Organic Agriculture": 2000–2023. URL: https://www.organic-world.net/yearbook.html

for five years, India is the first, where the number of producers has almost doubled — from 835 to 1599 thousand units. By such an indicator as sales volume, the United States, Germany and France are ahead of all, annually increasing the turnover of organic products. During the reporting period, the United States increased organic sales by 21.5%, Germany — by 59.0%, France — by 60.76%. However, the first place in terms of average per capita consumption of organic products for a number of years is occupied by Switzerland (increase in consumption level in the interval from 2017 to 2021 — from 288 to 425 euros / person per year), Denmark (from 278 to 384 euros / person per year) and Luxembourg (from 265 to 313 euros / person per year) with an average per capita consumption of organic products in the world in 2021–15.7 euros / person per year and in the European Union — 84 euros / person per year[3] [6, 7].

Along with this, as noted by R. W. Verburg, E. Verberne and S. O. Negro. Negro, the saturation of world markets by type of organic products also varies. For example, "the market share of organic dairy products in 2019 was 21% in Denmark, 16% in Austria and only 4.1% in the Netherlands' [8].

In Russia, this market segment is only beginning to emerge. The key prerequisite is the need to create sustainable agricultural production, independent of the Western policy based on the application of various sanctions. At the same time, there are already positive results of state regulation of the agricultural sector.

According to the yearbook "The World of Organic Agriculture", the market of organic food products in Russia in 2020 was estimated at 0.19 billion euros and accounted for only 0.16% of the world market,[4] and in 2021 (according to Rosstat) — 24.4 billion roubles (about 0.24 billion euros) and 0.19% of the world market. [6].

The total volume of organic products in Russia in 2021 was 287.8 thousand tonnes, 69.73% of which covered the domestic needs of the population, and 30.27% — went to meet foreign trade obligations [9]. According to Roskachestvo, in 2022 the number of "organic" regions increased from 40 to 45; 173 agricultural producers were certi-

[3] Action plan for organic production in the EU. URL: https://agriculture.ec.europa.eu/farming/organic-farming/organic-action-plan_en

[4] Yearbook "The World of Organic Agriculture": 2000–2023. URL: https://www.organic-world.net/yearbook.html

Table

Top leading countries in the global organic market

Years Key indicators	2017	2018	2019	2020	2021
Area of land under organic agriculture, mln hectares	Australia — 35.6 Argentina — 3.4 China — 3.0	Australia — 35.7 Argentina — 3.6 China — 3.1	Australia — 35.7 Argentina — 3.7 Spain — 2.4	Australia — 35.7 Argentina — 4.5 Uruguay — 2.7	Australia — 35.7 Argentina — 4.1 France — 2.8
Number of organic producers, units.	India — 835 000 Uganda — 210 352 Mexico — 210 000	India — 1 149 371 Uganda — 210 352 Ethiopia — 203 602	India — 1 366 226 Uganda — 210 353 Ethiopia — 203 602	India — 1 599 010 Ethiopia — 219 566 Tanzania — 148 607	India — 1 599 010 Uganda — 404 246 Ethiopia — 218 175
Sales of organic products, billion euros	USA — 40.0 Germany — 10.0 France — 7.9	USA — 40.6 Germany — 10.9 France — 9.1	USA — 44.7 Germany — 12.0 France — 11.3	USA — 49.5 Germany — 15.0 France — 12.7	USA — 48.6 Germany — 15.9 France — 12.7
Average per capita consumption of organic products, EUR/person/year	Switzerland — 288 Denmark — 278 Sweden — 237	Switzerland — 312 Denmark — 312 Sweden — 231	Denmark — 344 Switzerland — 338 Luxembourg — 265	Switzerland — 418 Denmark — 384 Luxembourg — 285	Switzerland — 425 Denmark — 384 Luxembourg — 313

Source: compiled by the authors based on the data Yearbook "The World of Organic Agriculture": 2000–2023. URL: https://www.organic-world.net/yearbook.html

fied; 146 of them are directly involved in organic production.[5]

The redistribution of land resources in favour of the development of this type of farming is evidenced by the following data: 2020 in our country, the area of land under organic farming was equal to 615.2 thousand hectares, and already in 2021–655.5 thousand hectares.[6] (According to this indicator, Russia is in 14th place among the world countries).

MECHANISM OF STATE REGULATION OF ORGANIC AGRICULTURE AND ORGANIC MARKET: COMPARATIVE ANALYSIS

Since each state — participant of the organic market has its own specific economy, its own potential for the development of organic production, the mechanisms of regulation and state support are built individually. They depend on such conditions as the level of legal regulation, the availability of resource potential, the amount of demand for organic food, the presence of a developed sales network. Let us consider the practices of state support and the expected results of the development of the market under consideration, characteristic of the United States, the European Union and Russia.

[5] Roskachestvo presented a rating of organic regions of Russia based on the results of 2022. Union of Organic Farming (official website). URL: https://soz.bio/roskachestvo-predstavilo-reyting-org/

[6] Yearbook "The World of Organic Agriculture": 2000–2023. URL: https://www.organic-world.net/yearbook.html

Specifics of regulation of organic agriculture in the USA

The official website of the US Department of Agriculture in 2022 presents the Organic Transition Initiative (OTI)[7] (hereinafter — the Initiative) — an interagency programme worth $ 300 million. The prerequisite for its appearance was the negative trends identified in the dynamics of the organic market in 2021.

Despite the fact that "organic products are available in all US markets and, according to surveys, 40% of Americans said that most of the products they consume are organic', there is a downward trend in their sales compared to 2020 by € 0.9 billion euros, or 1.82% [10].

Thus, the main objective of the Initiative is "to support producers during the period of transition to organic production and in the first years after certification (in order to minimise their risks associated with technical and market problems), as well as to assist in the formation and dynamic development of the organic market'.[8] Three U.S. government agencies are directly involved in the regulation of this process: the Agricultural Marketing Service, the Natural Resources Conservation Service, and the Risk Management Agency.

The main parts of the mechanism of state support of organic agriculture in the country, presented in the Initiative, in particular, in the "Programme of transition to organic partnership"[9] (hereinafter — the Programme) and other similar documents, are reflected in *Fig. 2*.[10]

This Programme is implemented in six regions of the United States and involves partner non-profit organisations, which make a significant contribution to the development of organic production, providing interaction between farmers and regional mentors; providing training opportunities; providing assistance in agronomy and certification procedures, as well as in the implementation of planning, conservation and regulation of business development. It is worth noting that great importance is attached to counselling in the application of the latest organic technologies and exchange of practical experience.

In the USA, there is a mandatory condition for farmers — land intended for organics must not be treated with prohibited substances (in particular, synthetic pesticides) for 3 years.

It should be emphasised that the business partners in the implementation of the Programme are Tuskegee University, the Small Farm Research Centre of the University of Alabama Agricultural and Mechanical Sciences and Auburn University, which regularly conducts seminars on organic farming.

Iowa State University, which has a sub-programme in this area, is also noteworthy, as is the Field Day project on science-based farming and educating farmers about the benefits of organic practices in the face of climate change, which attracted 256 participants in December 2023.[11]

Another area of state support of organic agriculture in the United States is direct assistance to farmers. For example, the Risk Management Agency implements the "Organic Conversion Assistance Programme', which provides a number of discounts (premium subsidies) to cover costs:

- premium subsidies to cover the cost of 10 percentage points on crops undergoing certification as part of the transition to organic production;
- insurance assistance of $ 5 per insured acre

[7] Organic Transition Initiative. U.S. Department of Agriculture. URL: https://www.farmers.gov/your-business/organic/organic-transition-initiative

[8] Ibidem.

[9] Transition to Organic Partnership Program. U.S. Department of Agriculture. URL: https://www.ams.usda.gov/services/organic-certification/topp

[10] TOPP Success Stories. U.S. Department of Agriculture. URL: https://www.ams.usda.gov/services/organic-certification/topp/stories

[11] TOPP Success Stories. U.S. Department of Agriculture. URL: https://www.ams.usda.gov/services/organic-certification/topp/stories

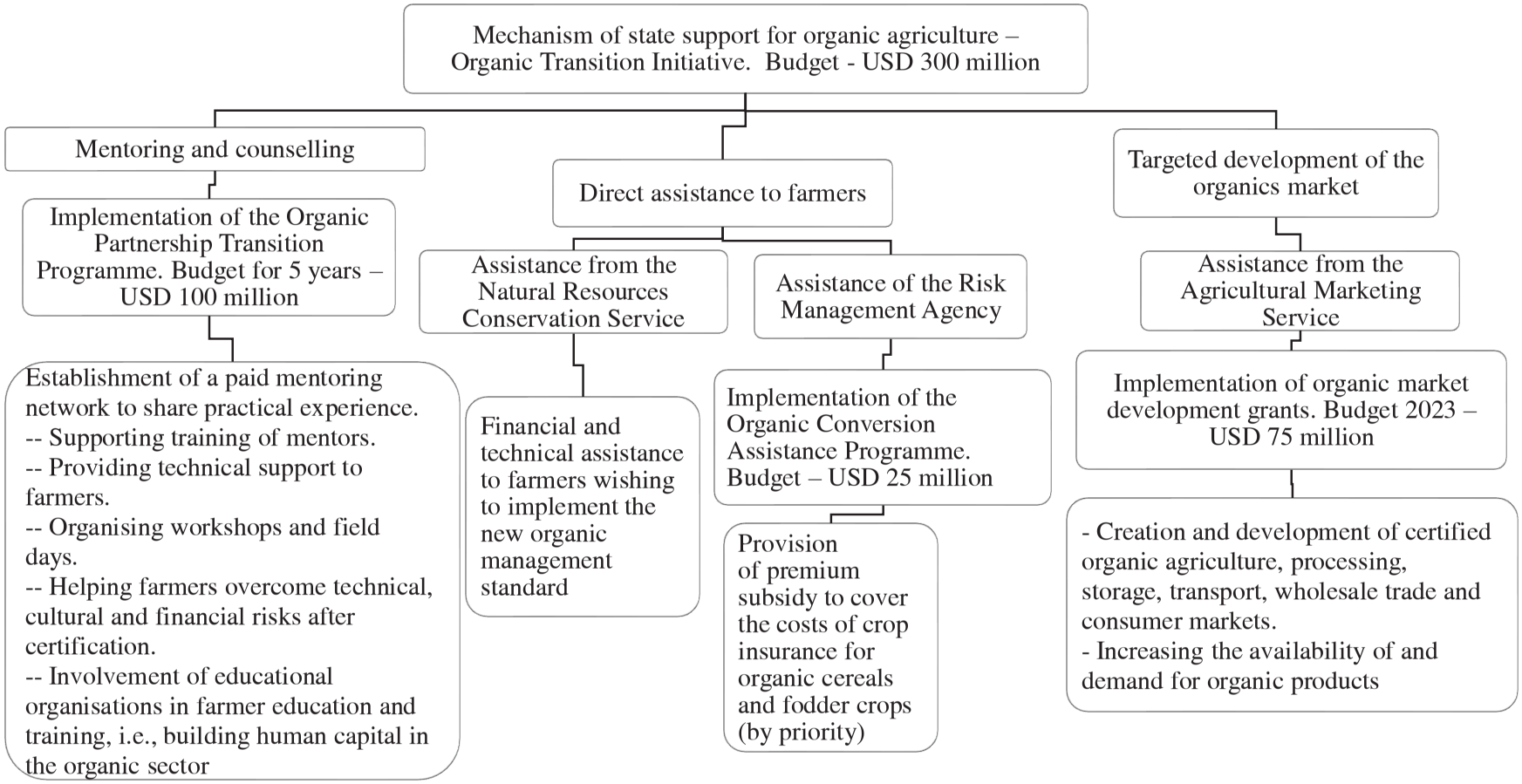

Fig. 2. **Mechanism of state regulation of organic agriculture in the USA**

Source: compiled by the authors based on the data Organic Transition Initiative – U.S. DEPARTMENT OF AGRICULTURE. URL: https://www.farmers.gov/your-business/organic/organic-transition-initiative

of organic grain and forage crop land;

• subsidised premium of 10 percentage points under the "Farmer Income Protection Programme',[12] which applies to all organically grown crops or certified organic crops.

The system of grants applied in the country, provided within the considered area of production, assumes two directions: a grant for a simplified project "Equipment Only' (implementation period — 2 years, amount — 10–100 thousand USD); a grant for a project on development and expansion of organic processing (3 years, 100–3000 thousand USD).[13]

It should be noted that the U.S. agricultural policy in the field of organic production is characterised by a pronounced targeted nature — the applied tools are aimed specifically at solving problematic issues.

Policies for the development of the organic market in EU countries

Further we will consider the specifics of the development of the organic market in the countries — members of the European Union (hereinafter — the EU), where this production is also a priority and is the basis of the "European Green Deal'.

Farm to Forks strategy, implemented within the framework of the "green course' of The Common Agricultural Policy (CAP) of the EU countries, contains a number of priority areas for the development of the organic market, which in March 2021 were reflected in the Action Plan for Organic Production in the EU[14] (*Fig. 3*).

In order to identify the impact of the direction "Promotion of organic consumption' in June 2022, a survey was conducted in the EU countries, which confirmed that 61% of its citizens recognise the logo "organic',[15] which is 5 percentage points higher than in 2021.

Thus, the work carried out to position organic products gives results, providing a high level of recognisability on the part of potential consumers, providing a certain image for certified producers, which allows to expand the boundaries of a certain niche market for this type of food products.

The Common Agricultural Policy of the European Union (as well as the United States) provides technical assistance to farmers through the Agricultural Knowledge and Innovation Systems (AKIS) programme, which guarantees advisory services through the exchange of information on best practices and the diversity of innovations in organic production.[16]

As a result of these measures, by the end of 2021, the EU will have increased sales of organic products to € 46.7 billion, just € 1.9 billion (or 3.91%) behind the US. As a consequence, the average per capita consumption of such products is growing. In particular, in Switzerland by the end of 2021, their sales rose by 1.67%, in Luxembourg — 9.82%.[17]

In 2021–2022, the European Commission foresaw an incentive of € 50 million/year for the increase in the area under organic farming and agriculture.[18] Also in the framework of the "green course" EU countries are implementing such di-

[12] Transitional and Organic Grower Assistance Program. U.S. Department of Agriculture. URL: https://www.farmers.gov/your-business/organic/organic-transition-initiative/toga#eligible-organic-grain-and-feed-crops

[13] Organic Market Development Grant. U.S. Department of Agriculture. URL: https://www.ams.usda.gov/services/grants/omdg

[14] Action plan for organic production in the EU. URL: https://agriculture.ec.europa.eu/farming/organic-farming/organic-action-plan_en

[15] Action plan for the development of organic production in the EU. What has been achieved so far? URL: https://agriculture.ec.europa.eu/system/files/2023–09/organic-action-plan-report-sept23_en.pdf

[16] EU Organic Day: Highlighting excellence across the organic value chain through the second EU Organic Awards. URL: https://agriculture.ec.europa.eu/news/eu-organic-day-highlighting-excellence-across-organic-value-chain-through-second-eu-organic-awards-2023–09–25_en

[17] Yearbook "The World of Organic Agriculture": 2000–2023. URL: https://www.organic-world.net/yearbook.html

[18] Implementation of the Organic action plan for the development of organic production in the EU: what has been achieved so far? URL: https://agriculture.ec.europa.eu/system/files/2023–09/organic-action-plan-report-sept23_en.pdf

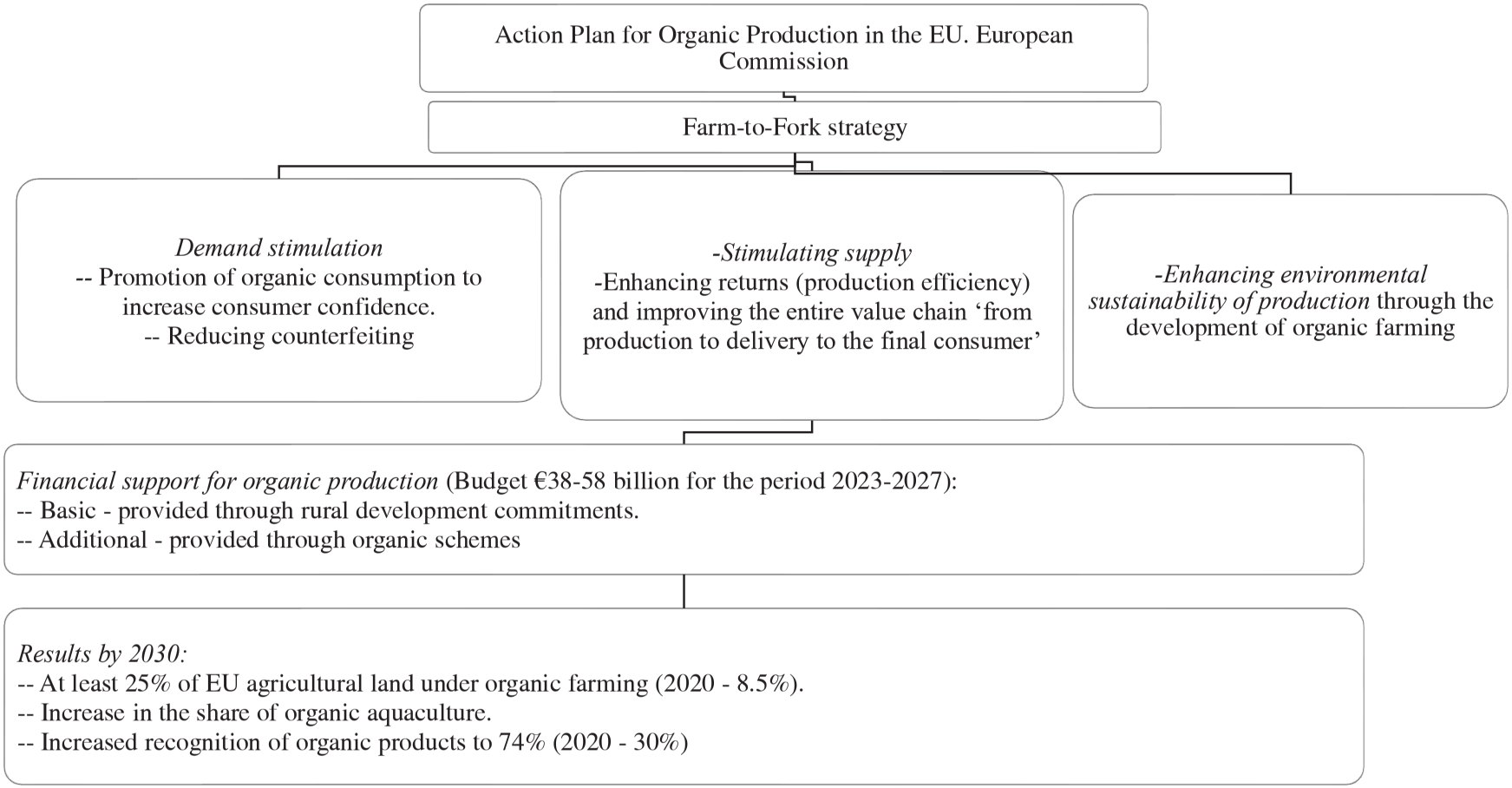

Fig. 3. **Mechanism of state regulation of organic agriculture in the EU**

Source: compiled by the authors based on the data Action plan for organic production in the EU. URL: https://agriculture.ec.europa.eu/farming/organic-farming/organic-action-plan_en

rection as "Improving the value chain in the field of organic production", which uses an incentive mechanism aimed at improving the image of organic producers (EU Prize for Excellence in Organic Production).

In September 2023, Brussels (Belgium) hosted the "EU Organic Day"[19] and the second award ceremony for several categories, such as: "Best Organic Seller" and "Best Organic Region". The German company Gut Wulksfelde, a producer and distributor with its own bakery and restaurant, won in the first category. In the second, the Burgenland region [Austria], which is implementing a strategy aimed at turning 50 per cent of all land in the region into organic farming and expanding its organic distribution network, including to regional canteens, cafés, and schools, was recognised as the leader of the competition.

Since the regulations in the US and EU were adopted in 2021–2022, it is currently difficult to analyse the impact of these mechanisms in more detail, but by the end of 2021, these countries have already seen an increase in both sales and average per capita consumption of organic products. Therefore, this practice can already be considered a success.

Russia: prospects for development of the organic agriculture segment

Russia is also on the way to the formation of organic agriculture. In conditions when "economic sanctions from the European Union and the United States, changed geo-economic situation, forced lockdowns caused by the COVID-19 pandemic, inevitably affect all spheres of the Russian economy", including the development of the domestic market of organic food [11], at the federal level steps are taken to regulate organic production. They include the following types of state support of agricultural producers, including those engaged in organic production:

- assistance in covering the costs of certification of products on foreign markets;
- assistance in covering the costs of transporting agricultural products and providing favourable tariffs for their transportation;
- assistance in covering the direct costs of creating (modernising) agro-industrial complex facilities, including those used in the processing of agricultural products;
- preferential lending and leasing;
- subsidising the promotion of products on foreign markets.

In 2020, the Federal Law "On Organic Products and Amendments to Certain Legislative Acts of the Russian Federation" came into force,[20] which served as an incentive to support the organic segment of agriculture at the level of constituent entities of the Russian Federation. In particular, at the regional level the following practices are implemented:

- subsidising the leasing and purchase of agricultural machinery;
- subsidising certification, part of the costs of organic production and 50% of the costs of biological remedies, veterinary medicines and feed additives approved for use in organic production;
- hectare support in crop production and dairy cattle breeding (per 1 litre of milk) during the transition period.

In addition, the initiative to support small and medium-sized businesses was launched by the Autonomous Non-Commercial Organization "Russian Quality System", which provides enterprises producing organic products with a privilege in the certification process.[21]

[19] EU Organic Day: Highlighting excellence across the organic value chain through the second EU Organic Awards. URL: https://agriculture.ec.europa.eu/news/eu-organic-day-highlighting-excellence-across-organic-value-chain-through-second-eu-organic-awards-2023–09–25_en

[20] Federal Law of 03.08.2018 No. 280-FL (ed. 29.12.2022) "On Organic Products and on Amendments to Certain Legislative Acts of the Russian Federation".URL: https://www.zakonrf.info/doc-35382364/?ysclid=lztzgicgm377984957

[21] Order of the Government of the Russian Federation of 04.07.2023 № 1788-o "On Approval of the Strategy for the Development of Organic Production in the Russian Federation until 2030". URL:

In July 2023, the "Strategy for the Development of Organic Production in the Russian Federation until 2030" was added to the existing measures,[22] which forms the general mechanism of state regulation of the development of this segment of agriculture (*Fig. 4*).

Note that the Government of the Russian Federation, in addition to economic support measures, provides a wide range of consulting services, etc. Leading agrarian universities of Russia in the course of their scientific activities implement projects that contribute to the development of organic production in different climatic zones, and project the results obtained on real projects, while using elements of mentorship.

Today, food industry enterprises are actively involved in the sphere of organic production, which allows to significantly expand the range of "organic" products, opens new opportunities for the development of the domestic market for these products and considering the prospects of entering the international level.

The above comparative analysis of the practice of state regulation of organic agriculture allowed us to conclude that there is a need for more detailed elaboration of the directions of development of the latter both at the level of the country and its subjects through the implementation of special programmes, for example, stimulating the development of individual subsectors (organic dairy farming).

We consider it appropriate to recommend additional ways and tools that form a more holistic mechanism of state regulation of the development of organic agriculture in Russia (*Fig. 5*).

CONCLUSIONS

The scientific novelty of the study lies in the identification of distinctive features of the mechanism of state regulation of organic production, characteristic of the policy of the United States, the EU and Russia, as well as recommendations of additional directions and tools that allow to form an integral system of state regulation of this sector of the economy in Russia.

1. The study of trends in the development of the global organic market has allowed us to conclude that its leaders are characterised by their own dynamics of key indicators, and as a result, each country (or their association) builds its own mechanisms of state support for this segment of the agricultural industry.

2. During the analysis of the main programmes and strategies in the sphere of organic production adopted in the USA, the European Union and Russia, the authors of the study identified priority areas of its development, as well as common and distinctive characteristics of the mechanism of state support.

The common blocks are the improvement of certification of organic land and production, the formation of a system of consulting in the field of certification, training and dissemination of best practices and information on innovation, technical and financial (investment) assistance to producers. At the same time, it is possible to identify several differences in the policies implemented by different countries.

In the USA, emphasis is placed on mentoring and human capital formation, subsidising part of the cost of crop insurance for organic grain and feed crops, as well as on the expansion of grant activities, which is due to the decreasing number of farms that prefer to work in organic production. Thus, the activation of citizens potentially interested in this activity is the main goal of the mechanism of state support.

In the EU, the emphasis is on the work of the media and advertising companies to increase con-

https://sudact.ru/law/rasporiazhenie-pravitelstva-rf-ot-04072023-n-1788-r/strategiia-razvitiia-proizvodstva-organicheskoi-produktsii/ii/9/

[22] Order of the Government of the Russian Federation of 04.07.2023 № 1788-r "On Approval of the Strategy for the Development of Organic Production in the Russian Federation until 2030". URL: https://sudact.ru/law/rasporiazhenie-pravitelstva-rf-ot-04072023-n-1788-r/strategiia-razvitiia-proizvodstva-organicheskoi-produktsii/ii/9/

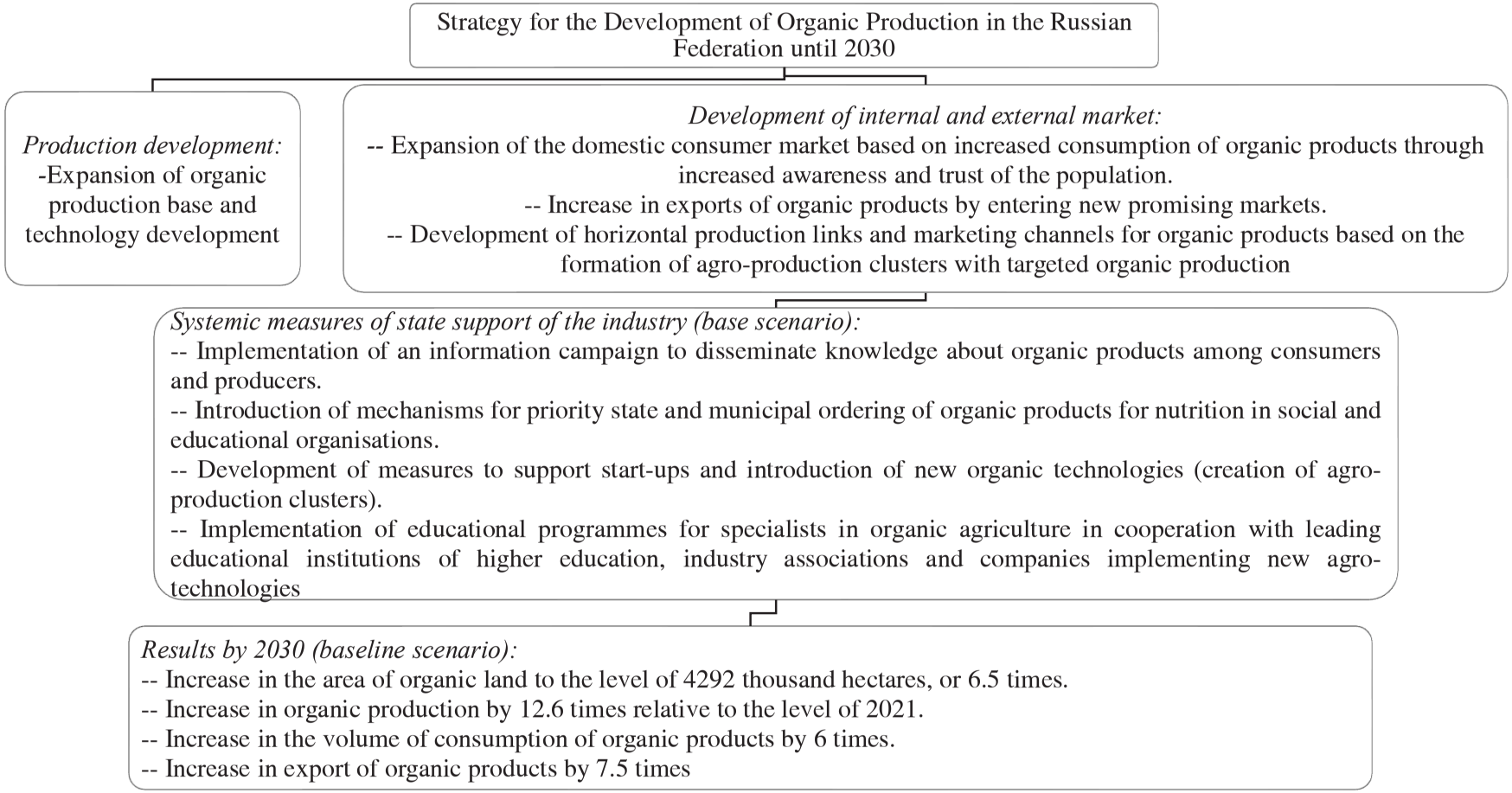

Fig. 4. **Mechanism of state regulation of organic agriculture in Russia**

Source: compiled by the authors on the basis URL: https://sudact.ru/law/rasporiazhenie-pravitelstva-rf-ot-04072023-n-1788-r/strategiia-razvitiia-proizvodstva-organicheskoi-produktsii/ii/9/

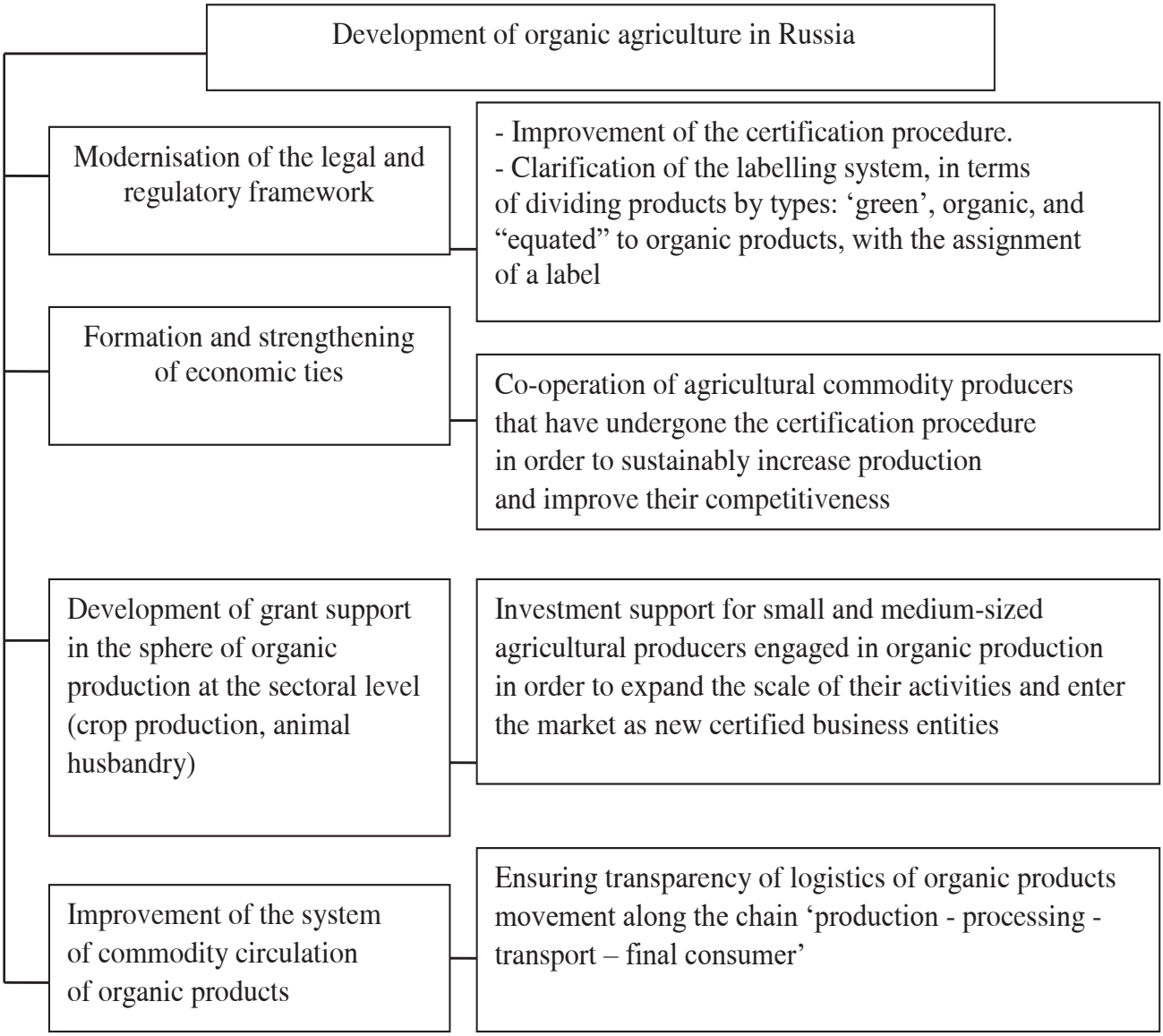

Fig. 5. **Additional instruments of state regulation of organic agriculture in Russia**

Source: compiled by the authors.

sumer confidence in organic products; in addition, such a measure as non-financial bonuses (awards) is used to promote the image of organic producers.

3. In Russia, by the end of 2021, there were already significant results of the implementation of the mechanism of state support for organic production and development of the organic market, as evidenced by the increase in the area of organic land, and the growth of turnover of relevant products.

Perspective directions outlined in the new "Strategy for the development of organic production in the Russian Federation until 2030" are partly similar to those envisaged in the programmes of the USA and the European Union — these are subsidies, knowledge projection, technological equipment of organic production.

A distinctive lever is the "state order of organic products for nutrition in social and educational organisations", the purpose of which is not only

to ensure guaranteed production, but also to position the state's interests in preserving the health of the younger generation.

4. Comparative analysis of mechanisms of state regulation of the development of organic agriculture and the market of organic products allowed us to propose a number of additional tools that can be applied at the level of sub-sectors (e.g., vegetable production or dairy farming) and constituent entities of the Russian Federation seeking sustainable development of the regional economy. The results of the study suggest that a more detailed analysis of foreign and domestic experience in the development of organic agriculture, evaluation of the effectiveness of the adopted mechanism of state support are critical for the development of tactical directions of development of this segment, both at the level of the state as a whole, and at the level of constituent entities of the Russian Federation.

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Profitability Indicators: Critical Analysis and Applicability in Modern Conditions

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ABSTRACT

Constant variability of the external environment is one of the key features affecting the business activity of domestic organizations and generates the need for constant updating of managers' professional skills. The issues of assessment efficiency of commercial companies are always relevant not only for owners, but also for managers, employees and other stakeholders. In the conditions of economic instability, the interest to the indicators of organizations' efficiency increases and, accordingly, their clarification and adjustment is required. and adjustment. **The purpose** of the study is to summarize the profitability indicators depending on the goal-setting of the participants of commercial organizations and to establish the possibility of using these indicators to assess the effectiveness of the company's activities. Many years of experience of the authors of this article in the field of business valuation allowed to systematize the techniques of calculation of the main profitability indicators, to present an updated system of their grouping, as well as to classify the factors affecting them. Also, theoretical approaches to the calculation of invested capital were generalized in the course of the work. The research applied the **methods** of analysis, comparison, synthesis, classification, collection and generalization, logic, graphical and tabular display of information. Theoretical significance of the obtained **results** consists in the development of the methodology of value-oriented management in order to actualize and adapt the algorithms for calculating profitability indicators to domestic conditions, taking into account the interests of the participants of the organization. The practical significance of the work consists in the development of methods for assessing the performance indicators of the company, which can be used in the corporate governance of commercial structures, as well as in making management decisions by stakeholders.
Keywords: value approach; value-based management; valuation methods; equity capital; invested capital; profitability

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INTRODUCTION

Correct and timely decision-making in management is a basic condition for building a successful organization capable to cope with external and internal challenges and achieve effectively its goals. One would not answers to management questions in the abstract without assessment of the results achieved. To make a certain management decision, a manager must consider the potential impact on the profitability indicators and as a follow-up to assess effectiveness and efficiency of the company's activities. In this regard, all issues of assessing the achieved results are key factors for building a reasonable approach to management, and besides, for solving potential problems of the estimate of efficiency (profitability and cost efficiency) of commercial organizations which remain relevant not only for their owners, but also for their managers, employees and other stakeholders.

The authors of the study set as their goals to collect and classify coefficients of profitability and, depending on the goal-setting of the participants of commercial companies, also define options for their employment to assess the efficiency of the company. During the scientific research, the following tasks were solved: the authors have determined classification of the main profitability indicators and the factors influencing them. Besides, they made a systematization of the calculation technique for these indicators (employed by foreign and domestic authors) as well as differentiation of these indicators in accordance with the criterion of applicability for the purposes of individual stakeholders. The authors also made a general summery of theoretical approaches towards calculating invested capital as well.

It is worth noting, that within the framework of this work, the authors also studied general indicators of profitability regardless of the type of activity for such type of commercial corporate organizations in business, as joint-stock companies (JSC) and limited liability companies (LLC).

METHODOLOGY AND INFORMATION BASIS OF RESEARCH

As a rule, the traditional approach to assessing the performance efficiency of an organization (in this case, a commercial company) is primarily estimated on original goal of commercial enterprises, which are established aimed to make a profit as a result of their core activities.[1]

It is worth noting, that this approach has a few essential disadvantages: the presence of which require the need to use other indicators for such an assessment. Due to development of scientific thought in the theory of strategic management, several basic methods emerged to determining effectiveness of organizations and this made it possible to identify positive aspects of the entity for its stakeholders.[2]

One of them is the concept of Value-Based Management (VBM), a mindset known in the Russian scientific literature as "theory of cost management" or "cost approach to management". A. Rappoport [1], J. Olson [2], T. Copeland [3], B. Stewart [4] and A. Damodaran [5, 6] developed main provisions of the concept. Based on many value-oriented indicators, some of the key indicators deal with profitability. The theory of cost management and its individual aspects were also elaborated by such domestic specialists in the field of financial management as I.A. Astrakhantseva [7], D.L. Volkov [8], D.S. Demidenko [9], A.M. Emelianov [4], I.V. Ivashkovskaya [10], V.V. Kobzev [11], T.V. Teplova [12], S.V. Cheremushkin [13], E.A. Yakovleva, E.A. Kozlovskaya [14] and some more experts.

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[1] Civil Code of the Russian Federation (part one) of 30.11.1994 No. 51-FZ (as amended on 08.08.2024) URL: https://www.consultant.ru/document/cons_doc_LAW_5142/3a585d0351c74adc4c9878b6019d704cdd9d3699/?ysclid=m012ixzl8v606408912

[2] Stakeholder is a person or organization that can influence the activity or decision-making, be subject to their influence, or perceive themselves as the latter.URL: https://www.consultant.ru/document/cons_doc_LAW_195013/?ysclid=m012tjt77k154334434

A.N. Golovina ranks indicators related to effectiveness of the organization's cost management by complexity and accuracy, assessing in priority the return on equity, return on net assets and dividend yield [15]. In our opinion, this needs to be expanded and to be brought to uniform designations and formulations, which in fact served as a prerequisite for conducting this study.

The authors of this research work have used more methods of analysis, comparisons, synthesis, classification, collection and generalization, logic, as well as graphical and tabular presentations. The above-mentioned works of international and domestic specialists in the field of the topic under study made an information basis for this article.

RESULTS

The concept of value-oriented management was revealed among other parts of the study, through the approach towards assessing the effectiveness of an organization's management, which is generally based on the profitability indicators proposed within its framework. Merging and ranging of these indicators was based on calculation of the rate of return on assets, return of equity employed and total financial return which in display in *Fig. 1*.

The indicators of profitability for the company under consideration may not be of interest to all stakeholders. This is why it is important to classify the latter and identify those among them who are the subject of the study. The main criterion should be their affiliation: whether stakeholders belong to the organization or they are outsiders (*Fig. 2*). The first group is internal, and these stakeholders are analyzed in accordance with the principle of close or no association with the company's management bodies.

The second (external) group is, in its turn, divided into several large sub-groups, and their list is open. This circumstance is due to the fact, that it is not possible to categorise the full list of such stakeholders due to the unclear motives of the involvement of these persons, who may find themselves influenced by the organization's decisions. At the same time, it is permissible to categorize several large groups of stakeholders for the purposes of the study, which was accomplished in the course of the work. Subsidiaries for the purposes of classification are formally excluded

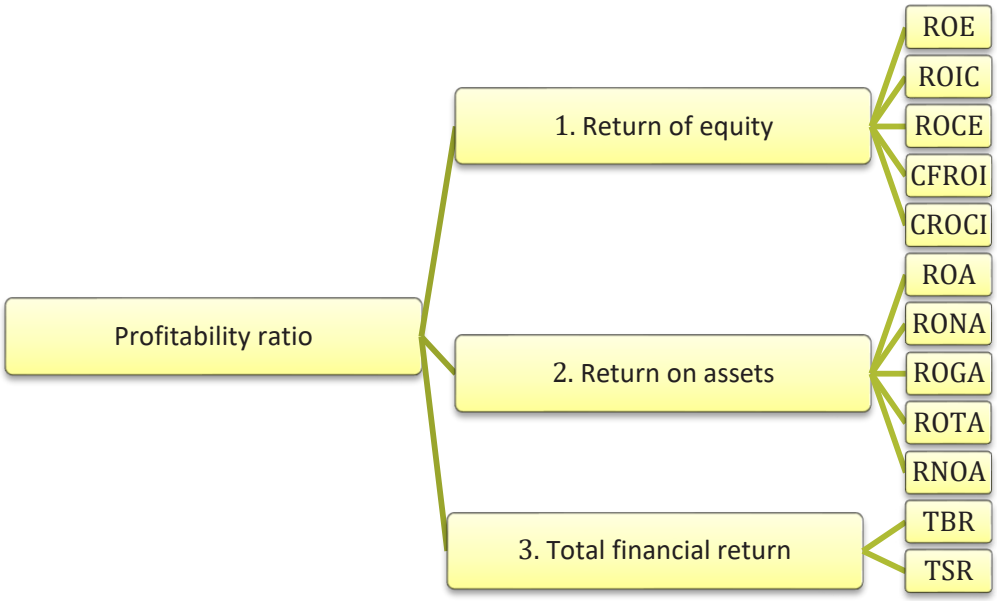

Fig. 1. **The main profitability indicators within the framework of value-based management**

Source: compiled by the authors based on [8, 9, 16].

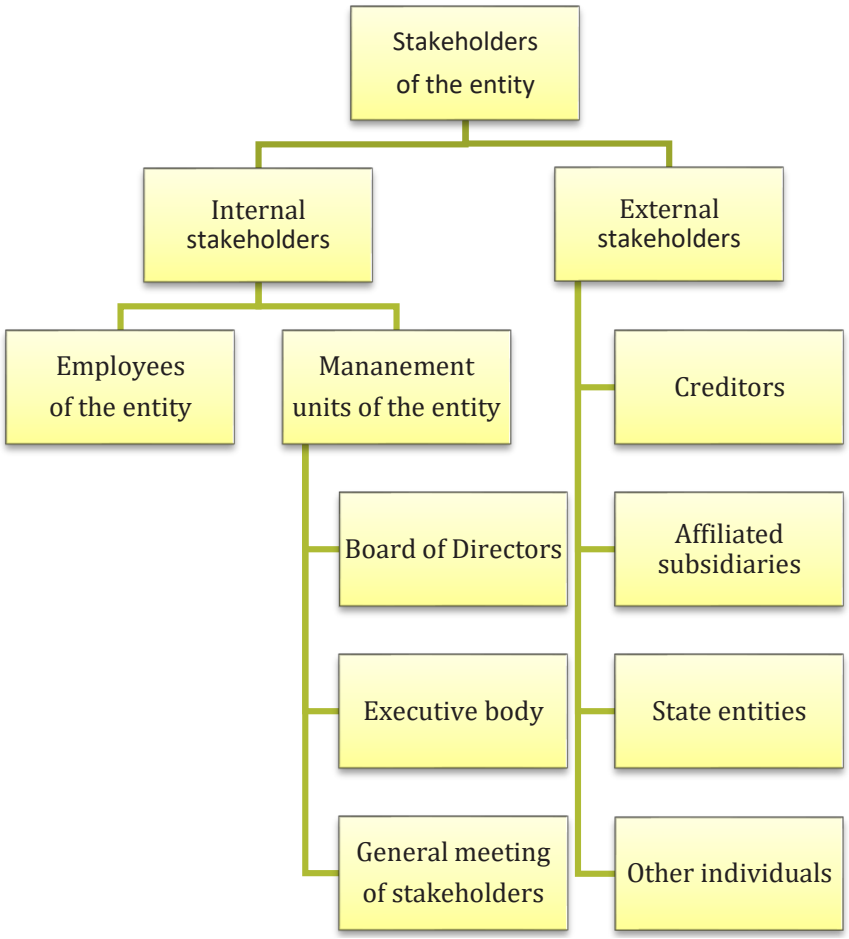

Fig. 2. **Commercial corporate organization's stakeholder tree**

Source: compiled by the authors based on [17].

from outside the perimeter of the company under consideration: since, as a matter of fact, they formally operate as quite a separate and often independent business category.

Since internal structure is of paramount importance for existence and activities for any company, the focus is on internal stakeholders — within its internal perimeter. At the same time, the assessment of the company's effectiveness should take into consideration all points of view of LLC participants (or shareholders), because their influence cannot be disregarded. By virtue of competence, the General Meeting of owners has exclusive powers to form executive bodies, terminate their powers before the schedule ends, or delegate the powers to other persons.[3] Since the entity's participants are beneficiaries of its activities as well, they have the right to appoint governing bodies. This is why the entity's administrator, who runs the company, cannot ignore their interests, while carrying out their duties. This also determines the need to consider any indicators of effective performance of the entity from the point of view of its participants.

[3] Federal Law of 08.02.1998 No. 14-FZ (as amended on 08.08.2024) "On Limited Liability Companies". Clause 2 of Art. 33. URL: https://www.consultant.ru/document/cons_doc_LAW_17819/a30bf80b5a1bd89c0c53d61c2d178b65a9a20f60/; Federal Law of 26.12.1995 No. 208-FZ (as amended on 08.08.2024) "On Joint-Stock Companies". URL: https://www.consultant.ru/document/cons_doc_LAW_8743/fca351034948ee4a2889d0f3c08595a7933ea9f2/

In the interests of research, it is necessary to assess furthermore the profitability indicators of value-oriented management for their compliance with objectives of the corporation's activities in accordance with points of views of the stakeholders under consideration — its participants (owners). Any reasonable investor has a similar motive: just income from activities of the entity, which is, according to the rights of the entity's participants, guaranteed by domestic corporate legislation. There are the following types of income:

- dividends — a portion of the profit subject to be paid to participants of the entity;
- the difference between the acquisition price of a participatory interest in the capital of the entity and the value of property received by the participant after the liquidation of the entity;
- the difference between acquisition price of participatory interest in the capital of the entity and its sale price (market value);
- the difference between acquisition price of a participation interest in the capital of the entity and value of interest in case if the participant withdraws from the limited liability company.

The authors have accomplished a comprehensive analysis of profitability indicators (*Fig. 1*) and made a general conclusion regarding the possibility of application of profitability indicators in current conditions by means of correlating algorithms to calculate these indicators and the criteria (factors) shown in *Fig. 2* with consideration of financial interests of the entity's owners.

Fig. 3 shows the classification of factors needed to take into account for calculating these indicators.

It is worth noting, that comprehensive analysis of the latter indicators implies taking into account of the following aspects:

- all forms of income that can be received exactly by owners of the company generated by personal involvement in their capital. In *Fig. 3* **Formal factor**: profitability indicators from the point of view of the company's participants should reflect the profitability which they can claim in the context of all previously identified forms of income;

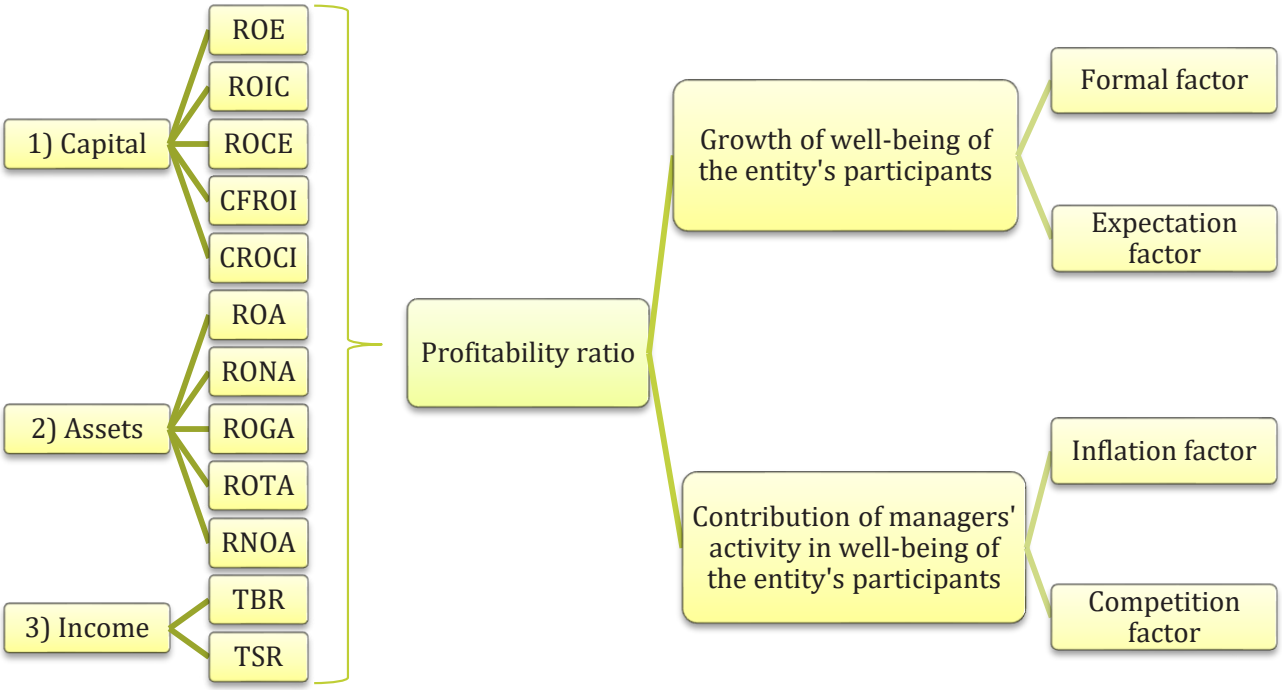

Fig. 3. **Classification of factors affecting profitability indicators**

Source: compiled by the authors.

• expectation of future incomes and risks of their receipt. In *Fig. 3* **Expectation factor**: taking into account prospects of the company's participants in relation to future income, including uncertainty and corresponding risks, initial unprofitability of any investment activity related to development (investors are willing to cover these losses with their funding at their own expense for the sake of future profits);

• **Inflation factors** (*Fig. 3*) which may distort the company's performance assessments: profitability indicators should allow to judge the actual performance of the entity regarding the results achieved in the retrospective time period, excluding the influence of inflation, which may become a source of error;

• efficiency of the company's activity evaluated in relations to competitors (*Fig. 3* — **Competitive factor**): conducting a benchmarking analysis of the company's indicators of profitability comparing with the main competitors.

In the course of further research, the authors took into account the above factors.

It is worth noting as well the following aspects:

• the formulas below use Russian ruble as a reference to a monetary unit;

• during the analysis of sources of information on the topic of the study, it was revealed that the same indicators are perceived as different notions in their semantic content. In this regard, each formula is attributed to the source containing the formula indicated, as well as methodological explanations clarifying the features of calculating this or another coefficient;

• the indicators under consideration are brought to a common notion in terms of comparability of values with the time factor. Sometimes calculation requires simultaneous use of company performance indicators, such as statistic data, relevant to a specific date (for example, quoted from the balance sheet), dynamic indicators, reflecting the results for a certain time period (for example, the data from the financial performance report and/or cash flow). For the purpose of comparison in formulas, the authors use average values of statistical indicators for the period of relevance of the dynamic ones. Besides, the authors add an indication, that these ratios are calculated within a certain time period.

ANALYSIS RESULTS: PROFITABILITY INDICATORS OF VALUE-BASED MANAGEMENT

The first group includes indicators based on the ratio of certain types of profit and company's capital:

Return on Equity (ROE) for the period *n* is calculated with the following formula [18, 19]:

$$ROE_n = \frac{NI_n}{\bar{E}_n}, \quad (1)$$

with NI_n as net profit in thousand Rubles for the time period *n* and $\bar{E}_n$ as average value of equity in thousand Rubles for the time period *n*.

The ROE indicator demonstrates profitability of company's assets generated from the funds of its participants, based on its financial result, and it also illustrates effectivity of investments in this company (compared with possible alternatives), based on the amount of its net profit.

At the same time, since such indicator as *ROE* is based on the amount of net profit, its use for the category of stakeholders under study is not appropriate. The reason is that income of the company's owners is determined on the basis of the amount of the company's net profit, reduced prior to payment of dividends, for example, by the amount of investments in capital assets and working capital required for functioning, or by the amount of borrowed funds to be repaid in the calculation period. At the same time, the amount of dividends, which could be paid to the owners of the company's equity instruments, do not reflect expectations related to the company's performance, as well as risks that follow together with receiving income.

In this regard, the application of a coefficient based on the value of net profit without additional adjustments, which take into account the above circumstances, is not consistent with objectives of the company's participants.

There is an option of calculating *ROE* suggested by A. Damodaran [5, 6], which implies the use of this indicator only for a certain part of equity capital that relates to ordinary shares. This option raises doubts about consistency of its application in relation to assessment of efficiency of those emitters, who issued, among other things, preferred shares, since a part of net profit of such an emitter subject to distribution is directed to payment of dividends of this type of shares as well. This circumstance potentially causes incomparability of numerator and denominator in the formula used (1). Therefore, this indicator should not be used in practice.

Return on Invested Capital (*ROIC*) for the time period *n* is calculated by means of the following formula[4]:

$$ROIC_n = \frac{NOPAT_n}{\overline{IC}_n}, \quad (2)$$

with $NOPAT_n$ as net operating profit after tax deducted in thousand Rubles for the time period *n*, $\overline{IC}_n$ as average value of invested capital in thousand Rubles for the time period *n*.

$NOPAT_n$ is calculated as Net Operating Profit After Tax before interest payable and income tax, similarly to designated indicator EBI in specialized literature [12, 20, 21].

Coefficient *ROIC* helps to determine profitability of the company's assets compiled from all available sources of financing, based on financial results related to all of them.

This indicator, in comparison with return on equity, involves a larger number of stakeholders, including both the company's participants and other persons (for example, its creditors). It also allows clearly figuring out effectiveness of investments in the company's capital, regardless of the source of its assets, based on the amount of profit attributable to stakeholders (whose investments are accounted for as part of the company's invested capital).

There is another option of calculation: instead of net profit from sales after income tax for the time period (NOPAT), the numerator is the indicator of Earnings Before Interest and Taxes (EBIT) [5, 6, 19], but the format of the *ROIC* indicator does not change significantly.

Return on Capital Employed (*ROCE*) for the time period *n* is calculated with the following formula [12, 20]:

$$ROCE_n = \frac{NOPAT_n}{\overline{CE}_n}, \quad (3)$$

with $NOPAT_n$ as net operating profit after tax in thousand Rubles for the time period *n*, hereinafter this indicator is calculated as profit before deducting interest payable and income tax (similar to the indicator designated as EBI in specialized literature), meanwhile $\overline{CE}_n$ is the average value of capital employed in thousand Rubles for the time period *n*.

This indicator is close in the essence to the Return on Invested Capital (*ROIC*) and may correspond to it under certain conditions. However, in most techniques, *CE*, which means Capital Employed is a reimbursable investment in the form of equity and interest-bearing[5] borrowed capital. In analyzed algorithms for calculating the indicators, equity capital is regarded as a source of financing that involves the remuneration payment for its provision, since it is assumed, that the company will provide all its investors with the required rate of return. Sometimes one can find the designation ROTC,[6] which in most cases corresponds to ROC. However, these indicators may differ depending on the way for calculating the amount of invested capital and on understanding of the term "total capital".

[4] Heyes A., James M., Kazel M. Return on Invested Capital: What Is It, Formula and Calculation, and Example. Investopedia. URL: https://www.investopedia.com/terms/r/returnoninvestmentcapital.asp; Alt-Invest (Encyclopedia). URL: https://www.alt-invest.ru/library/kb/

[5] Return on invested capital, ROIC. Alt-Invest (Encyclopedia). ROIC. URL: https://www.alt-invest.ru/lib/roic/?ysclid=ltlqdo9opr786334189

[6] Return on Total Capital (ROTC). URL: https://corporatefinanceinstitute.com/resources/accounting/return-on-total-capital/

There is also another way to calculate *ROCE*, which implies taking into account the profit, or earnings before interest and taxes (EBIT) for denominator, or net operating profit, however, after income tax paid (NOPAT). Anyway, the focus of the indicator under consideration does not change significantly: it is oriented towards a whole variety of stakeholders, and therefore cannot be used for the purposes under consideration.

Cash Flow Return On Investment (CFROI) in general and for the time period *n* can be determined using the following formula [8]:

$$CFROI_n = \frac{CF_n^{adj}}{\overline{CI}_n^{adj}}, \quad (4)$$

with CF_n^{adj} as inflation-adjusted cash inflow in thousand Rubles for the period *n* and $\overline{CI}_n^{adj}$ as average inflation-adjusted investment in the company in thousand Rubles for the time period *n*.

Denominations of indicators used in the research work by D.L. Volkov [8] have been adjusted in accordance with their actual economic meaning. This circumstance regarding the numerator of formula (4) is resulted by the fact, that receipts (or cash inflows, according to the source) do not quite correctly reflect benefits for stakeholders who do not take into account cash outflows (payments). This is why the use of *cash flows* in formula (4) is more appropriate and corresponds to some other options for calculating CFROI, which is discussed below.

As to denominator, it is worth noting that companies often receive large non-monetary investments, for example, various contributions to the capital from participants. This is why "monetary" definition (regarding investments) is removed from this formula.

Due to inflation impact, adjustments are necessary for the components of formula (4). Their purpose, based on economic sense, is to bring the quantities under consideration to the form corresponding to a single price level.

According to A. Damodaran, it is possible to calculate the indicator under consideration with a more detailed formula [5, 6]:

$$CFROI_n = \frac{GCF_n - ED_n}{\overline{GI}_n}, \quad (5)$$

with GCF_n as gross cash flow in thousand Rubles for the time period *n* and $\overline{GI}_n$ as gross investment in the entity in thousand Rubles for the time period *n*. Meanwhile ED_n as Economic Depreciation for the time period *n* can be calculated using the following formula:

$$ED_n = \frac{RC_n}{\left(1 + \overline{r}_n^{IC}\right)^n - 1}, \quad (6)$$

with *RC* as replacement cost of assets in thousand Rubles for the time period *n*, $\overline{r}_n^{IC}$ average cost of raising invested capital for the period *n* in per cent, and *n* as an expected lifespan of assets at the date of calculation of the indicator expressed in the length of period n (years, months, weeks, etc.).

According to A. Damodaran, all-round investments in a company should be regarded as the book value of assets adjusted. Firstly, adjustment is the result of inflation that probably occurred during the period from the date of their acceptance for accounting, until the date of calculation of the required indicator. Secondly, adjustment is related to amount of accumulated depreciation of assets over the same time period. In fact, according to M.L. Pyatov [22], the amount of total investment in this case is equated to replacement cost of assets in current terms, which is justified from the viewpoint of management decision. The scientist notes pointed out, that the most appropriate way is to assess the value of relevant assets at their fair value by means of using accounting data to obtain information on the volume of aggregate investments.

The term "gross cash flow" is correctly acquired from English by M.L. Pyatov, is defined by him, as operating profit [profit after paying business costs]

including costs of depreciation and amortization and taxes to be paid.

Cash Return on Capital Invested (*CROCI*) is calculated in thousand Rubles for the time period *n* with the following formula[7]:

$$CROCI_n = \frac{EBITDA_n}{\overline{E}_n}, \quad (7)$$

with $EBITDA_n$ as Earnings Before Interest payable and income Tax profit Deduction and Amortization paid in thousand Rubles for the time period *n* and $\overline{E}_n$ as the average capital of the equity in thousand Rubles for the time period *n*.

This indicator under consideration can be used to assess the efficiency of the company's activities only if it has no borrowed funds, since otherwise both the numerator and denominator are incomparable. To correct this discrepancy, if the company has borrowed funds, it is possible to either apply the invested capital in the denominator, indicator that excludes interest payable from this amount in numerator.

If both numerator and denominator are comparable, *CROCI* can be regarded as alternatives to indicators of efficiency of return on equity and invested capital, implying cash flows instead of a certain type of profit. At the same time, this profitability ratio has disadvantages, similar to those indicators observed above, and, as a result, it is inappropriate to apply it for the needs of the company's participants.

The second group includes indicators based on the ratio of certain types of profit and assets:

Return on assets (ROA) in thousand Rubles for the time period *n* is calculated by means of the following formula[8]:

$$ROA_n = \frac{NI_n}{\overline{TA}_n}, \quad (8)$$

with NI_n as net income for the time period *n* in thousand Rubles and $\overline{TA}_n$ as the Total (amount of) Assets for the time period *n* in thousand Rubles.

The indicator under consideration makes it possible for the company to assess the efficiency of operations with its assets. It also gives a clear understanding for stakeholders of the entity, how effectively investments generate the net profit.

There are several options for making calculation of *ROA*:

- with the amount of net profit and interest expense payable included in the numerator [19];
- using pre-tax income indicators, when the amount of operating profit without deduction of any taxes included in the numerator [8];
- with the amount of net profit and interest expense payable included in the numerator, but the specified percentage is subject to reduction by the amount of income tax accrued on them (After-Tax Interest) [5, 6, 23].

The last and the last-but-one options have a more accurate algorithm for calculating asset efficiency for stakeholders. In this case, the financial indicators will be comparable, taking into account the interests of stakeholders' majority and the amount of assets acquired with funds of these stakeholders.

The following formula[9] makes calculation for *Return On Net Assets* (RONA) for the time period *n*:

$$RONA_n = \frac{NI_n}{\overline{FA}_n + \overline{NWC}_n}, \quad (9)$$

with NI_n as the Net Income for time period *n* in thousand Rubles, $\overline{FA}_n$ as the average value of Fixed Assets in thousand Rubles for the time period *n* and $\overline{NWC}_n$ as the average value of Net Working Capital for the time period *n* in thousand Rubles, which, in its turn, is determined in the course of the following calculations:

[7] Kenton W., Kindness D., Munichiello K. Cash Return on Capital Invested (CROCI): What it is, How it Works. Investopedia. URL: https://www.investopedia.com/terms/c/croci.asp

[8] Hargrave M., Kindness D., Eichler R. Return on Assets (ROA): Formula and ‚Good' ROA Defined. Investopedia. URL: https://www.investopedia.com/terms/r/returnonassets.asp

[9] A. Heyes, J. Barry-Johnson. Return on Net Assets (RONA): Definition, Formula, Example. Investopedia. URL: https://www.investopedia.com/terms/r/rona.asp

$$\overline{NWC}_n = \overline{CA}_n - \overline{CL}_n, \quad (10)$$

with $\overline{CA}_n$ as the average value of Current Assets in thousand Rubles for the time period *n* and $\overline{CL}_n$ as the average value of short-term or Current Liabilities for the time period *n* in thousand Rubles.

This indicator allows to make assessment of profitability of a company's assets (as both fixed assets and current assets) formed with its own funds and based on the amount of net profit. It can be used by companies with income largely formed at the expense of fixed assets, reflecting the efficiency of use of both their own fixed assets and their own working capital. In general, this indicator is of scarce information value for participants of companies, who are more interested in income from ownership of shares in its capital, rather than how efficiently particular assets are used.

D.L. Volkov [8] suggested other options for the calculation of *RONA* with the numerator for Earnings before Interest (EBI). The numerator is either the difference between total assets and accounts payable for creditors, or the amount of equity and liabilities that provide for the payment of interest ("paid liabilities'), which is, another words, Capital Employed.

Return On Gross Assets (*ROGA*) is calculated for a certain time-period *n* by means of the following formula [8, 12]:

$$ROGA_n = \frac{GOPAT_n}{\overline{GA}_n}, \quad (11)$$

with $GOPAT_n$ as Gross Operating Profit After Tax deducting for the time period *n* in thousand Rubles. This indicator is different from *NOPAT* due to amortization, deducted from income, as part of the cost price restored when calculating *GOPAT*. Another words, *GOPAT* includes depreciation charges. $\overline{GA}_n$ is the average value of Gross Assets in thousand Rubles for the time period *n*.

Gross Assets are the assets acquired from financing sources that involve a finder's fee for their provision, namely interest-bearing loans and equity increased by the amount of accumulated depreciation.

This indicator in consideration, as follows from its content, is mainly oriented on investors, who provided the entity with reimbursable financing and not on the company's participants. Regarding its content, *ROGA* is closer related to Return on Capital Employed (*ROCE*), however, the difference is in presence, or absence of accounting for depreciation charges (amortization) both in the numerator and denominator of their calculation formulas.

The following formula[10] finds out the total of *Return On Total Assets (ROTA*)

$$ROTA_n = \frac{EBIT_n}{\overline{TA}_n}, \quad (12)$$

for the time period *n* with $EBIT_n$ as the Earnings Before Interest payable and income Tax expense in thousand Rubles within the time period *n* and $\overline{TA}_n$ as Total amount of Assets in thousand Rubles within the time period *n*.

As a matter of fact, this indicator is another option of the previously described *ROA*, however, it bears a separate title.

Return on Net Operating Assets (RNOA) within the time period *n* is determined by means of the following formula [8]:

$$RNOA_n = \frac{NOPAT_n^{adj}}{\overline{NOA}_n}, \quad (13)$$

with $\overline{NOA}_n$ as net operating assets in thousand Rubles within the time period *n* and $NOPAT_n^{adj}$ as net operating profit after tax in thousand Rubles within the time period *n*, which, in its turn, is determined as follows with the following formula:

$$NOPAT_n^{adj} = NI_n + ni_n \times (1 - t_n), \quad (14)$$

with NI_n as net income in thousand Rubles within the time period *n*, ni_n as net interest

[10] Kenton W., Scott G., Courage A. Return on Total Assets (ROTA): Overview, Examples, Calculations. Investopedia. URL: https://www.investopedia.com/terms/r/return_on_total_assets.asp

payable in thousand Rubles within the time period n and t_n as income tax rate effective for the time period n in per cent.

The amount of net interest (*ni*) is based on the difference between interest payable and interest receivable.

According to D.L. Volkov, net (operation) interest is a difference between operating assets and operational covenants.

Operating assets are assessed as assets that are not related to financial ones, namely, the assets, which provide the company with income not related to its core business and the result of such investing its free funds is nearly beyond interest-bearing operations. D.L. Volkov does not specify exactly in his research work, what is operating assets, but it can be understood from the context, that he considers such assets as liabilities, which the company acquired as a result of its core business.

In general, according to D.L. Volkov's research work, it is problematic to visualize the difference between operational and financial assets, as the definition does not provide clarity for other assets that belong to either of these two types. For example, an abandoned non-functioning children's summer camp, which a manufacturing company inherited quite a while ago during reorganization of Soviet enterprises in the 20th century, is not an operational asset. It does not operate in the core sphere of the company's production activity. On the other hand, the camp can not be regarded as a financial asset either: it has hardly become an object of investment. This asset is unprofitable for this enterprise, since it does not function properly and requires costs and expenses for its maintenance.

Alternative calculation of net operating assets involves calculating the amount of equity and net debt, which is defined as the difference between financial liabilities and financial assets within the framework of calculating the indicator under study.

Calculation of *RNOA* for the entity with the above algorithm requires re-classification of existing assets and liabilities — both financial and operating ones, which is problematic, as it was noted earlier. This is not mainly related to much efforts for research, but rather to peculiarities of classification of these assets and liabilities.

In view of the above, indicators of the group of the abovementioned assets are oriented rather to a wide range of stakeholders, than to participants of entities, so, consequently, to focus on these assets for the purposes under consideration is highly dubious.

The third group of profitability indicators under consideration may include some relative indicators, which characterize a certain type of return on capital, namely:

Total Business Return (TBR) for the time period n is calculated by means of the following formula [16]:

$$TBR_n = \frac{FCF_n}{V_{n-1}} + \frac{V_n - V_{n-1}}{V_{n-1}}, \qquad (15)$$

with FCF_n as free cash flow in thousand Rubles within the time period n, V_{n-1} as the cost of invested capital in thousand Rubles at the beginning of the time period n, V_n as the cost of invested capital in thousand Rubles by the end of the time period n.

As it follows from the above calculation algorithm, this indicator is oriented to all investors who deal with entity's capital. In this regard, based on the principle of comparability of the numerator and denominator, cash flow to invested capital should probably be used as free cash flow in formula (15).

TBR is probably the cash flow included in the first summand of the given formula and it is subject to distribution among investors in the entity's capital during the given time period, since otherwise these funds will be added to the cost of invested capital again. One should keep in mind this aspect, when examining the indicator under consideration, which means, it is not required to use it for assessment if no distribution of any part of this cash flow occur in favor of corresponding investors.

As follows from the above, investors are more interested about *TBR*, rather than members of the company. At the same time, the applicability of this indicator is questionable: the value of invested capital may grow, if new loans are made at the end of the period under review, however, this would not indicate the efficiency of the company's activities at all.

TBR will be provided exclusively with the growing amount of borrowed capital in such a situation with a conditional zero value of free cash flow invested in the capital within the conditional time period. This is not a positive situation neither for staff members of the company, nor for its lenders, to whom the company had obligations as of the beginning of the period under consideration.

In view of the above circumstances, the indicator in question is not applicable for the purposes under consideration.

Total Shareholder Return (*TSR*) for the period of time *n*, is calculated as follows [16]:

$$TSR_n = \frac{Div_n}{V_{n-1}} + \frac{V_n - V_{n-1}}{V_{n-1}}, \qquad (16)$$

with Div_n as dividends in thousand Rubles for the time period *n*, V_{n-1} as the value of equity instruments of participation in the company's capital in thousand Rubles at the beginning of period of time *n* and V_n as the value of equity instruments of participation in the capital of the entity's equity capital in thousand Rubles at the end of period of time *n*.

To avoid the influence of such factors, as changes in the period of time *n* of number of shares or registered capital relatively to limited liability companies, the above indicator is determined in terms of one share (or Ruble) of the registered capital, respectively, depending on the type of commercial corporate organization.

TSR is applicable to staff members of the entity. Besides, taking into account its specific use (similar to those indicated earlier regarding the overall return of the business in terms of dividends), it involves both the payment of dividends and the increase in the value of equity instruments owned by the founders of the corporation. This makes the indicator even more perfect for assessing the efficiency of the company's activities by its participants in comparison with shareholder added

Table

Systematisation of the considered profitability indicators depending on their focus on the interests (goals) of the selected stakeholders of the organizations under consideration (compiled by the authors)

Stakeholder groups (main)	Interests (goals) in relation to the organization (main)	Profitability indicators aimed at the specified interests (goals)
Participants of the company	Any kind of income from the company's activities	ROE, TSR
Creditors of the entity	Fulfilment of the company's obligations to creditors, including payment of interest for the use of funds	None of the indicators under consideration aimed at assessing the performance of the company only from the perspective of the company's creditors
Creditors and participants of the company	The above objectives in combination	ROIC, ROCE, CFROI, CROCI, ROGA, ROTA, RNOA, TBR

Source: compiled by the authors.

value and free cash flow to equity. At the same time, the *TSR* itself, calculated according to the algorithm given in various sources, does not solve other problems inherent in shareholder added value. Or, to be more precise, it does not allow us to make an assessment of the actual efficiency of the company's activities on the basis of results achieved by it in the retrospective period and in relation to its competitors, which is important from the viewpoint of understanding the efficiency of management activity.

Thus, despite the fact, that such profitability indicator, compared to others, which characterize value-oriented management, can be considered the most suitable for the purposes under study, it does not take into account all the circumstances that are important for assessing the profitability of entities from the viewpoint of its participants. Besides, the *TSR* is a relative indicator, although it makes sense to use an absolute indicator to inform the owners of equity instruments.

This can be solved by converting the components of formula (16) into a non-fractional form by excluding denominators. I.A. Astrakhantseva suggests using the indicator of Returns to Shareholders (RTS), which determines not a relative, but absolute total shareholder return, calculated with viewpoint of the above clarifications [7].

Since most of the indicators under consideration reflect the interests of the company's participants and its creditors (including lenders), whose funds altogether form its assets, these indicators based on the results of the study were categorized in view of specified groups of stakeholders.

ROA and *RONA* are not in the table: they do not meet the interests of the stakeholders. The fact is, that the algorithm for their calculation (as numerators and denominators of the formulas) involves components that are incomparable in their focus: some of which are aimed at the participants of the company, meanwhile some others are aimed at a wider range of stakeholders.

DISCUSSION

As the conducted study revealed, the indicators displayed in the *Table* correspond to the interests of the identified groups of stakeholders. However, they can not be used to assess effectiveness of companies from the viewpoint of its participants in the form the indicators presented in the article (according to the data of scientific sources). The point is that these indicators either focus on a different, wider range of stakeholders, or they can not correspond and meet the previously identified factors.

The comprehensive analysis conducted of profitability indicators also allowed us to identify some problems, which managers face, when using the indicators:

Firstly, researchers have a different viewpoint to consider time period to be taken into account in numerators and denominators, when they make calculation of profitability indicators and other static values determined in accounting for a certain moment of time (the value of assets, equity, etc.). For example, one of the options makes a calculation of return on equity with divisor for the value of equity at the beginning of the timeframe period. [8] To make it comparable with the net profit indicator, the calculation is more correct, if it is based on the average value of equity, since its value may change within a certain timeframe period.

However, an individual investor is interested in the ratio of the size of investments transferred at the beginning of a certain timeframe period and the return at the end of the timeframe period. Thus, such indicators as TSR and TBR can be used to assess the effectiveness of investments, in the option of calculation from the sources of information cited in the article, if the composition of the company's participants has not changed during the timeframe period under study. If, on the contrary, one of the specified indicators of this composition underwent changes during the period of cal-

Alt-invest. URL: https://www.alt-invest.ru/lib/roic/?ysclid=ltlqdo9opr786334189

- It is customary to use the sum of equity capital and all long-term liabilities as invested capital.

Berk J. DeMarzo P. [18]

- Equity capital including net debt.

Bukharin N.A., Ozerov E.S., Pupentsova S.V., Shabrova O.A. URL: https://elibrary.ru/item.asp?id=25584626

- The market value of the balance sheet currency minus the market value of current accounts payable is equal to the market value.

Valdaitsev S.V. URL: https://elibrary.ru/item.asp?id=19751837

- The sum of equity and borrowed capital.

Damodaran A. [5, 6]

- Reported value of debt with book value of equity and excluding cash and cash equivalents.

Koller T., Goedhart M., Wessels D. [21]

- Invested capital is the total amount invested by an enterprise in its core business, primarily in fixed assets and working capital.

Pratt S.P.[17]

- Market value of common and preferred stock, and book value of debt as well.

CFA Institute

- Market value of common and preferred stock, and book value of debt as well.

Credit Suisse. URL: https://www.alt-invest.ru/lib/roic/?ysclid=ltlqdo9opr786334189

- The sum of equity capital, all long-term liabilities, and current liabilities on which interest is accrued.

Fig. 4. **Approaches to calculate invested capital**

Source: compiled by the authors.

culation, it is necessary to adjust it with the relevant formulas.

Secondly, scientific communities manifest different understanding of the concept of invested capital and, accordingly, this generates multiple algorithms for its calculation.

The most common in practice approaches are illustrated in *Fig. 4*[11] for calculating the algorithm of this given indicator.

Thirdly, different specialists use different components in the same formulas. It generates a problem, for example, different indicators are used for assessing the effectiveness of company's activities: some use NOPAT indicator, meanwhile others use EBI indicator.

One of the versions is the indicator of profit from sales (operating profit) after profit tax — Net Operating Profit After Tax (*NOPAT*) — is visualized as the profit from sales (operating profit) reduced by the amount of profit tax accrued on the specified type of profit [19]. Besides, due to the specified calculation algorithm and according to the Russian accounting rules, *NOPAT* will be determined regardless of other income and expenses, interest receivable and

[11] The CFA Institute approach established in accordance with CFA® Program Curriculum 2020. Level I. Vol. 4. ISBN 978–1–946442–79–6.

payable, as well as income from participation in other organizations.

According to D.L. Volkov, unlike *NOPAT*, the indicator of net profit before interest payments — Earnings Before Interest (*EBI*[12]) — is calculated with the following formula [8]:

$$EBI_n = NI_n + i_n \times (1 - t_n), \quad (17)$$

with NI_n as net profit in thousand Rubles for the time period n, i_n as interest payable in thousand Rubles for the time period n and t_n as income tax rate effective during the period n in per cent.

EBI is determined with consideration to other income and expenses, interest receivable and payable, as well as income from participation in other organizations, since the calculation of this indicator deals with a net profit.

Despite the fact, that *NOPAT* and *EBI* have different content, various researchers suggest using these two indicators for calculating the same indicators of the company's performance, which may lead to the change of meanings of the latter ones (for example, such indicators as EVA, ReOI, etc.).

At the same time, according to Alt-Invest specialists, the value of NOPAT is calculated as follows:

$$NOPAT_n = EBIT_n \times (1 - t_n), \quad (18)$$

with $EBIT_n$ as profit before interest payable and income tax in thousand Rubles for the time period n, t_n as income tax rate in effect during the timeframe period n in per cent.

According to the formula (18), the indicator in this option takes into account components not provided for in its calculation of the formula cited earlier.

All of the abovementioned information emphasizes, that it is impossible to use these indicators under consideration to assess effectiveness of company's activities from the perspective of its participants.

CONCLUSIONS

The conducted research found out, that the analyzed indicators are used differently in different sources. It confirms the need for systematization and unification of such indicators. It also points out that it is impossible to use them for the purposes under consideration taking into account of the previously cited arguments.

The above-mentioned circumstances reveal problems in using the existing indicators for assessment of effectiveness of company's activities in the current conditions in terms of profitability indicators. It is also necessary to transform these indicators, in view of their shortcomings identified and due to demand of stakeholders mentioned above, which furthermore emphasizes a paramount importance of the relevant studies.

[12] According to D.L. Volkov — earnings before interest and taxes — which does not correspond to the formula to make calculation of this indicator.

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Information and Service Support of the Mechanism of Industry Functioning in the Single Digital Space

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ABSTRACT

The functioning of industry in the context of the creation and development of a single digital space of the Russian economy requires the development of an appropriate mechanism, in which information and service support for the digitalization of business processes of industrial enterprises should play a key role. The purpose of this study is to build a model of the mechanism for the functioning of an industrial enterprise in a single digital space (hereinafter referred to as the SDS) as well as to characterize the information and service support for the control and governing functions of this mechanism. The categorical apparatus of the digital economy and digital technologies, methods of classification, comparative analysis, functional and systemic approaches were used as the methodological basis of the study. The results of the work were the construction of a conceptual model of the mechanism of functioning of an industrial enterprise in a single digital space, based on the principle of optimality and capable of adapting to the needs of a particular industrial enterprise, as well as the identification of the basic functions of the management activity of an industrial enterprise in the single digital space, and the characteristics of the information and service support mechanism, which is digital services (technologies) that ensure management activities and interaction of actors of the business ecosystem in the single digital space. The conclusions drawn from the results of the study can be applied in practice by the management of companies when developing their own mechanism and strategy for digitalizing business processes in order to increase the efficiency of functioning in the single digital space industry.

Keywords: single digital space; industrial enterprise; functioning mechanism; information and service provision and support

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INTRODUCTION

The digital transformation taking place in the world is leading to major changes in the economy and society. A new round of technological progress continues to widen the gap between different states, changing economic, technological, and social models of decision-making and behaviour. The Ministry of Industry and Trade has initiated the 4.0 RU project, which demonstrates a long-term benchmark for the formation of a single digital space for the digital coordination of industrial enterprises. The implementation of this project involves the use of an ecosystem approach (including digital ecosystems), the theoretical and practical aspects of which are disclosed in the works of [1–6]. In addition, the effectiveness of digital transformation of industry largely depends on the development of digital platforms, which is the subject of publications [7–8], as well as on the corresponding state support — its features are reflected in the studies[1] [9–10]. At the same time, at the level of specific enterprises it is necessary to create a mechanism for their functioning in a single digital space using a systematic approach and the principles of improving the efficiency of complex systems, as well as managerial mechanisms to ensure a technological breakthrough, described in the works of [11–14].

The basis for building a single digital space is the comprehensive introduction of digital technologies at all stages and levels of industrial production. The formation of such cyber-physical environment provides an opportunity to reduce the time to bring new products to the market; to increase the degree of production flexibility, product quality, efficiency of production processes, and ultimately — to bring the country's industry to a fundamentally new level. Various types of digital services are considered by the authors of [15, 16]. According to the estimates of Allied Market Research, by 2030 the size of global investments in digital technologies may reach USD $ 698.48 billion.[2]

The purpose of this study is to create a model of the mechanism of functioning of an industrial enterprise in single digital space, the key component of which is information and service support of the control functions of this mechanism.

The information base of the study includes: regulatory legal acts that reveal the understanding of the essence of digital technologies, single digital space industry, the mechanism of functioning of industrial enterprises in single digital space; works of Russian and domestic researchers on the subject of the article; thematic publications in the media; statistical data from open sources.

RESEARCH METHODOLOGY

The following methods were used in the course of the work: analysis of regulatory and legal documents in the field of digitalisation of the economy and industry in Russia, methods of empirical research (observation, comparison, data collection and study), comparative analysis, synthesis of theoretical and practical materials, modelling and methods of business process management, system, and functional approaches.

Modern trends and requirements for the digitalisation of industry, single digital space, information, and service support of the mechanism of functioning of industrial enterprises are defined in accordance with such regulatory and legal documents as:

[1] Digital Ecosystems in Russia: Evolution, Typology, Approaches to Regulation. E.T. Gaidar IEP (official site). URL: Issledovanie_jekosistem_Otchet.pdf (accessed on 26.04.2024).

[2] Allied Market Research. URL: https://www.alliedmarketresearch.com/investment-banking-market-A06710

President's Address to the Federal Assembly on 29.02.2024.[3]

Order of the Government of the Russian Federation No. 1632-o dated 28.07.2017 "On Approval of the Digital Economy of the Russian Federation Programme'.[4]

GOST R 57700.37–2021 National Standard of the Russian Federation. Computer models and modelling. Digital twins of products. General provisions.[5]

Order of the Ministry of Industry and Trade of Russia No. 2091 dated 23.06.2016 "On Approval of the Concept of Development of the State Information System of Industry'.[6]

Methodological recommendations for digital transformation of state corporations and companies with state participation.[7]

To visualise the scientific results, the graphical and tabular form of information presentation was used.

RESULTS

Model of the mechanism of functioning of an industrial enterprise in a single digital space

The mechanism of industry functioning in a single digital space is still poorly studied, insignificantly reflected in the scientific literature and has not yet had a sufficiently developed practical implementation.

At the same time, there are various approaches to the interpretation of the management mechanism of systems. The most commonly used is the functional approach, which is based on the general idea of their work as a managed process of achieving some set of target functions (strategic, tactical and operational levels) on the basis of assessing the compliance of the obtained results with the specified efficiency criteria (target parameters of functioning) [11].

For business ecosystems of industrial enterprises (as the main form of industry functioning in a single digital space), a set of target functions lies in the digital transformation of business processes and digital interaction with actors. This implies such management of resources (potential), which would ensure the achievement of the results of the enterprise's activities in the digital environment, as outlined by the management at the micro level, and at the macro level — the goals of industrial development in single digital space (effects) declared by the state in strategic documents. Goals and objectives are detailed by subsystems corresponding to the basic functions of mechanism management (planning, organisation, motivation, control, coordination) and/or specific functions of production activity, for each of which criteria and performance indicators are established.

When choosing the latter, the principle of optimality, which exists in two forms, is most often used: 1) the principle of maximising the effect with given resources; 2) the principle of saving resources while necessarily achieving a given effect [12]. In general, there are three types of efficiency criteria that exhaustively characterise the quality of mechanism functioning in the course of achieving the main objectives of the business ecosystem:

1) results, which allow assessing the mechanism's ability to fulfil the set tasks

[3] President's Address to the Federal Assembly 29.02.2024. URL: http://www.kremlin.ru/events/president/transcripts/messages/73585 (accessed on 25.06.2024).

[4] Order of the Government of the Russian Federation No. 1632-o dated 28.07.2017 "On Approval of the Programme "Digital Economy of the Russian Federation". URL: http://static.government.ru/media/files/9gFM4FHj4PsB 79I5v7yLVuPgu4bvR 7M0.pdf (accessed on 21.06.2024).

[5] GOST R 57700.37–2021 National Standard of the Russian Federation. Computer models and modelling. Digital twins of products. General provisions. URL: https://docs.cntd.ru/document/1200180928 (accessed on 23.03.2024).

[6] Order of the Ministry of Industry and Trade of Russia No. 2091 dated 23.06.2016 (ed. 12.08.2021) "On Approval of the Concept of Development of the State Information System of Industry'. URL: https://base.garant.ru/71721830/ (accessed on 15.06.2024).

[7] Methodological recommendations on the digital transformation of state corporations and companies with state participation. URL: https://digital.gov.ru/ru/documents/7342/ (accessed on 10.06.2024).

by measuring the degree of compliance of the achieved results with the planned ones (*efficiency*);

2) economic, which is used to assess the degree of achievability of given performance indicators (effects) given the available resources by measuring the ratio between the cost of effects and resources (*resource intensity*);

3) temporal, which makes it possible to determine the speed of fulfilment of the set task by assessing the probability of meeting certain (directive, planned, technical) deadlines (*promptness*).

As a result, according to the authors, the mechanism of functioning of the business-ecosystem of industry on the basis of the principle of optimality should implement the strategy of results management and represent an interrelated set of social and personnel, organisational and production, financial and economic and information-service components of the potential of industry, as well as methods and tools of its embodiment to achieve the goals and objectives of intraproduction and ecosystem interaction of all participants and stakeholders in a single digital space.

The main actors in this case are industrial enterprises. The conceptual model of the mechanism of their functioning in a single digital space is presented in *Fig. 1*.

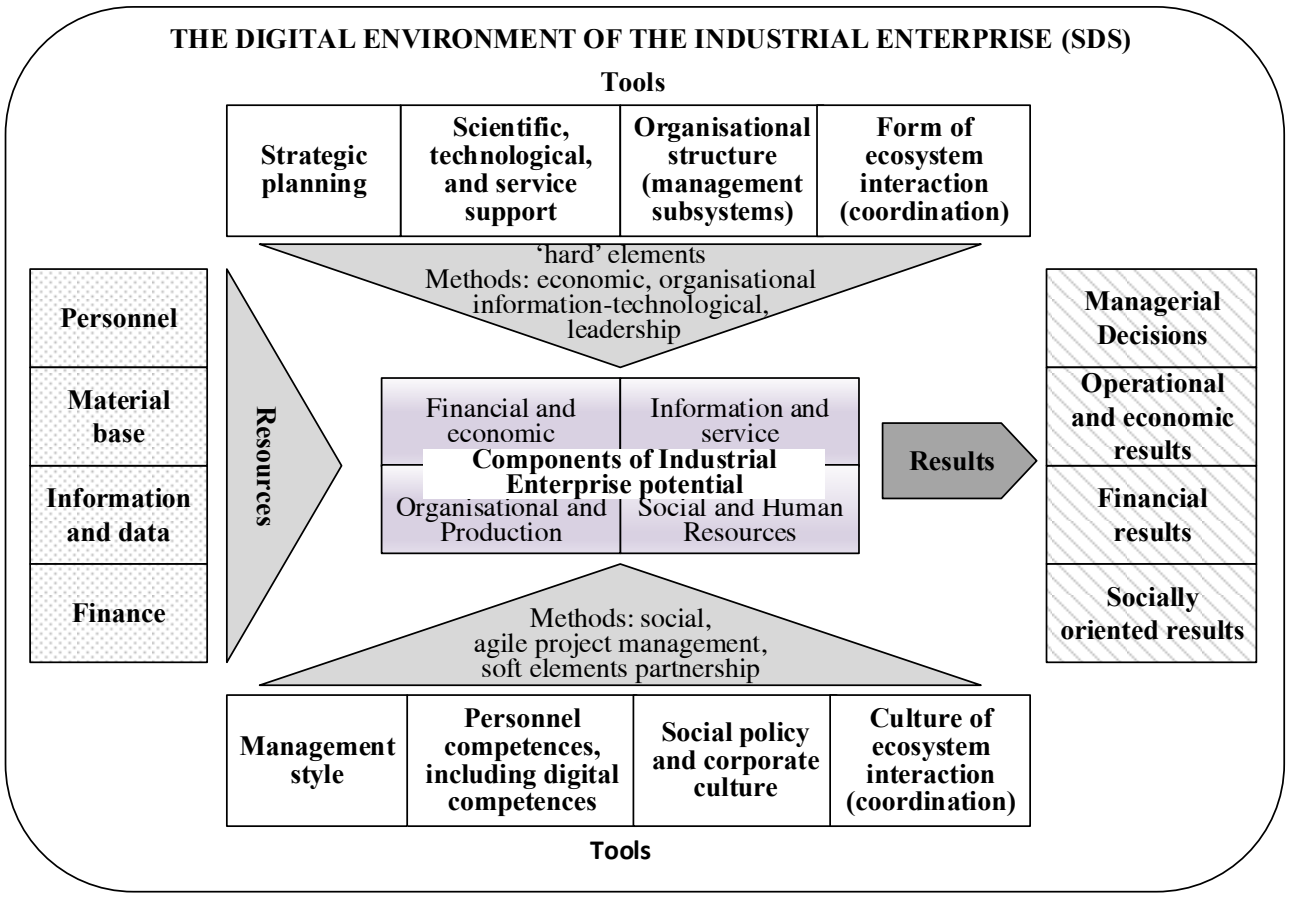

Fig. 1. **The conceptual model of the mechanism of functioning of an industrial enterprise in the ecosystem of a single digital space (SDS)**

Source: compiled by the authors.

It includes the elements identified at the first stage of the R&D work that constitute the ecosystem basis of a single digital space: strategic goal-setting (at the level of the state, industry and individual enterprise); financing; human capital; science, technology and digital services; material infrastructure; entrepreneurial culture; communications, including in the digital environment.

Only optimal interaction of all components of the potential of an industrial enterprise and tools for their realisation will activate the mechanism of its functioning in single digital space. Potential represents the created conditions (opportunities) capable of ensuring maximum performance of an industrial enterprise in a single digital space in accordance with managerial decisions relevant to the set tasks. As for the methods and tools, they are the means of realising the available opportunities, which can have a "hard' or "soft' character, determined by direct or indirect influence on the achievement of the set tasks in ecosystem interaction with other industrial enterprises and authorities of regional and federal levels.

The presented conceptual model can be extended to the mechanism of a holistic ecosystem of single digital space industry, taking into account the adaptation to the industry specifics of resources and applied tools; at the same time, the organisational structure will be transformed into an institutional one, and the potential and results of functioning will represent a synergetic set of opportunities and achievements of all actors of ecosystem interaction in single digital space.

Thus, the quintessence of the proposed mechanism is the organisation of managerial decision-making processes in a single digital space, which has a significant impact on the achievement of expedient and purposeful functioning of all elements and parts of the business ecosystem of industry. At the same time, the mechanism should:

1) adequately respond to environmental impacts, including those of a negative nature (operational and tactical management tasks);

2) objectively assess the effectiveness of management processes based on selected criteria of efficiency of the entire business ecosystem and its elements (control tasks);

3) ensure the availability of the required volume and quality of resource provision (planning tasks);

4) reflect quantitative (measurable) and qualitative parameters of functioning (accounting tasks);

5) plan on the basis of identified trends and regularities of the business ecosystem functioning (tasks of forecasting and strategic goal-setting).

The universality of the proposed mechanism lies in the fact that, if necessary, it can be adjusted to the industry specifics of the industrial enterprise, the form of coordination within the business ecosystem, as well as the chosen competitive strategy of its development [13].

The development of this mechanism is conditioned by the improvement of all its structural elements, including tools and methods. In particular, information and technological methods involve the introduction of new digital technologies, automated and robotic equipment, up-to-date technical standards and procedures, the latest results of research and development, as well as management decision-making in all areas of the business ecosystem. Agile management methods do not focus on rigidly defined work processes, but on high-level values of interaction, depending on the situation in the team and the relationship with the customer and aimed at the final result.

However, it is obvious that without the development of various components of the potential it is impossible to obtain qualitative results in a given timeframe, despite

the most modern management methods and tools.

Financial and economic potential provides financing, economic planning and forecasting of the industrial enterprise functioning processes (joint projects in the business ecosystem), material stimulation and encouragement of employees.

Organisational and production potential determines the material and technical, organisational, and structural support of production processes of each industrial enterprise and their coordination interaction in the business ecosystem.

Social and human resources potential determines the quality and sufficiency of labour resources of industrial enterprises, the level of their professionalism, emotional satisfaction, moral motivation and readiness to perform their production functions.

In the context of our research, it is necessary to emphasise the information and service potential (provision) of the mechanism under consideration. This is the least studied component of the potential, and it has, however, significant importance both for its development and for the organic implementation of the developed concept of single digital space of industry as a whole, since this concept is based on the business ecosystem, including a set of own or partner services used in the process of interaction between industrial enterprises and providing them with competitive advantages.

Under information and service support (ISS) we will understand an interrelated set of information resources and tools that allow an industrial enterprise (an actor of the business ecosystem) to perform the functions of supporting production and management activities in the single digital space of industry.

Instrumental means are broadly understood as hardware and software. The former includes means of computing and communication technology, including wireless communication channels, and the latter includes system and application software products that allow solving problems in a given subject area. Thus, all kinds of information systems, databases, hardware and software complexes, telecommunication, and computer technologies, etc. are considered as tools. It is important to understand that information carriers and devices for its storage, transmission and processing can be both material and virtual, but, of course, to function in a single digital space, first of all, digital solutions and virtual environment are required. In other words, in further consideration of service support, the emphasis will be placed on modern software of the digital economy, i.e., digital services (digital technologies).

ANALYSIS OF INFORMATION AND SERVICE SUPPORT FOR INDUSTRY OPERATING IN A SINGLE DIGITAL SPACE

For a comprehensive disclosure of this type of provision it is necessary to define:

1) types of information resources used in the functioning of industry in single digital space;

2) basic functions of management activity, the digitalisation of which increases the efficiency of an industrial enterprise in a single digital space;

3) digital services (technologies) that ensure management activity and interaction of business ecosystem actors in a single digital space.

Let us explore each of these points in more detail.

1. All types of information resources and data used in the functioning of industry in a single digital space can be traditionally divided into external and internal, which will be relevant both for an individual actor and for the entire business ecosystem (*Fig. 2*).

External information and data	Macroeconomic and sectoral information, official statistics
	Scientific and technical information
	Legal information and information of state structures
	Thematic information (data on geological exploration, meteorology, etc.).
	Financial and market information (stock exchange, competitors, etc.).
	Other external information and data from open sources and online resources.
Internal information and data	Reporting and current documentation
	Fonds of production literature, archive funds
	Data from hardware devices and sensors (internet things)
	Databases of structured and unstructured data (Big Date)
	Internal local normative acts, standards, instructions, regulations, methods, etc.
	Other internal information and data, including personal data

Fig. 2. **External and internal information resources of the business ecosystem in the SDS**

Source: compiled by the authors.

Information and data can be of time-preserved value (as an archive) or a source for management decision-making, which in a single digital space requires the use of various digital services, as well as technologies for their acquisition, processing and transmission, examples of which will be given below.

It should be noted that for a business ecosystem operating in a single digital space, new principles of information and data management apply, which determine the requirements for the functionality of modern software based on digital technologies. It is assumed that information and data initially have a digital form or can be transformed into it (using digitisation) (*Fig. 3*).

2. The basic functions of management activity, the digitalisation of which increases the efficiency of an industrial enterprise in a single digital space, can be classified on various grounds. Taking into account the proposed model of the mechanism of functioning of an industrial enterprise, it seems most appropriate to single out the functions of resource, process and result management (*Fig. 4*).

It is allowed to expand them in each group depending on the detail or industry specification of resource, process or resultant components of the enterprise functioning. In particular, if necessary, management of auxiliary processes (infrastructure maintenance, technical support) can be singled out or industry specifics can be taken into account — for example, the process of metalworking management in machine building is selected.

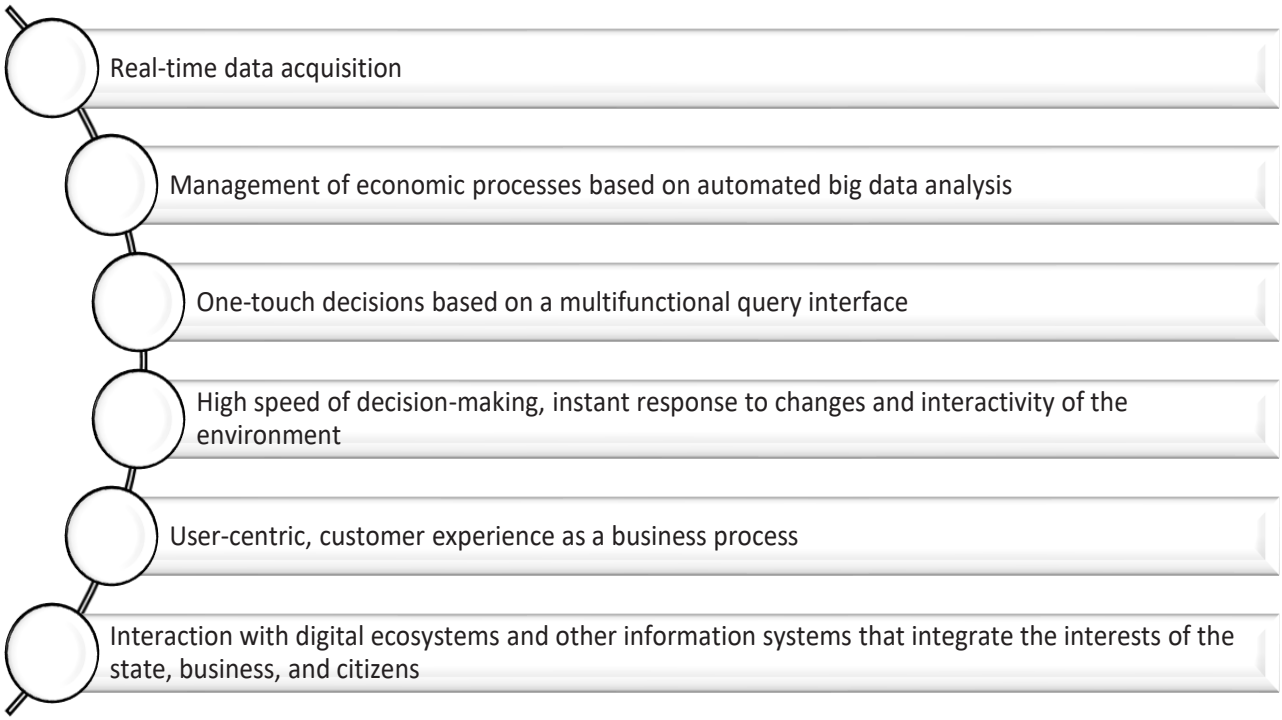

Fig. 3. **Principles of information and data management based on digital technologies**

Source: compiled by the authors.

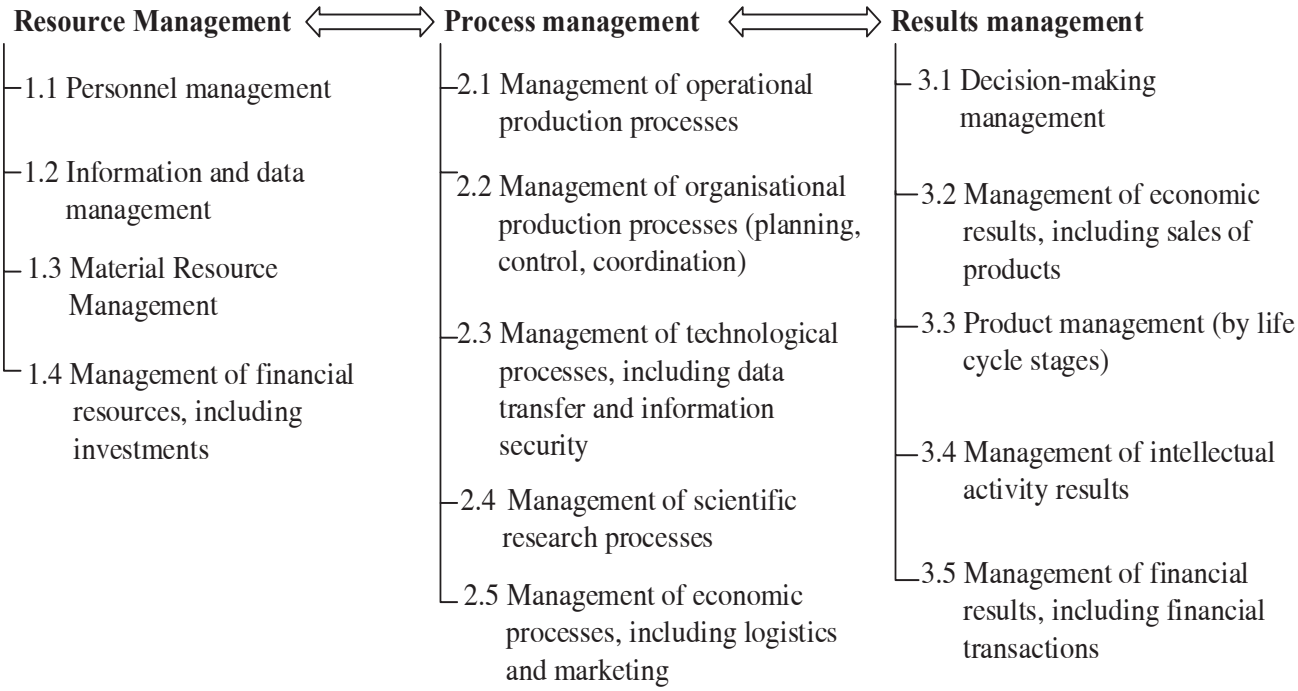

Fig. 4. **Management functions of an industrial enterprise**

Source: compiled by the authors.

It should also be noted that functions in a business ecosystem may be spatially dispersed across different actors, which requires additional special software tools for effective spatial data management, in particular, spatial databases.

Existing digital services (technologies) can provide automated support for each management function or combination of functions. Depending on target settings, specific ecosystem objectives, needs and financial capabilities, actors make decisions on the development, purchase, or partner access to service software of different levels of complexity — from simple databases to complex digital platforms that automate all the main management functions of a business ecosystem. Let us consider the latter in more detail from the point of view of their use for the realisation of the highlighted management functions.

3. Digital services (technologies) that ensure managerial activity and interaction of business ecosystem actors in a single digital space.

The most relevant of them, most often used in industry, are presented in the *Table*, and the numbers of managerial functions that these digital services allow to realise, taking into account their inherent advantages and disadvantages, are presented in *Fig. 4*.

Historically, DBMS (data base management system) and ACS (Automatic Control Systems) are considered to be the first digital services that implement management functions, which in various modifications are still used by many domestic enterprises; however, modern digital technologies are significantly expanding the capabilities of these electronic systems to the level of platform solutions and ecosystem communications. Cloud technologies, digital platforms and operational digital twins play a special role in this. According to Tadviser, the volume of the cloud services market will reach RUB 140 billion in 2025 and (according to surveys) 85% of Russian companies plan to use cloud technologies.[8] Interest in the development of domestic digital platform solutions in industry is also growing. In particular, Rostech State Corporation's Techmash Concern plans to launch a digital industrial design platform based on Russian software by 2025, which will cover the entire product development process — from the development of a prototype of a promising product to its launch into production.[9] As for digital twins, from 1 January 2022, Russia (for the first time in the world practice) applies the national standard "Computer models and modelling. Digital twins of products'.[10] At the same time, digital twins that can reproduce a business process or the work of the entire enterprise (business ecosystem) are essential for improving the mechanism of functioning of an industrial enterprise in a single digital space. Thus, the main trend of information and service support of industrial enterprise activity is the aggregation of traditional and new digital services (technologies) capabilities for the implementation of management functions; and in the conditions of geographically separated actors and geographically dispersed resources of the business ecosystem, spatial databases (SDB), which can become a universal tool for organising business processes and functioning of the entire industry in a single digital space, are of particular importance.

[8] Cloud services (the Russian market). Tadviser. URL: https://www.tadviser.ru/index.php/

[9] Rostech creates a Russian digital platform for industrial design. Rostech (official website). URL: https://rostec.ru/media/pressrelease/rostekh-sozdaet-rossiyskuyu-tsifrovuyu-platformu-dlya-promyshlennogo-proektirovaniya/ (accessed on 23.03.2024).

[10] GOST R 57700.37–2021 National Standard of the Russian Federation "Computer models and modelling. Digital twins of products'. URL: https://docs.cntd.ru/document/1200180928 (accessed on 23.03.2024).

Table

The relationship between digital services (technologies) and management functions implemented with their application

Digital service (technology)	Functional	Types/Tools, examples	Advantages and disadvantages of implementing management functions
Cloud technologies (cloud computing)	Enabling remote users to process data and IT infrastructure as an Internet service	Types: PaaS — ready-made software platform as a service; SaaS — software as a service; IaaS — infrastructure as a service (data storage, server, network resources); BPaaS — business process as a service; DBaaS — database as a service; SECaaS — security as a service, etc. Examples of cloud providers ProCloud, Softline, Timeweb Cloud[a]	Functions: 1.2, 2.3, 2.4, 2.5. Advantages: availability; cost-effective, large computing power, flexibility, security. Disadvantages: Requires uninterrupted and high-speed internet access; dependence on ISP; risks of losing control of data
Artificial Intelligence (AI) and Big Data (BD)	Intellectual support of decision-making, including on the basis of methods of processing large arrays of heterogeneous and poorly structured data	AI tools: neural networks; image and speech recognition; machine learning; genetic algorithms; data visualisation, etc. Examples of AI programmes: Rationale; Taskade; GitHub [15]. Big Data tools: Data Mining; predictive analytics; simulation modelling; spatial and statistical analysis, etc. Examples: Apache Hadoop; Apache Spark; NoSQL; SAP HANA	Functions: 1.2, 2.2, 2.4, 3.1; 3.3; 3.4. Advantages: Automation, transparency and speed of decision-making; reduced probability of errors in device interaction. Disadvantages: interoperability, information security and data protection vulnerabilities; ethical concerns
Distributed computation	Partitioning a large computational task into subtasks that can be processed independently by individual nodes in the network	Tools: cluster computing; parallel computing; distributed ledger systems (blockchain); distributed storage applications (BitTorrent; IPFS); deep neural network training applications (TensorFlow CNTK); data ecosystems in value chains (Automotive Network e.V. Catena-X)[b]	Functions: 1.2, 1.4, 2.3, 3.1, 3.2, 3.5. Advantages: Improved performance, high scalability; fault tolerance; flexibility; cost-effective. Disadvantages: startup costs; compatibility; high power costs; network vulnerability; data consistency issues across nodes
Internet of Things (IoT)	Interaction of physical objects among themselves or with the external environment by reading data from sensors of devices, their subsequent transmission and processing for decision making	Examples of tools: Arduino IDE — electronic devices and related software; Kinoma — hardware and programmable device for IoT prototyping; Apache NetBeans — IoT application development platform; MQTT — messaging protocol in IoT; Wireshark — network traffic analyser[c] etc.	Functions: 1.2, 2.1, 2.3, 2.4, 3.2, 3.3. Advantages: automation of processes, reduction of labour costs; reduction of waste, improvement of service quality, cheaper production, and logistics. Disadvantages: poor data security; incompatibility of software from different manufacturers

Table (continued)

Digital service (technology)	Functional	Types/Tools, examples	Advantages and disadvantages of implementing management functions
Digital platforms	Provide integration of data and digital services (technologies) into a unified information system to enhance analytical capabilities, create more value, including by ensuring synergy in the business ecosystem	Examples of industrial DP: FLCS DP (Full life cycle system for digital enterprise products) — a Russian platform for creation and management of product lifecycle, enterprise, and production management[d] Zyfra Industrial Internet of Things Platform (ZIIoT) — a platform for automation of business processes of production management, which includes a ready-made set of solutions and a built-in development environment for solving local tasks by the enterprise; GE, Siemens, etc. Examples of other DPs: Infrastructure: General Electric Predix, ERA-GLONASS; Instrumental: Java, SAP HANA, Bitrix; Service-application: electronic banking (Tinkoff); online trading (R Trader), etc.	Functions: 1.1–1.3, 2.1–2.5; 3.1–3.4. Advantages: speed and efficiency of transactions, reduction of transaction costs; optimisation of business processes; supported "smart manufacturing'; interoperability; system integration; information security; synergy of interactions; expansion of the product sales market. Disadvantages: high cost of in-house development; labour-intensive customisation of DP for specific business processes; risks of failures in digital services; reduction in the number of jobs
Digital twins and virtual / augmented reality technologies (VR/AR)	Possibilities of building digital models of objects, systems, processes for diagnostics, design, modernisation, forecasting, simulation, including on the basis of VR/AR technologies	Types of digital twins: informational — tracks parameters, e.g., equipment in real time; simulation — creates operating conditions and predicts properties, behaviour in different situations; operational — simulates the entire business process or operation of the entire system. VR/AR technology tools: VR/AR content development tools, motion capture, graphic design, sensorics, 3D models, etc.	Functions: 2.1–2.4, 3.1–3.3. Advantages: productivity growth; control and transparency of production processes; preliminary hypothesis testing in a virtual environment; optimisation based on data analysis; speed and validity of decision making. Disadvantages: incomplete coincidence with physical reality, difficulty in combining, analysing, and processing heterogeneous data
Additive technologies[e]	Manufacturing prototypes and finished products using 3D printing	Types of technologies: FDM — layer-by-layer build-up from plastic filament; SLM — selective laser fusion of metal powders; SLS — selective laser sintering of polymer powders; SLA — laser stereolithography in photopolymer processing	Functions: 1.3, 3.1–3.3. Advantages: accelerating the creation of new products and prototypes, reducing material consumption and minimising waste; high-precision creation of parts with complex geometry. Disadvantages: high labour intensity; significant equipment costs; limited printing materials

Table (continued)

Digital service (technology)	Functional	Types/Tools, examples	Advantages and disadvantages of implementing management functions
Robotics (RT) and Sensorics	Automation of production and other systems using robots with sensor technology	Tools: digital RT tools for human-machine interaction; tools for sensor-motor coordination and spatial positioning; telemetry and telecontrol; tools for integrating and synchronising heterogeneous sensor data	Functions: 1.3, 2.1, 2.3, 3.3 Advantages: Routine, dirty, hazardous work, as well as those requiring high precision and repeatability. Disadvantages: Increased maintenance and repair costs, higher energy consumption, higher costs of regular renewal, reduced number of jobs
Database management systems (DBMS)	Storage and management of data tables based on inbuilt data processing tools and a special query language (SQL, JavaScript, Python etc.)	DBMS types with examples: 1) local (on one server) and distributed (on different servers, including cloud servers); 2) relational (data tables are linked — PostgreSQL, MySQL); object (MongoDB); non-relational (data can be unstructured — (Oracle NoSQL Database); value-key (access to identified data by key — Redis, Memcached), etc.	Functions: 1.1–1.4, 2.1, 2.3–2.5, 3.2–3.5. Advantages: Routine, dirty, hazardous jobs and those requiring high precision and repeatability. Disadvantages: Increased maintenance and repair costs, higher energy consumption, higher costs of regular renewal, reduced number of jobs
Automated control systems (ACS)	Solving tasks of planning and management of various types of resources and activities of the enterprise on the basis of a set of software and hardware, information and linguistic, organisational and technological means and actions of qualified personnel	Types of ACS: ACSE — ACS of the enterprise, including production and sales of products (ERP, CRM-systems); ACS TP — ACS of technological process, equipment (MES-systems); CADS — computer-aided design system; AIPCS — automated information processing and control system (SCADA, ETL, BI), etc.	Functions: 1.1–1.4, 2.1–2.3, 2.5, 3.2–3.5. Advantages: Routine, dirty, hazardous work, as well as those requiring high precision and repeatability. Disadvantages: Increased maintenance and repair costs, increased energy consumption, increased costs of regular upgrades, reduced number of jobs

Source: compiled by the authors.

Note: a — ProCloud is the best cloud provider: the ranking has been announced. TADVISER. URL: https://www.tadviser.ru/index.php/Новости: ProCloud_стал_лучшим_облачным_провайдером:_обнародован_рейтинг (accessed on 21.03.2024); b — Blockchain. TADVISER. 15.06.2022. URL: https://clck.ru/3F9oBS (accessed on 21.03.2023); c — Top 10 IoT Tools to Consider in 2024. URL: https://www.geeksforgeeks.org/top-iot-tools; d — What is SPWC. URL: https://цифровоепредприятие.рф/about-sprgc/ (accessed on 22.03.2024); e — Additive technologies — what they are and where they are applied. URL: https://old.sk.ru/news/b/press/archive/2019/09/18/additivnye-tehnologii-_1320_-chto-eto-takoe-i-gde-primenyayutsya.aspx (accessed on 22.03.2024).

CONCLUSIONS

The conducted research allows us to draw the following conclusions:

1. The considered mechanism of functioning of the business-ecosystem of industry is based on the fundamental provisions of the concept of a single digital space, is oriented on the strategy of results management in a single digital space and represents an interrelated set of organisational and production, financial and economic, information and service and social and human resources components of the potential of industry, as well as methods and tools of its implementation to achieve the goals and objectives of intra-production and ecosystem interaction of all participants (actors) and stakeholders within various forms of coordination (clusters, supply chains, consortia, industrial platforms).

2. The information and service support of the mechanism is proposed to be understood as an interrelated set of information resources and tools that allow the actors of the business ecosystem to perform the functions of managing resources, processes, and results in a single digital space on the basis of the identified principles of information and data management using digital technologies. The industrial enterprise's choice of information and service support for the mechanism of its functioning in single digital space should be carried out depending on the realised management functions (*Fig. 4*) and the advantages and disadvantages of the main types of existing digital services that support these functions (*see Table*) within the mechanism.

The obtained results and conclusions of the scientific research can be used by the management of industrial enterprises in developing (on the basis of the proposed model of the mechanism of functioning in a single digital space and characteristics of digital services to support management functions) their own strategies for managing the digitalisation of business processes, taking into account industry specifics.

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Research of Practices of Formation and Development of Human Capital in Companies of Various Industries on the Russian Market

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ABSTRACT

Almost all global trends create a synergistic effect, which increases the importance of forming and developing human capital to ensure the survival of companies in the market and their confidence in the future, regardless of their size and type of activity. However, despite the unflagging and continued interest of the scientific community in the issues related to human capital, there are still many "white spots" in this area. **The aim of this work** is to explore the approaches to forming and developing human capital applied by companies doing business in Russia in the current realities and modern conditions, to identify industry specifics and to outline recommendations. To achieve this goal, the authors conducted a questionnaire survey of managers of enterprises from different segments of the economy. As a result of the analysis of the obtained data, the conclusions were made that not all organisations have a generally accepted definition of HR and not everywhere there are procedures for its assessment. The problems related to personnel development, creation of competitive labour conditions for employees, search for potential employees and internal filling of vacancies were also revealed. **The methodology** of this work is based on a systemic approach and surveying, as well as general scientific methods such as synthesis, analysis, comparison, and generalization. **Research results:** Despite the fact that, in the opinion of the authors of the study, it did not consider all the problems of human capital formation and its impact on the sustainability of organisations, the obtained results allowed for the identification of the peculiarities of approaches to forming and developing human capital, considering industry specifics, and can be useful to develop practical recommendations for managers of companies aimed at improving this activity. **Originality:** This study presents, for the first time, a comprehensive overview of the approaches to forming and developing human capital in companies across various industries in the Russian labor market.
Keywords: human capital; personnel management; formation of human capital; knowledge economy; labor market

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INTRODUCTION

Virtually all global trends in today's business environment are associated with an increasing demand for improving the quality of management's work on building human capital (HC) of companies to maintain their competitive position and progressive development in a dynamic and poorly predictable environment. Thus, the McKinsey Global Institute research has convincingly shown that such management activities for the purpose of personnel development and effective management give enterprises a competitive advantage.[1] Despite the fact that the problem of human capital is in the sphere of scientific interests of foreign and some domestic researchers, many issues of its formation and development remain open. International consulting companies from time to time conduct studies of approaches to the consideration of this problem, however, without affecting the activities of organisations doing business in the Russian Federation.

In general, the important role of the human factor in economic activity was emphasised by the founders of classical economic theory — Petty [1, p. 324], Ricardo [2, p. 308], Smith [3, p. 490]. The founders of the modern theory of human capital in the world scientific community are considered to be T. Schultz and G. Becker, who proposed this term in the 1960s. [One of the authors of this article has already written about it earlier [4, p. 55–67]. Under the term human capital Shultz meant the totality of investments in a person, increasing his ability to work [5, p. 455–458]. According to G. Becker, these investments are mainly directed to education, production training, health care, labour migration [6]. The dividends from this kind of investment are the development of human potential, human intelligence, as well as the growth of the productive capacity [7, p. 534].

Among the representatives of domestic science, we can also identify scientists whose scientific interests relate to the sphere of the considered type of capital. These are R.I. Kapelyushnikov, who considers human capital as a certain stock of knowledge, abilities and motivations that are inherent in a certain person [8]; A.N. Azriliyan, who considers human capital as "education, qualifications acquired in the process of production; knowledge and skills embodied in the labour force" [9, p. 470]; E.S. Yakhontova, who called human capital a set of competencies of the company that belong to it and contribute to the achievement of its goals [10, p. 48–55]; S.A. Dyatlov, who perceives human capital as a certain stock of health, knowledge, skills, abilities, motivations formed as a result of investments and accumulated by a person, which is expediently used in one or another sphere of social reproduction, contributing to the growth of labour productivity and production efficiency and thus affecting the growth of earnings [11, p. 10].

We can distinguish human capital of an employee (individual), organisation and state [4, p. 55–67]. Human capital of an individual is a set of personal qualities, knowledge, skills, and abilities of a person, which are used by him/her in production activities in order to obtain benefits. The quality of an employee's existing human capital should be maintained to ensure competitiveness in the labour market by reinvesting part of the benefits received in his education and health, as well as using on a regular basis in production activities the knowledge and skills available to him. In turn, the human capital of a company is the total human capital of its employees, which is used effectively to achieve its goals, and the total human capital of employees of enterprises within the territory of one country is the human capital of the state.

[1] McKinsey Global Institute. 2023. Performance through people: Transformation human capital into competitive advantage. URL: https://www.mckinsey.com/mgi/our-research/performance-through-people-transforming-human-capital-into-competitive-advantage?stcr=6684B0CCFEED47-309268B8BB1A7E6B51&cid=other-eml-ttn-mip-mck&hlkid=dc78ca3265f2423ea1b76a69b0ba17d8&hctky=2136184&hdpid=c88cd392-ac9a-4010-8b2d-0c7649781db8

There are two mechanisms for building an organisation's human capital — training personnel to acquire the missing competencies and hiring employees who already possess the required skills "from outside". In order to maximise the benefits of human capital, companies need to create the conditions that would help to fully develop it. Organisations compete with each other to obtain the best human capital; employees have the right to choose where to realise their abilities — this is the mechanism of the labour market. The systems of formation of human capital of the state were described in the works of the founders of the theory — Schultz and Becker [7, p. 534].

Current problems of the domestic labour market are described in the macroeconomic analysis conducted by R.I. Kapelyushnikov in 2023. The author states the loss of labour force and employment associated with the action of demographic factors — the reduction in the total population of Russia and its gradual ageing [12, p. 78]. The situation can be alleviated by the launched processes of digital transformation, which naturally leads to a decrease in the composition of some categories of personnel with a simultaneous increase in the requirements for others [13, 14].

The current situation is complicated by the geopolitical situation and its impact on human capital and the economy. Thus, according to V. Gimpelson, the combination of sanctions, counter-sanctions and import substitution is a strong shock for human capital [15, p. 234–238]. The existing problems are also stated in current studies, according to which 60% of companies have a shortage of staff, and the number of unoccupied vacancies is estimated in hundreds of thousands,[2] which naturally leads to the degradation of human capital.

The purpose of this paper is to study the approaches to human capital formation used by companies (in the context of the turbulent situation in the Russian economy in general and in the labour market in particular) and to identify its industry specifics. To achieve this goal, the authors link the solution of such tasks as conducting a questionnaire survey of company managers, analysing the obtained data, and developing recommendations for further research and improvement of approaches to work with personnel in companies.

RESEARCH METHODOLOGY

The study was conducted in three phases:

Stage 1 (preparatory phase). At the end of 2022, the goal and objectives were formulated, the target audience and sample were defined, and a questionnaire was developed using both Likert scales and closed-ended questions. The questionnaire contained 5 thematic blocks and consisted of 34 questions covering the following processes:

1. General understanding of human capital in an organisation. Human resource policy of companies: results of implementation and difficulties.
2. Evaluation of human capital: evaluation criteria and frequency of evaluation.
3. Practices of human capital development.
4. Staff retention. Working with the potential of employees.
5. Assessment of the company's position in the labour market.

The target audience was managers of various levels. The general population included all 2,600,000 registered domestic companies (data from the Federal Tax Service of Russia[3]). The sample used was a probability sample, which is a set of elements selected randomly and independent of each other. The sample size was calculated using a sampling calculator[4] based on the following values: target population size — 2,600,000 organisations; confidence level — 95% (generally accepted standard); margin of error — 10%. The calculation showed that in order to ensure a cer-

[2] Golden Hands: Russia has a total deficit of personnel. Forbes Business. 2023. URL: https://www.forbes.ru/biznes/497478-zolotye-ruki-v-rossii-total-nyj-deficit-kadrov

[3] The number of companies established in the Russian Federation in Q1 increased by 17% year-on-year. Interfax. 2023. URL: https://www.interfax.ru/business/895266

[4] Sampling size calculator. URL: https://ru.surveymonkey.com/mp/sample-size-calculator/

tain level of error, the sample should consist of at least 97 participants.

Stage 2 — testing of the questionnaire. Prior to the practical part of the study in 2022, the authors conducted pilot tests in three companies in different sectors of the economy [FMCG[5]; IT and software development (hereinafter referred to as IT); education, science, and healthcare]. The validity of the questionnaire was confirmed using test-retest methodology. Different employees at the selected enterprises were tested with an interval of three months. Based on the feedback received from the respondents, the questionnaire was finalised.

Stage 3. Conducting the survey. The survey was conducted in June 2023 in the format of an online questionnaire. The questionnaire was posted on the Google Forms platform,[6] and everyone could answer the questions contained therein. 20% of the results were verified by the authors by calling respondents and conducting oral interviews. The questionnaire was distributed via social networks in business communities (Leaders of Russia, Skolkovo, etc.) and alumni associations (RANEPA, MIPT, MSU, etc.). Frequency analysis was used to analyse the results.

The study involved representatives of various sectors of the economy, such as oil and gas and extractive industries, industrial and agricultural production, FMCG and others. (*Fig. 1*). The total number of unique respondents was 106, of which 28% represented foreign companies operating in the Russian market and 72% represented domestic enterprises. When summarising the results, the authors of the article selected one unique representative per company.

The division of respondents by management level is as follows: 51% are the top management of organisations; 23% are heads of line departments; 19% are middle managers, and 8% are heads of HR departments. The survey participants

[5] This refers to the production of everyday goods or consumer staples (Engl. Faster-Moving Consumer Goods, FMCG).

[6] Online questionnaire form. URL: https://docs.google.com/forms/d/1rZ-GkBrwnrEztDba_lV1ip5DuX78rlSZYwR_Alq-0d4/edit?pli=1

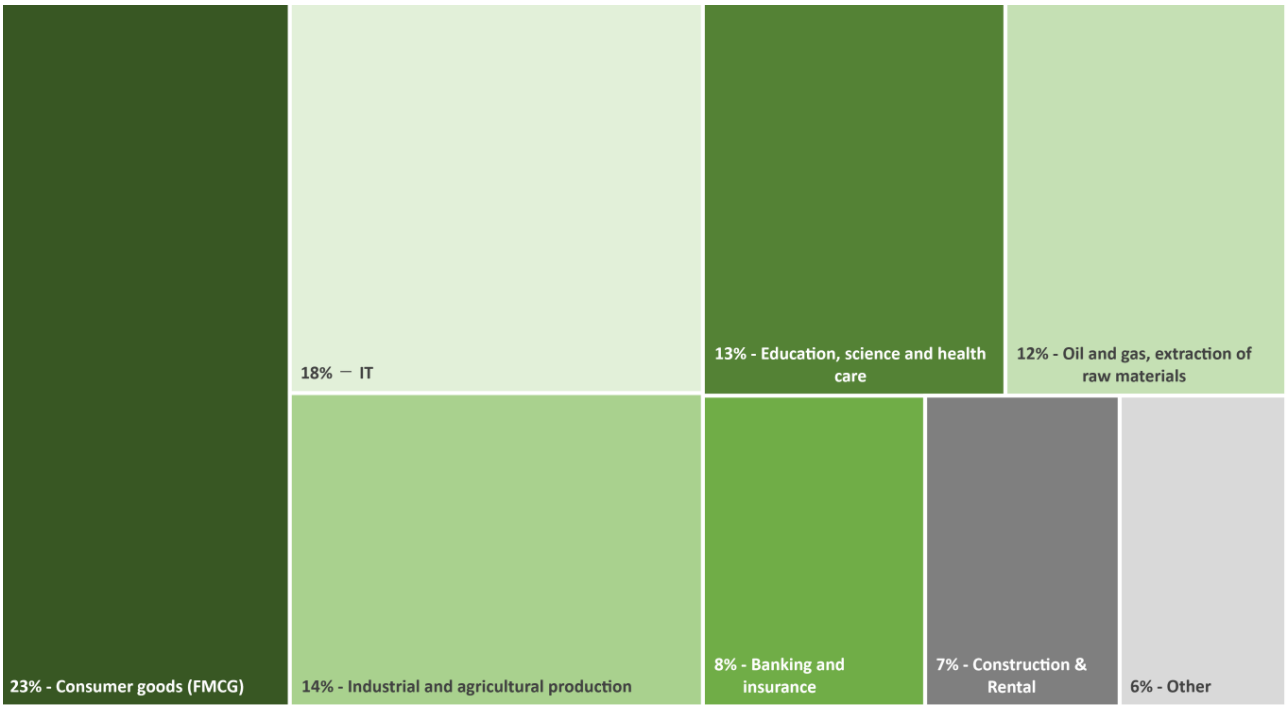

Fig. 1. **Number of companies (by industry) whose representatives took part in the study**

Source: compiled by the authors based on the results of the study.

Fig. 2. **Number of employees in companies whose representatives took part in the study**

Source: compiled by the authors based on the results of the study.

were representatives of companies with different numbers of employees (*Fig. 2*), which made it possible to assess the situation at enterprises that differ in scale.

RESULTS OF THE RESEARCH

The authors present the results structured by thematic blocks, which correspond to all stages of the work carried out in the course of the study on the formation and development of human capital. Some of the results are shown in the context of industries (where the obtained indicators are differentiated).

1. General understanding of human capital in an organisation. Human resources policy of companies: results of implementation and difficulties.

Regardless of the type of activity of an organisation, it is important that its employees use a common conceptual framework. Its exist-

Table 1

Companies' definition of the Human capital

Sector of the economy	All human resources	Personnel competencies used to achieve organizational goals	Corporate talent	Do not operate with such a concept as human capital
Banking and Insurance	37.5%	50.0%	0.0%	12.5%
Information technology and software development	57.9%	31.6%	0.0%	10.5%
Oil and gas, mining, and quarrying	53.8%	15.4%	0.0%	30.8%
Education, science and healthcare	64.3%	14.3%	0.0%	21.4%
Industrial and agricultural production	33.3%	33.3%	6.7%	26.7%
Consumer Goods (FMCG)	41.7%	41.7%	4.2%	12.5%
Construction and leasing	57.1%	28.6%	0.0%	14.3%
Other	16.7%	66.7%	0.0%	16.7%
The labour market	**47.2%**	**33.0%**	**1.9%**	**17.9%**

Source: compiled by the authors based on the results of the study.

ence allows the staff to "agree" on key issues of strategy more easily and quickly, to understand and communicate a common goal at all levels of management. The first thing the authors of the article wanted to determine was whether companies have an understanding of what human capital is. According to the survey results, 47% of organisations present on the market define human capital as all human resources, and another 33% define it as competencies of employees that allow them to perform their tasks. At the same time, almost 20% of enterprises do not operate with this concept (*Table 1*), i.e., there is no common agreement among the management as to what human capital means to them. The worst result is observed in the companies operating in the field of mining (31%), industrial and agricultural production (27%).

The survey also showed that, according to the respondents, at the majority of Russian enterprises the HR policy leads to the development of human capital (59%) or its preservation (21%) (*Table 2*). At the same time, there are differences between industries — for example, among FMCG companies the policy leads to the development of human capital in 83% of cases, and this is the highest indicator demonstrating the attitude of the industry to work with this type of capital. As for a number of other sectors, respondents either indicated that their companies are negatively affected by policies in this area (>25%) or found it difficult to answer: banking and insurance (25%),

Table 2

The Impact of the HR or Personnel Policies on the organisations' human capital and Audit Committee of Organizations

Sector of the economy	Your organization's HR policy leads to...			
	development of human capital	preservation of human capital	reduction (degradation) of human capital	Difficult to answer
Banking and insurance	37.5%	37.5%	0.0%	25.0%
IT and software development	68.4%	15.8%	10.5%	5.3%
Oil and gas, mining, and quarrying	53.8%	23.1%	7.7%	15.4%
Education, science and healthcare	57.1%	14.3%	28.6%	0.0%
Industrial and agricultural production	26.7%	33.3%	13.3%	26.7%
Consumer Goods (FMCG)	83.3%	0.0%	8.3%	8.3%
Construction and leasing	42.9%	57.1%	0.0%	0.0%
Other	66.7%	33.3%	0.0%	0.0%
The labour market as a whole	**58.5%**	**20.8%**	**10.4%**	**10.4%**

Source: compiled by the authors based on the results of the study.

education, science and healthcare (29%), manufacturing and agriculture (40%).

It is also worth noting that in the majority of foreign companies operating in the Russian market the human capital policy leads to a positive result (70%); as for domestic companies, according to respondents, such a result is achieved only in half of cases (53%).

One of the key methods to improve the level of human capital of companies is personnel development, which, according to the authors of the study, should be implemented through the adoption of long-term training plans or included in the company's roadmap. The study revealed that only 66% of organisations operating in the Russian market have personnel development reflected in their development strategies. A further 22% of respondents said that their companies have no plans for staff development; 12% found it difficult to answer (*Table 3*).

The authors of the article identify a number of industries whose enterprises should pay attention to this aspect. For example, in the construction sector, 57% of firms either do not have the above strategy or management found it difficult to answer; in the industrial production sector, the number of such companies is 47%; in the banking sector and in education, science and health care the number of such companies is 50%. These organisations need to develop and implement staff development plans to better adapt to changes in the market, improve business performance and strengthen their competitiveness. The best performers in this area are companies in such industries as IT, mining, FMCG.

Table 3

Inclusion of personnel development plans in the strategy of companies by industry

Sector of the economy	Yes, as long-term staff training plans	Yes, it is included in the HR strategy and business strategy	Difficult to answer	No
Banking and insurance	25.0%	25.0%	12.5%	37.5%
IT and software development	15.8%	57.9%	5.3%	21.1%
Oil and gas, mining, and quarrying	38.5%	38.5%	0.0%	23.1%
Education, science and healthcare	21.4%	28.6%	7.1%	42.9%
Industrial and agricultural production	26.7%	26.7%	33.3%	13.3%
Consumer Goods (FMCG)	16.7%	66.7%	12.5%	4.2%
Construction and leasing	14.3%	28.6%	0.0%	57.1%
Other	16.7%	50.0%	33.3%	0.0%
The labour market as a whole	**21.7%**	**44.3%**	**12.3%**	**21.7%**

Source: compiled by the authors based on the results of the study.

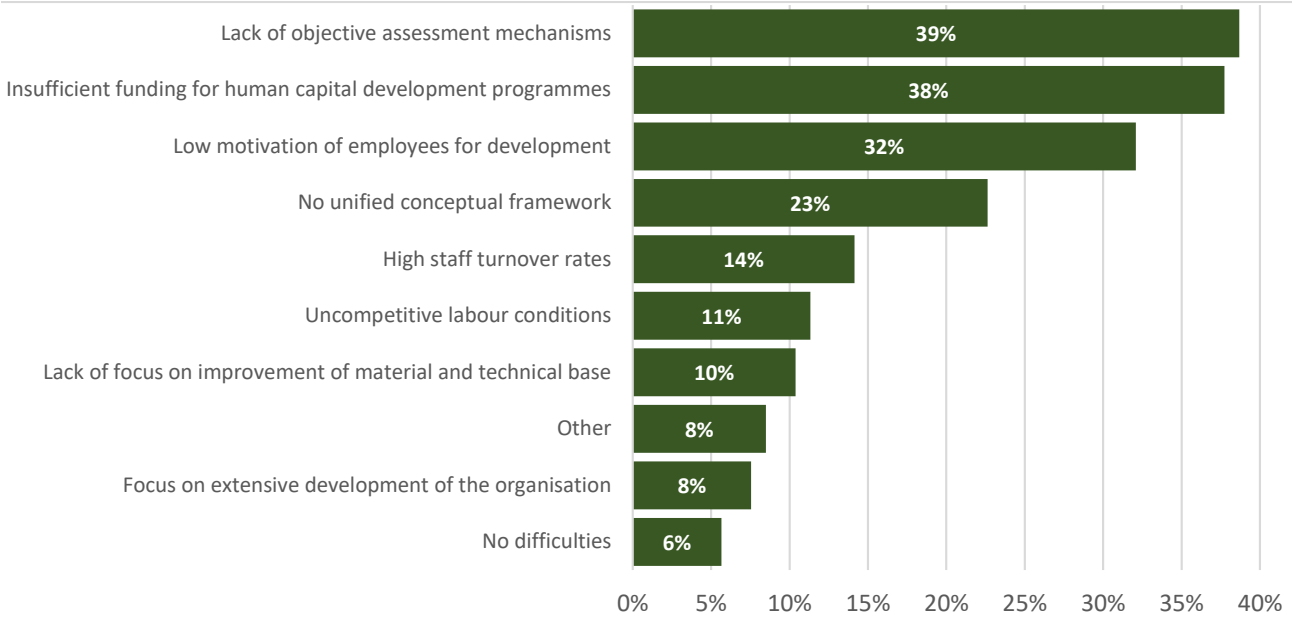

Fig. 3. **Difficulties faced by companies in the process of forming a HC**

Source: compiled by the authors based on the results of the study.

The survey also revealed the most common difficulties faced by companies in building human capital (*Fig. 3*). More than a third of respondents indicated that the main problems are related to the lack of mechanisms for its objective assessment, insufficient funding for human capital development programmes and low motivation of employees for training.

No differentiation between industries on this aspect was revealed, therefore the results are given for the labour market as a whole.

2. Human capital assessment: assessment criteria and frequency of evaluation.

Procedures for assessing human capital and the dynamics of its development/reduction are the starting points that give management an understanding of the current state of affairs. They are also necessary for drawing up an action plan and understanding the effectiveness of the work carried out. Human capital should be assessed on a regular basis. According to the authors of this article, the optimal frequency is once a year.

In the labour market as a whole, only 59% of companies conduct human capital assessment with such frequency or more frequently; another 29% do not conduct it at all, and 12% of respondents found it difficult to answer (*Table 4*). Taking into account the fact that the management of organisations was interviewed, which should be involved in assessment activities to a greater or lesser extent, the authors propose to equate the answer "I find it difficult to answer" to the option "No assessment is carried out", i.e., a significant number of companies (41% of the total number of companies on the market) do not have such assessment procedures in place.

Particular attention should be paid to management in the following industries: banking and insurance (50%); industrial and agricultural production (53%); construction and leasing (71%). Without assessing the effectiveness of the measures taken, companies may rely on the subjective opinion of managers at different levels or executives, which can lead to significant errors and failure to achieve the desired results.

It is recommended that the management of enterprises carry out a systematic assessment, which will allow them to understand the current situa-

Table 4

Assessment of the system of human capital formation

Sector of the economy	Once every two years or more	Evaluation is not carried out	Difficult to answer
Banking and insurance	50.0%	12.5%	37.5%
IT and software development	73.7%	26.3%	0.0%
Oil and gas, mining, and quarrying	53.8%	38.5%	7.7%
Education, science and healthcare	57.1%	35.7%	7.1%
Industrial and agricultural production	46.7%	40.0%	13.3%
Consumer Goods (FMCG)	70.8%	8.3%	20.8%
Construction and leasing	28.6%	71.4%	0.0%
Other	50.0%	33.3%	16.7%
The labour market as a whole	**58.5%**	**29.2%**	**12.3%**

Source: compiled by the authors based on the results of the study.

tion more accurately, identify necessary measures and develop plans based on objective data, which can contribute to improving the performance and sustainability of companies in the market.

The research revealed the most popular areas of human capital assessment used by Russian organisations (*Fig. 4*), including the following:

- assessment of personnel loyalty and satisfaction level — applied in 43.4% of companies;
- comparison of salary levels with similar companies — in 38.7%;
- assessment of personnel training and development costs — in 38.0%;
- dynamics of competences — in 32.1%;

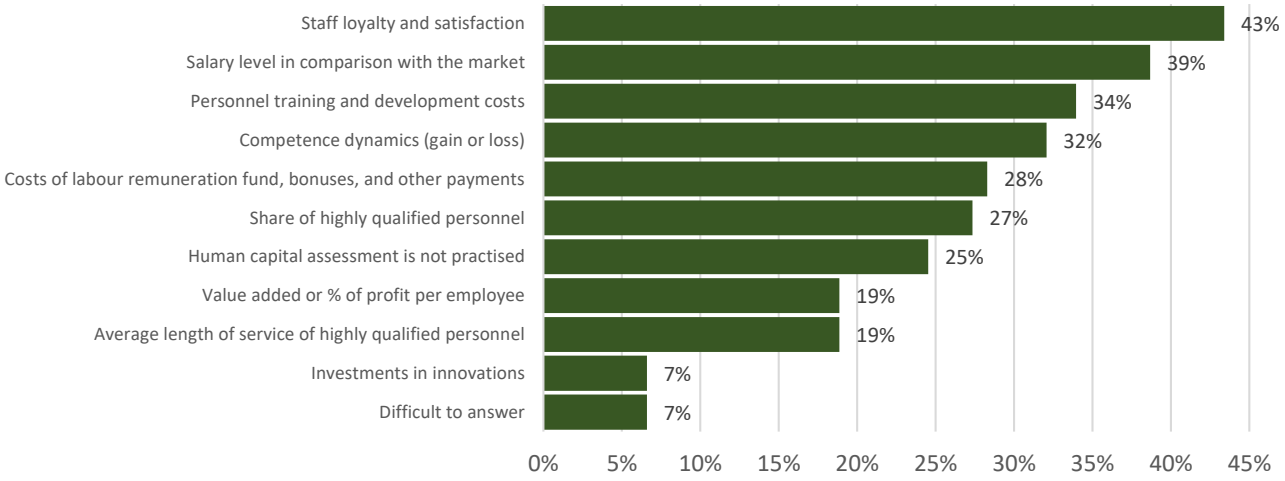

Fig. 4. **Directions for assessing human capital or the effectiveness of its formation**

Source: compiled by the authors based on the results of the study.

• estimation of expenses on salaries, bonuses, and other payments — in 28.3%.

Based on the obtained data, we can conclude that the types of assessments based on cost accounting (cost-based) have a great weight [16, p. 26], but they are not predominant. A significant part of companies pay attention to staff loyalty (43%) and competence (32%). As a rule, attention is paid to at least 2–3 aspects. It can be concluded that among the organisations assessing their human capital, this issue is elaborated and does not require operational adjustments.

3. Human capital development practices.

This block considers the practices of improving human capital through the development of company employees, since this type of capital is

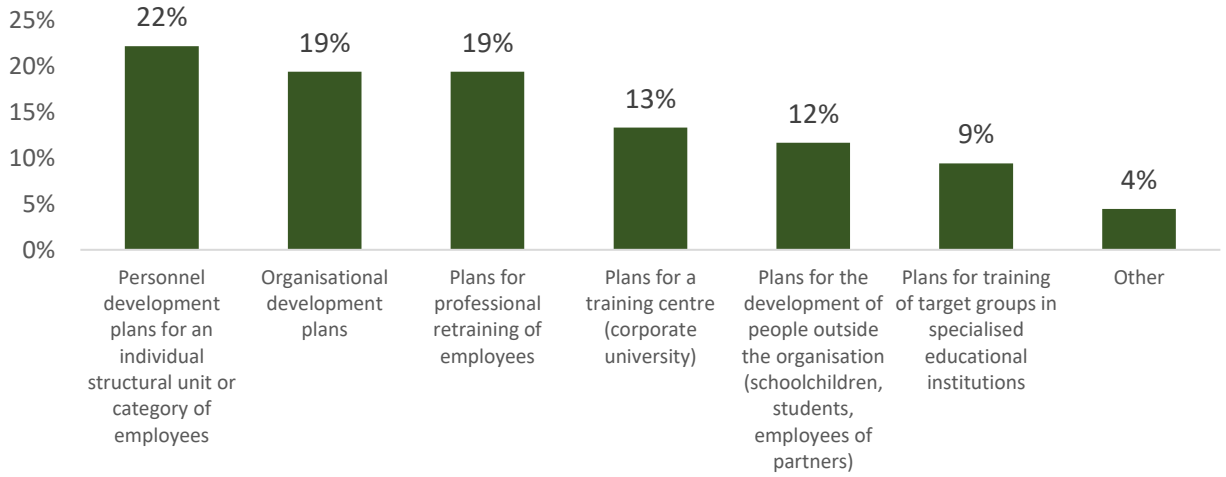

Fig. 5. **Components of the personnel development strategy**

Source: compiled by the authors based on the results of the study.

Table 5

Conducting a training needs assessment by industry

Sector of the economy	Is there a training needs analysis?		
	Yes	No	Difficult to answer
Banking and insurance	50.0%	37.5%	12.5%
IT and software development	73.7%	15.8%	10.5%
Oil and gas, mining, and quarrying	84.6%	15.4%	0.0%
Education, science and healthcare	57.1%	35.7%	7.1%
Industrial and agricultural production	60.0%	20.0%	20.0%
Consumer Goods (FMCG)	79.2%	8.3%	12.5%
Construction and leasing	57.1%	28.6%	14.3%
Other	83.3%	16.7%	0.0%
The labour market as a whole	**69.8%**	**19.8%**	**10.4%**

Source: compiled by the authors based on the results of the study.

inseparable from its bearer. In the first block it was indicated that only in 66% of organisations employee development is part of the strategic plan. The majority of approaches to human capital improvement mainly concern current employees, while only 12% of strategies contain plans for the development of individuals outside the organisation, such as schoolchildren, students or employees of partner companies, and only 9% take into account training programmes for target groups in specialised educational institutions (*Fig. 5*).

The low percentage of external candidates included in development plans means that companies miss the opportunity to consider this category of individuals as a potential for forming their own human capital. It is important to note that most companies that have an employee development strategy tend to use more than two components.

Before building a strategy for personnel training and development, management needs to assess the need for training — assessment activities give them the opportunity to understand the starting point and form plans not on the basis of their own beliefs, but on the basis of objective statistics. Such measures are implemented by 70% of enterprises. According to the authors of the study, this is quite a high indicator. There are three industries in which the vast majority of companies (>70%) carry out this type of assessment: IT, mining, FMCG (*Table 5*).

A difference between the priorities in training was revealed — for example, in 50% of Russian organisations it is aimed at improving professional skills, while the focus in foreign companies is equally divided (37%) between professional skills and interpersonal interaction techniques. (*Fig. 6*). This, in our opinion, is the evidence of a strategic approach to the development of their human capital, as the approach typical of Western firms is based on more systematic investment in the training and development of their staff.

The distribution of training areas by industry is presented in *Table 6*. It is worth noting that the greatest attention to the development of interpersonal skills is paid by companies in the FMCG industry; enterprises of other sectors are focused on functional and technical competencies and employee safety (labour protection, fire safety, etc.). Formalised training is absent in 15% of organisations. In our opinion, mastering "technical competences and safety" does not contribute to the full development of employees and their human capital; therefore, it can be assumed that 32% of companies in the Russian market do not focus on the real development of their human capital, which determines their loss of stability under the pressure of unfavourable environmental factors.

The correlation between interpersonal skills and professional skills is not crucial, as it is determined solely by the organisation's field of activity and business context. For example, in the FMCG industry the main focus is on interpersonal skills, because most of the work processes are outsourced by companies, and the task of personnel is to manage them. The opposite situation is observed in IT, industrial production, education, and healthcare sectors.

One of the key tools for personnel improvement is a personal development plan, which is drawn up by mutual agreement between an employee and a superior manager (including HR). In our opinion, this document should reflect the delta between the current state of the employee (his/her competences, performance) and the desired level and include a list of specific actions. The development plan is adjusted by the employee and the involved management on a regular basis. As part of the research, the respondents answered questions about the practice of using personal development plans and their terms. *Table 7* presents the results with a breakdown by economic sector. Based on these data, the following conclusions can be drawn:

- In almost 1/3 of companies on the market, employees do not have formalised personal development plans.

Fig. 6. **Focus areas in employee training and development**

Source: compiled by the authors based on the results of the study.

Table 6

Direction of focus in the training and development of employees by industry

Sector of the economy	Interpersonal Skills	Professional skills	Technical competence and employee safety	There is no formalized development of employees
Banking and insurance	25.0%	37.5%	0.0%	37.5%
IT and software development	5.3%	68.4%	10.5%	15.8%
Oil and gas, mining, and quarrying	38.5%	30.8%	30.8%	0.0%
Education, science and healthcare	7.1%	42.9%	28.6%	21.4%
Industrial and agricultural production	6.7%	66.7%	13.3%	13.3%
Consumer Goods (FMCG)	50.0%	29.2%	12.5%	8.3%
Construction and leasing	0.0%	28.6%	28.6%	42.9%
Other	16.7%	66.7%	16.7%	0.0%
The labour market as a whole	**21.7%**	**46.2%**	**17.0%**	**15.1%**

Source: compiled by the authors based on the results of the study.

• In 37% of companies, only a certain part of personnel (e.g., potential employees) have development plans; in 26% — every employee.

• The undisputed leader in this area is FMCG segment, where there is a practice of personal development planning; IT companies in the industry and mining companies have similar indicators.

• Development plans (if any) are mostly prepared for 1 year or less (48%); for 2–3 years (21%) and from 3 years and more (3%).

• The largest percentage of organisations that prepare long-term development plans (for a period of more than 3 years) is in the "Education and Science" and "Health Care" industries (7%),

Table 7

Practice of using personal development plans and their deadlines

Sector of the economy	Development plans				Timeline of development plans			
	Every employee has	Yes for some categories	Difficult to answer	No development plans	up to 1 year	2–3 years	> 3 years	No development plans
Banking and insurance	25.0%	0.0%	25.0%	**50.0%**	37.5%	12.5%	0.0%	**50.0%**
IT and software development	10.5%	52.6%	15.8%	**21.1%**	42.1%	31.6%	5.3%	**21.1%**
Oil and gas, mining, and quarrying	23.1%	38.5%	15.4%	**23.1%**	76.9%	0.0%	0.0%	**23.1%**
Education, science and healthcare	7.1%	42.9%	7.1%	**42.9%**	21.4%	28.6%	7.1%	**42.9%**
Industrial and agricultural production	13.3%	46.7%	0.0%	**40.0%**	46.6%	13.3%	0.0%	**40.0%**
Consumer Goods (FMCG)	50.0%	33.3%	8.3%	**8.3%**	58.3%	29.2%	4.2%	**8.3%**
Construction and leasing	28.6%	14.3%	0.0%	**57.1%**	28.6%	14.3%	0.0%	**57.1%**
Other	50.0%	33.3%	0.0%	**16.7%**	50.0%	33.3%	0.0%	**16.7%**
The overall result	**25.5%**	**36.8%**	**9.4%**	**28.3%**	**48.1%**	**20.8%**	**2.8%**	**28.3%**

Source: compiled by the authors based on the results of the study.

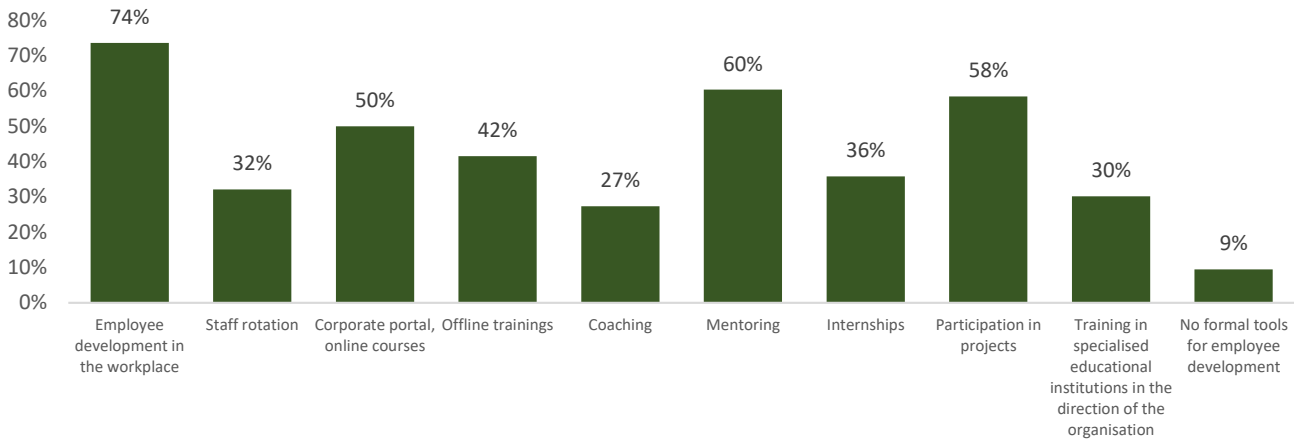

Fig. 7. **Employee training and development tools used**

Source: compiled by the authors based on the results of the study.

which is due to the increased cycle of staff tenure due to the high science-intensive nature of work processes.

The absence of development plans in almost 1/3 of companies in the market as a whole and up to 60% in certain industries is an area for improvement, as well as a signal to management, indicating the spontaneous nature of personnel development, which does not contribute to the development/accumulation of human capital. The results showed that firms that pay attention to employee training do so in an integrated way — respondents noted the use of an average of four educational tools in one company. The most popular are on-the-job development (used in 74% of companies); mentoring (60%) and project participation (58%). (*Fig. 7*).

Formal development tools are absent in 9% of organisations. This value is not critical on the market scale. It should be noted that in recent years the need for online training has increased [17, p. 56–64] and, judging by the survey data, this format is already used by half of the enterprises. The cycle of employee development is completed by the evaluation of the conducted training, which is necessary to understand the levels of quality and effectiveness of training, staff satisfaction, as well as to analyse the effectiveness of the use of investments in education. The most popular assessments on the market are the degree of satisfaction with training and the level of performance change (*Fig. 8*).

Since the goal of most organizations is to make a profit,[7] one of the key indicators, in our opinion, should be the evaluation of the return on investment in training programmes. The survey revealed that only 7% of companies apply this criterion; 6% do not assess it at all.

Almost all enterprises in the market face a number of difficulties in the process of training and development of their employees. The most common answer among respondents was "lack of time" (18%) (*Fig. 9*), which implies, among other things, a high workload of employees and their managers in the main business process, as well as the distribution of priorities in favour of other tasks after performing direct work duties.

One solution to this problem, suggested by the authors of the article, is to allocate time for employees and management for "development processes", which company management should consider as an investment in increasing the human capital of the organisation, allowing to improve the knowledge and performance of the staff. A consistent solution to the problems identified represents the companies' potential to contribute to its sustainability in the face of uncertainty.

[7] The purpose of entrepreneurial activity is to make a profit. Federal Tax Service (official website). 29.11.2012. URL: https://www.nalog.gov.ru/rn48/news/activities_fts/4263891

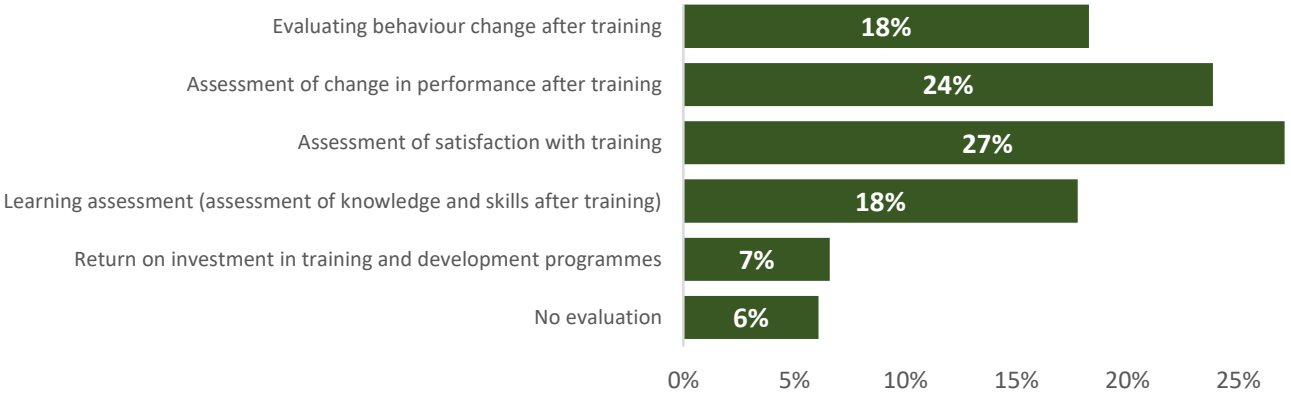

Fig. 8. **Evaluation of applied training programs**

Source: compiled by the authors based on the results of the study.

Fig. 9. **Difficulties identified in the learning process**

Source: compiled by the authors based on the results of the study.

Table 8

Working conditions in companies in the Russian market

Sector of the economy	Working conditions in your company			
	The company strives to occupy leading positions in the industry	The company maintains competitive labour conditions	It is difficult to answer	Labour conditions are worse than those of the competitors
Banking and insurance	37.5%	25.0%	12.5%	25.0%
IT and software development	36.8%	57.9%	0.0%	5.3%
Oil and gas, mining, and quarrying	30.8%	61.5%	0.0%	7.7%
Education, science and healthcare	14.3%	64.3%	7.1%	14.3%
Industrial and agricultural production	20.0%	60.0%	13.3%	6.7%
Consumer Goods (FMCG)	58.3%	37.5%	4.2%	0.0%
Construction and leasing	14.3%	85.7%	0.0%	0.0%
Other	66.7%	33.3%	0.0%	0.0%
The overall result	**35.8%**	**52.8%**	**4.7%**	**6.6%**

Source: compiled by the authors based on the results of the study.

4. Staff retention and motivation. Working with the potential of employees.

Staff retention and motivation are important conditions and elements of the system of formation of human capital of enterprises for a number of reasons, because:

- allow retaining valuable experience and knowledge that employees bring to the company;
- ensure stability and continuity of work, which contributes to the sustainability of the business;
- contribute to an organisation's unique culture;
- help reduce the cost of training new recruits.

We have identified the following aspects that need to be taken into account by management in order to solve the problem of retaining and motivating qualified personnel: providing interesting work; creating high-tech jobs to stimulate professional growth; a competitive system of remuneration and working conditions; availability of benefits and career development opportunities. Since the movement of qualified employees, who form the core of human capital of companies, takes place mainly within the industry, in this section of the survey respondents were asked to assess the situation at their company in comparison with others in the same industry.

89% of managers defined working conditions in their organisations as either being at a competitive level (53%) or corresponding to the best possible for companies in this sector of the economy (36%). In general, the situation on the market is the same in all sectors, except for FMCG and banking. In the first case, competition is the greatest — 58% of representatives of organisations say that they strive to create the best working conditions in the industry. In the banking sector there is a polarity of answers: on the one hand, 63% of respondents positively characterise the company's actions; on the other hand, according to 25% of survey participants, working conditions at their workplaces are worse than those of their competitors (*Table 8*).

Table 9

Creation of high-tech jobs in the Russian market

Sector of the economy	Do you have high-tech jobs in your organization?			
	Yes, occupies a leading position in the industry	Yes, corresponds to the state of affairs in the industry	Difficult to answer	No
Banking and insurance	12.5%	37.5%	25.0%	25.0%
IT and software development	26.3%	47.4%	15.8%	10.5%
Oil and gas, mining, and quarrying	46.2%	38.5%	7.7%	7.7%
Education, science and healthcare	7.1%	57.1%	7.1%	28.6%
Industrial and agricultural production	20.0%	60.0%	0.0%	20.0%
Consumer Goods (FMCG)	20.8%	54.2%	12.5%	12.5%
Construction and leasing	0.0%	57.1%	0.0%	42.9%
Other	33.3%	33.3%	16.7%	16.7%
The overall result	**21.7%**	**50.0%**	**10.4%**	**17.9%**

Source: compiled by the authors based on the results of the study.

Table 10

Comparison of the system of remuneration for work and the provision of benefits

Sector of the economy	Remuneration system				Additional benefits for employees			
	Industry leading	Competitive	Difficult to answer	Below industry average	Industry best conditions	Similar to competitors	Difficult to answer	No
Banking and insurance	0.0%	62.5%	25.0%	12.5%	0.0%	62.5%	0.0%	37.5%
IT and software development	15.8%	68.4%	5.3%	10.5%	15.8%	63.2%	0.0%	21.1%
Oil and gas, mining, and quarrying	0.0%	76.9%	0.0%	23.1%	0.0%	69.2%	0.0%	30.8%
Education, science and healthcare	0.0%	35.7%	7.1%	57.1%	7.1%	35.7%	14.3%	42.9%
Industrial and agricultural production	13.3%	46.7%	6.7%	33.3%	0.0%	60.0%	0.0%	40.0%
Consumer Goods (FMCG)	4.2%	79.2%	4.2%	12.5%	16.7%	79.2%	0.0%	4.2%
Construction and leasing	0.0%	71.4%	28.6%	0.0%	0.0%	71.4%	0.0%	28.6%
Other	0.0%	83.3%	16.7%	0.0%	16.7%	50.0%	0.0%	33.3%
The overall result	**5.7%**	**65.1%**	**8.5%**	**20.8%**	**8.5%**	**63.2%**	**1.9%**	**26.4%**

Source: compiled by the authors based on the results of the study.

For the professional development of employees, organisations need to create high-tech workplaces. In terms of application of high technologies and their improvement, the greatest competition is noted in the sphere of raw materials extraction. Polar values are noted in the construction sector: according to 57% of respondents, the technologies used correspond to the situation in the industry, but 43% believe that their company loses to competitors in this area.

According to the authors, there is a "healthy" situation in the market in general, with 22% of companies striving to occupy leading positions, regularly bringing innovations, and introducing modern technologies to the industry; 50% striving to meet the benchmark position in their sector; and 18% not withstanding the competition. 10% of respondents found it difficult to answer (*Table 9*).

Table 10 summarises the results of the survey regarding the remuneration system and fringe benefits for employees. Organisations need to keep up with competitors and either provide better conditions to retain employees or invite staff from other companies. The study found that the remuneration system and benefits provided in more than 60 per cent of the companies are competitive. In terms of wages, 6% of companies strive to provide the best conditions, and 9% of companies strive to provide the best conditions in terms of compensations.

The data obtained shows that in two sectors of the economy the level of remuneration and benefits is lower than that of competitors — "Education, science and health care" (representatives of 57% of companies consider their salaries lower than those received at other enterprises in this sector, and employees of 43% of organisations have the same opinion about the benefits provided); similarly, the situation is in industry and agricultural production — 33% are dissatisfied with remuneration for labour, 40% — are dissatisfied with benefits. It is also noteworthy that respondents highlighted the lack of fringe benefits (food, health insurance and mobile phones) in over a quarter (26.4%) of companies in the market. The FMCG industry stands out favourably, which once again confirms the high degree of employee support and focus on the key type of capital inherent in its companies.

In today's world, when the concept of "Lifelong learning" [18] has a high practical applicability, the possibility of transforming personal development into professional development plays an important role and becomes one of the factors contributing to staff retention. The study identified the economic sectors with the largest share of companies contributing to such transformation: IT — 63%, FMCG — 67%, industrial and agricultural production — 60% (*Fig. 10*). The most critical situation is observed in companies in construction (29%) and raw materials extraction (46%).

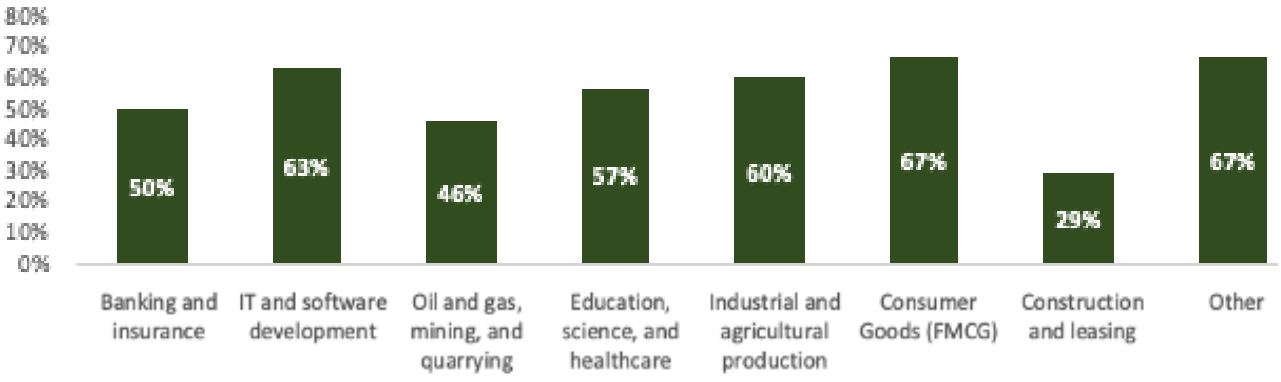

Fig. 10. **Share of companies in the industry that contribute to the transformation of personal development into professional development**

Source: compiled by the authors based on the results of the study

On average, 58% of organisations in the market help employees realise their potential and ambitions by transforming personal development into professional development; 16% of respondents found it difficult to answer; 26% gave a negative answer.

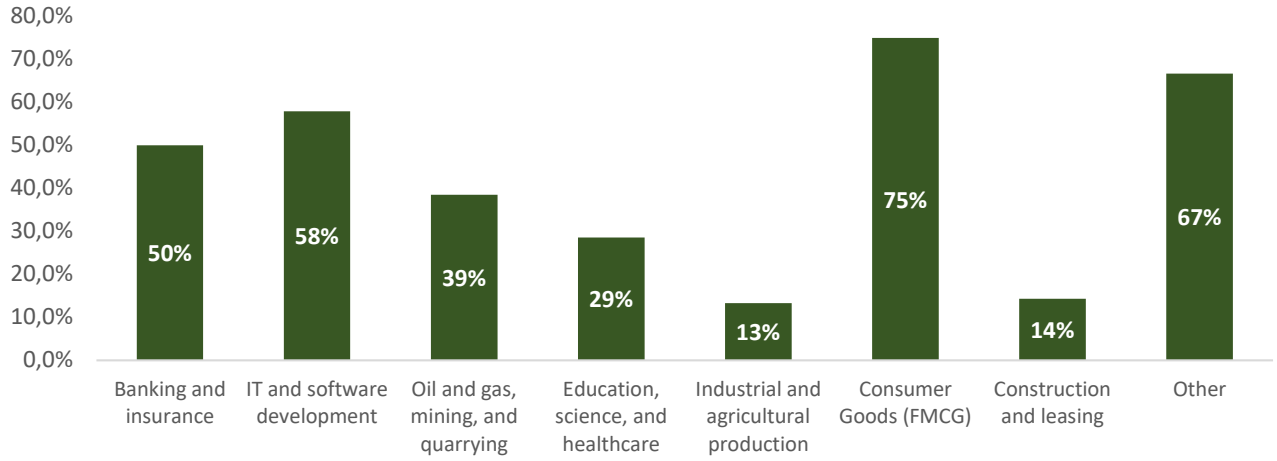

Fig. 11. **Share of companies in the industry that assess the potential of employees**

Source: compiled by the authors based on the results of the study.

Table 11

Filling vacancies and the effectiveness of succession programmes

Sector of the economy	Vacancies are filled mainly by			Are succession programs working effectively?		
	internal candidate	difficult to answer	external candidate	Yes	difficult to answer	No
Banking and insurance	12.5%	33.0%	56.5%	12.5%	33.0%	56.5%
IT and software development	26.3%	5.3%	68.4%	36.8%	5.3%	57.9%
Oil and gas, mining, and quarrying	38.5%	23.1%	38.5%	30.8%	7.7%	61.5%
Education, science and healthcare	42.9%	14.3%	42.9%	57.1%	28.6%	14.3%
Industrial and agricultural production	33.3%	6.7%	60.0%	33.3%	20.0%	46.7%
Consumer Goods (FMCG)	58.3%	16.7%	25.0%	66.7%	12.5%	20.8%
Construction and leasing	0.0%	14.3%	85.7%	28.6%	14.3%	57.1%
Other	33.3%	16.7%	50.0%	33.3%	33.3%	33.3%
The overall result	**35.3%**	**14.7%**	**50.0%**	**43.4%**	**16.0%**	**40.6%**

Source: compiled by the authors based on the results of the study.

The long-term development of companies depends to a large extent on ensuring staff succession, which also contributes to the development of human capital. However, the work on its potential should start with assessment, but such activity is characteristic of only 46% of organisations (*Fig. 11*).

The FMCG sector is the undisputed leader in this area, where more than 75% of enterprises assess the potential of their employees. The IT sector (58%) and the banking industry (50%) also have quite high indicators, and this is directly related to the largest representation of Western companies in these sectors, whose orientation to work with personnel has historically been at a higher level.

An indicative result of talent management is the percentage of vacancies closed by internal candidates (*Table 11*) — according to respondents, 35% of companies in the market as a whole do so. The effectiveness of succession programmes and good results are confirmed by the management assessments of 42% of companies. The highest percentage was noted in the FMCG sector (58 and 67% respectively), as well as in the Education, Science and Healthcare sectors (43 and 57%). According to the authors, investment in succession is a contribution to both the human capital of the company and the "final" result of investing in the human capital of a particular employee.

Working on continuity and succession is a difficult and time-consuming process. Thus, as a result of this study, typical accompanying problems were identified (*Fig. 12*):

- high workload of the personnel is noted by more than one third of respondents;
- professional burnout is a concern for 19% of companies.
- insufficient level of competence and professional maturity of novice employees worries 17% of the total number of organisations;
- unwillingness of experienced employees to share their knowledge was emphasised by 9%;
- low motivation for development in general is observed in 7% of companies.

5. Assessment of the company's position in the labour market.

In the final part of the survey, respondents were asked to assess the position of the company on the labour market relative to its competitors. Despite the fact that the answers in this section are subjective in nature (as the management considered the results of their company), they reflect the degree of confidence of managers in the company and the strategies adopted by it.

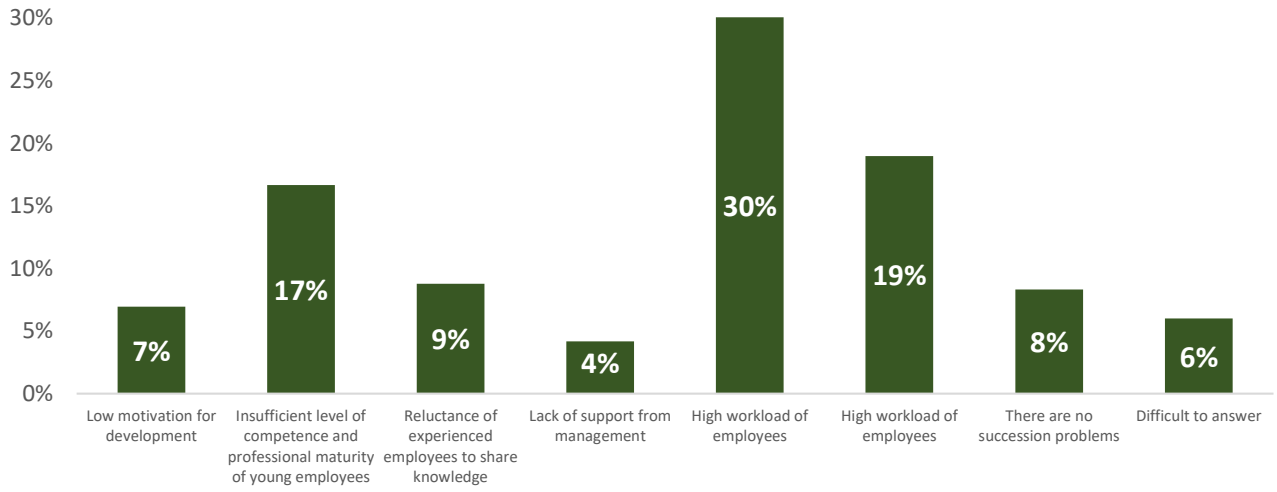

Fig. 12. **Problems and challenges in succession development and in the formation of continuity**

Source: compiled by the authors based on the results of the study.

Table 12

Management assessment of the position of their companies in the labor market

Sector of the economy	Position of the company in the labor market			
	Outperforms competitors and acquires competences when changing personnel	Loses out to competitors for top talent, but gets stronger in the process	Loses out to competitors and loses competences when staff changes	Difficult to answer
Banking and insurance	25.0%	12.5%	37.5%	25.0%
IT and software development	52.6%	26.3%	15.8%	5.3%
Oil and gas, mining, and quarrying	53.8%	15.4%	23.1%	7.7%
Education, science and healthcare	7.1%	35.7%	14.3%	42.9%
Industrial and agricultural production	40.0%	13.3%	20.0%	26.7%
Consumer Goods (FMCG)	33.3%	25.0%	8.3%	33.3%
Construction and leasing	0.0%	0.0%	28.6%	71.4%
Other	50.0%	33.3%	0.0%	16.7%
The labour market as a whole	**34.9%**	**21.7%**	**17.0%**	**26.4%**

Source: compiled by the authors based on the results of the study.

When assessing their organisation's position relative to competitors on the labour market, 35% of respondents said that their company is winning the battle for staff and gaining the necessary competencies by building up its human capital. According to 22% of respondents, despite the fact that their company is losing to competitors, it manages to strengthen its position; representatives of 17% of companies admitted that they lose human capital when recruiting staff; and 26% found it difficult to answer (*Table 12*).

Although a large percentage of respondents could not clearly formulate their opinion, the authors highlight the most frequently occurring answer options. For example, 38% of respondents from the banking and insurance sectors said that their HR policies do not allow them to build up human capital when applying to the labour market, and they are losing out to competitors. In turn, more than half of the respondents in the IT and mining sectors emphasised that their companies are strengthening.

When assessing turnover in relation to competitors, the opinions of respondents from different sectors did not differ too markedly. On average, more than half of the organisations (55%) noted the same level of this indicator (*Table 13*).

Based on these data, we can conclude that the situation is most similar in companies in the construction industry: 86% of them gave the same answer.

Table 14 compares the results of answers to the question about the presence of recruitment problems and assessment of organisations' attractiveness. Representatives of the majority of enterprises (69%) emphasised the attractiveness

Table 13

Management assessment of staff turnover relative to that of competitors

Sector of the economy	Turnover in your company relative to competitors			
	High	Difficult to answer	At the same level	Low
Banking and insurance	0.0%	12.5%	50.0%	37.5%
IT and software development	10.5%	10.5%	47.4%	31.6%
Oil and gas, mining, and quarrying	7.7%	7.7%	46.2%	38.5%
Education, science and healthcare	14.3%	7.1%	50.0%	28.6%
Industrial and agricultural production	13.3%	0.0%	60.0%	26.7%
Consumer Goods (FMCG)	4.2%	4.2%	54.2%	37.5%
Construction and leasing	0.0%	0.0%	85.7%	14.3%
Other	0.0%	0.0%	66.7%	33.3%
The labour market as a whole	**7.5%**	**5.7%**	**54.7%**	**32.1%**

Source: compiled by the authors based on the results of the study.

Table 14

Management assessment of hiring problems and attractiveness of the company

Sector of the economy	Does the organization face hiring problems?			Is your company an attractive employer?		
	Yes	Difficult to answer	No, or there are insignificant ones	Yes	Difficult to answer	No
Banking and insurance	37.5%	12.5%	50.0%	50.0%	37.5%	12.5%
IT and software development	10.5%	0.0%	89.5%	68.4%	21.1%	10.5%
Oil and gas, mining, and quarrying	23.1%	7.7%	69.2%	84.6%	7.7%	7.7%
Education, science and healthcare	42.9%	7.1%	50.0%	50.0%	14.3%	35.7%
Industrial and agricultural production	66.7%	6.7%	26.7%	53.3%	40.0%	6.7%
Consumer Goods (FMCG)	45.8%	4.2%	50.0%	91.7%	4.2%	4.2%
Construction and leasing	42.9%	0.0%	57.1%	57.1%	28.6%	14.3%
Other	66.7%	0.0%	33.3%	66.7%	0.0%	33.3%
The labour market as a whole	**39.6%**	**4.7%**	**55.7%**	**68.9%**	**17.9%**	**13.2%**

Source: compiled by the authors based on the results of the study.

of their campaigns as an employer, which was confirmed by the absence of serious problems related to recruitment (56%).

It is worth noting the results of the assessment of the attractiveness of companies in the FMCG sector (92%) and mining (85%). Such figures indicate a high level of market competition in these industries, as the majority of companies simultaneously believe that they are able to attract talent. According to respondents, IT industry organisations are experiencing the least number of problems.

CONCLUSIONS

In accordance with the previously stated objectives, a study of the approaches to human capital formation used by companies operating in the Russian labour market was conducted. In the course of the work, industry specifics were identified. The results obtained allow us to draw a number of conclusions:

1. There is no universally accepted definition of human capital in most organisations, although many (>50%) see a link between human capital and HR policies.

2. Human capital assessment procedures are the starting point for making decisions based on a real understanding of the current state of affairs. However, they are only conducted in 60 per cent of companies.

3. There are systemic problems in personnel development at enterprises and beyond — most of them conduct training needs assessment (70%), which allows to develop an educational strategy based on objective data. In the market as a whole, up to 60% of companies in certain industries do not have personalised employee development plans, which requires improvement and is a signal to management.

4. Most organisations cite improved (36%) or competitive (53%) working conditions as their goal. Approximately 20% say they lead their industry in creating high-tech jobs. More than half of firms say they have a competitive compensation system and provide fringe benefits compared to others in the industry.

5. To strengthen their position, companies can pay attention to interaction with potential employees. Thus, only about 40% of respondents emphasise the effectiveness of succession programmes at their place of work, which corresponds to a low percentage of internal vacancy filling (35%). The high workload of employees is cited as the main reason that hampers companies' capacity development efforts.

The authors of the study acknowledge that not all aspects of human capital formation and its impact on the sustainability of organisations have been considered. Special attention should be paid to the study of the influence of managers' worldview and thinking on HR management practices, as well as the formation and development of human capital. It is interesting to study the mutual influence of human capital and organisational culture. In particular, how can the latter, being traditional and hierarchical with dominant authoritarian management styles, be at the origin of vertical and horizontal cooperation of managers with the aim of formation and development of human capital?

The authors of the article also consider it relevant to analyse approaches to planning and budgeting in a turbulent environment.

RECOMMENDATIONS FOR COMPANY MANAGEMENT

The research allowed us to develop a set of interrelated recommendations, the implementation of which will contribute to the formation and development of human capital of companies, including the following:

1. Development of a commonly accepted definition of human capital in the context of management for use within companies.

2. Introducing the practice of regular assessment of human capital using comprehensive indicators to monitor the dynamics and improve the effectiveness of human resource decisions.

3. Using a systematic approach to improving corporate HR policies that promote the development of human capital.

4. Funding of development programmes and motivation of employees for training in order to overcome difficulties related to human capital development.

5. Paying attention to the implementation of strategic partnerships with relevant educational institutions to improve the effectiveness of succession programmes.

6. Allocating time for staff training and development as one of the priority areas within business process optimisation programmes and projects.

7. Adopting a comprehensive approach to improving its reputation as an employer, including the creation of high-tech workplaces.

8. Creating and maintaining an ecosystem around it aimed at early professional orientation of young people.

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Typology of Leadership Styles Depending on the Nature of Decision-Making and Business/Person Orientation

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ABSTRACT

The purpose of the study is to develop a classification of leadership styles based on a combination of two indicators: the degree of employees' involvement in the decision-making process and the prevailing orientation at the enterprise either towards achieving organizational results or towards ensuring employees' satisfaction. The scientific novelty of the work is in the approach to solving the stated problem, namely, the creation of the authors' typology of management styles (individual authoritarian, paternalistic, collective, communal), based on a combination of the degree of staff participation in making management decisions and target orientation towards business/relationships. **The results** obtained show that this methodology helps to reveal most efficiently the features of management at modern Russian enterprises. This methodology was used as a basis for the analyses of the aspects determining the nature of the leadership. There was revealed its relationship with various socio-economic factors. Long-term longitudinal studies conducted at Naberezhnye Chelny enterprises provided the authors of the article with empirical material, on the basis of which it was concluded that authoritarianism and paternalism were the most characteristic of the modern domestic managers' style. The practical significance of the study is in the possibility of applying its results at enterprises in various sectors of the economy. The proposed classification of management styles can be used as a methodological toolkit in studying the effectiveness of management work at different organizations, as well as in the process of training, retraining and advanced training of personnel.

Keywords: management decisions; management decision making; target orientation to result achievement; target orientation to employee satisfaction; leadership style; typology of leadership styles; individual authoritarian leadership style; collective leadership style; paternalistic leadership style; communal leadership style

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INTRODUCTION

Achieving key goals in social development is impossible without increasing management efficiency. Studying the style of modern Russian middle and lower level managers is a necessary condition for increasing the level and quality of management at domestic enterprises.

The growth of interest in the personality of the leader and the style of used leadership was largely influenced by the "managerial revolution" that began in the 50s of the previous century. The essence of this phenomenon was a decrease in the influence of owners on the activities of enterprises and a corresponding increase in the importance of top managers, who were often not the owners of the companies. The institution of owners as a key subject of power at enterprises began to be replaced by the institution of top managers, who began to determine the development strategy of enterprises. It is characteristic that this phenomenon was most typical for large enterprises that determined the state of the world economy as a whole. Under these conditions, it became obvious that the success of an individual enterprise and, consequently, the success of the economy as a whole was largely determined by the personality of the managers and their work style.

The problem of leadership style, despite its fairly deep and long-standing study, continues to have high theoretical and applied relevance. At the same time, the very concept of "leadership style" can be defined as a set of techniques and methods for organizing interaction between the managing and managed subsystems in the organization. The traditional basis for classifying leadership styles is the degree of participation of ordinary employees in the process of preparing and making management decisions. At the same time, the management decision, in our opinion, should be considered in the light of two theses. The first thesis: a management decision always involves a choice of alternatives. A person who does not have the opportunity to choose one or another action option is, by definition, not a subject of action and cannot be classified as a manager. The second thesis: a management decision always contains the obligation of its execution, both for the initiators of the decision and for the persons included in the orbit of their subordination. However, we believe that using only one indicator as the basis for classifying leadership style greatly simplifies the matter. In this article we will try to propose our own typology based on two principles for dividing leadership styles: 1) the degree of involvement of enterprise personnel in management processes; 2) the nature of management's aim orientation either towards achieving an organizational result or maintaining a high level of employees' satisfaction.

LITERATURE REVIEW

The rapid development of sociology and social psychology has become an important factor that has contributed to the growing interest in the personality of a leader. The interest of scientists in the problems of leadership and motivation has made it possible to make a well-known breakthrough in issues related to the sociological and psychological aspects of management.

Even in the period before World War II, the famous German-American psychologist Kurt Lewin touched upon the problem of typology of leadership styles. He took as the basis for the classification of leadership styles the degree of participation of employees in management decision-making. On this basis, he identified authoritarian, democratic and liberal leadership styles [1].

K. Levin himself considered the most preferable democratic style, based on the principles of collective decision-making and high involvement of staff in management. But over time, this author's position has undergone a certain evolution, since his new research conducted at secondary schools did not confirm that the democratic style always has a positive effect [2].

In our opinion, this was due to the fact that the only criterion that K. Levin was guided by

when identifying management styles was the method of making management decisions. Therefore, the classification he introduced was a scheme for reducing powers in the upper levels of management with the consistent transfer of managerial powers to lower levels up to the complete freedom of workers in decision-making, which is characteristic of a passive (liberal) style.

At the same time, K. Levin's views found many followers. In a number of studies, in particular, R. Tannenbaum and W.H. Schmidt [3], A.G. Vroom, F. Jetton, A. Jago [4] and other ones there were developing concepts of leadership styles in which the central issue was the degree of participation of ordinary personnel in management decision-making.

In contrast to these views, F. Fiedler created the concept of situational leadership and thereby initiated the study of leadership style from the point of view of factors of the internal and external environment in which the enterprise is located [5].

For supporters of this concept, the degree of management efficiency is completely determined by the achievement of the practical tasks assigned to the managed company [6]. Therefore, for the sake of positive production results, in necessary cases, management decisions that narrow the powers of personnel are considered justified and acceptable.

Recognition of enterprise efficiency as the main criterion for successful management has given rise to many concepts aimed at increasing it. In particular, many studies are devoted to such important processes as analysis and management of the life cycle of manufactured products, as well as analysis and management of the life cycle of used technologies [7].

However, despite the importance of the effective operation of an enterprise, it is impossible to reduce all the multifaceted activities of personnel to this alone factor. Using only one, although important, indicator does not allow one to get a complete picture of the possible options for leadership style [8, 9]. The incompleteness of such consideration became obvious due to the fact that in the second half of the twentieth century, an organization began to be viewed primarily as a social system, the most important element of which is a person not just as a subject of production functions, but primarily as an individual with his/her own goals and interests, which must be correlated with the interests of the enterprise.

In this regard, another indicator has been introduced into the typology of leadership styles — the ratio of the value of the result of the enterprise's activities and the value of the person working at this enterprise. This approach to the typology of leadership styles was first proposed by R. Blake and J. Mouton and was subsequently developed in a number of other concepts [10]. However, even in this case, the use of only this indicator does not reflect the entire range of possible management situations at the enterprise. For example, business orientation includes two completely different situations: the arbitrariness of one person in the interests of business, which infringes on the interests of other members of the organization, on the one hand, and the voluntary renunciation of part of his/her interests by an employee, on the other hand, in favor of the interests of the organization. In turn, human orientation can also have different options. An employee can be considered as an independent subject of activity, to whom part of the managerial powers can be delegated, or can be looked upon as a kind of passive object that needs to be taken care of and generally treated from the standpoint of paternalism [11, 12].

In modern scientific literature, both domestic and foreign, there are many works devoted to both the problems of decision-making and leadership style.

In his comprehensive study, M. Selart strives to help readers learn to analyze and develop their own decision-making style. To do this, the author carefully studies all stages, starting with the formulation of the solution problem and

ending with the implementation of the solution. But the author's key idea is to substantiate the inextricable connection between decision-making and leadership style, while most researchers, as he rightly emphasizes, study these problems deeply, but separately [13].

Thus, A. G. Wright, exploring the planning process of strategic decision-making, studies in detail the complex sequence of relevant actions [14] and, in collaboration with P. Goodwin, focuses on analyzing the structure of the decision-making process [15].

E. Witte, having examined a number of industries, comes to the conclusion that shortcomings in the procedures of making complex decisions lead to unnecessary work. To find ways to reduce it, the author develops an original "phase theorem" [16].

B. Widaye expresses a skeptical opinion that there is a direct and obvious connection between decision-making and its results. In his opinion, empirical reality shows a much more complex picture, in which there is room for a wide variety of factors influencing the functioning of organizations [17].

The topics of research that are currently of interest are related to gender [18], environmental [19] aspects of decision making, modern digitalization processes [20], as well as the problems of small business [21, 22].

At the same time, there are many works in which the nature of leadership is considered without any connection with decision making. Thus, detailed studies of different leadership styles in different contexts can be found in the works of M. Cerne, S. Batistic and Kenda R. [23], D. Cretu and A. R. Job [24], A. Fries, N. Kammerlander and M. Leitterstorff [25], L. A. Hambly, T. A. O'Neill and T. J. B. Kline [26], W. Liu, D. P. Lepak, R. Takeuchi, and H. P. Sims [27], S. Top, E. Oge and S. Gümüş [28], A. Wang, K. Tsai, S. D. Dionne et al. [29].

And the influence of various factors on the effectiveness of leadership is revealed in the studies of D. Hristov, N. Scott and S. Minoch [30], P. Mishra and R. K. Misra [31], F. Morais, A. Kakabadze and N. Kakabadze [32], Y. L. Wu, B. Shao and G. Schwartz [33], G. A. Yukl [34].

Meanwhile, we consider the most important task in this area the study of the relationship between the nature of decision-making and leadership style.

Contemporary ideas about leadership styles have developed in the context of many research projects. Thus, D. McGregor bases his concept of human behavior on an assessment of the alternative "Theory X" and "Theory Y". The first represents a concentration of negative ideas about employee motivation, while the second, on the contrary, is based on the assumptions about their positive motivation. The research findings indicate a clear preference for "Theory Y," the use of which in management practice increases labor productivity and improves interpersonal relationships [35].

W. J. Reddin developed an original three-dimensional theory (3D model), in which the two main dimensions of leadership, which he called business orientation and relationship orientation, are complemented by a third dimension — effectiveness, which in his interpretation is understood as the result of using the right leadership style in a specific situation. The study came to an interesting result, which shows that successful leadership leads not only to positive production results, but also means the development of the leaders themselves [36].

The original concept of emotional leadership was proposed by D. Goleman, R. Boyatzis and A. McKee, who presented and studied 6 leadership styles in the context of the theory of emotional intelligence: 1) idealistic, where the leader must play an inspiring role, orienting staff towards an image of an attractive prospect, 2) a training role, in which the manager promotes the development of employees' abilities to increase their productivity; 3) friendly, when the manager achieves harmony in relations between employees; 4) democratic, in which staff are involved in

management and give managers advice on how to improve their work; 5) ambitious: the leader sets difficult-to-achieve but interesting goals for himself and his/her employees, however, if poorly implemented, this style can lead to negative results; 6) authoritarian, where the leader acts confidently, clearly in difficult and uncertain situations, but in cases of abuse of power by managers, this style has the most negative impact on the atmosphere and relationships in the organization [37, p. 69–70]. Research has shown that the most effective leaders are those who have mastered multiple styles and are able to implement them in different circumstances.

The problem of leadership style has been actively studied by domestic authors both in the Soviet and post-Soviet periods. Many of them come to the conclusion that the preferred leadership style is determined primarily by the individual psychological characteristics of the leaders themselves and not by the social and state system. At the same time, A.G. Kovalev believes that "as the key characteristics of a leader's personality that influence the choice of leadership style, it is necessary to highlight abilities, will and temperament" [38]. However, empirical data proving the existence of a relationship between the individual psychological characteristics of a leaders and their chosen leadership style is currently insufficient.

Of significant interest are works in which the authors explain management style not only by the characteristics of the manager's personality, but also by a combination of external factors. In particular, I.P. Volkov, trying to explain the reasons why the authoritarian-directive style of management clearly predominates in modern Russian conditions, points to "the lack of discipline and order, the laxity of subordinates and their superiors, ignoring a new boss" [39]. A.V. Kuznetsov also refers to "the behavior of a manager who does not want to share power with subordinates and, as a result, introduce elements of complicity into everyday organizational practice, the low professional level of subordinates, their lack of confidence in their abilities, and fear of independently completing tasks" [40]. R.L. Krichevsky, in turn, is sure that this is due to the cultural and qualification level of workers: "...the lower the qualifications and culture of the employee, the easier it is to impose on him a tough management style and even, moreover, to cause satisfaction with this style" [41, p. 54]. A.L. Zhuravlev believes that leadership style is determined by twenty-seven factors, and the significant part of which are related to the relationship between managers and subordinates [42]. However, his works do not reveal the dependence of the choice of leadership style on the nature of the aim orientation of management either to achieve an organizational result or to maintain a high level of employees' satisfaction.

The analysis of domestic authors' works both in the Soviet and post-Soviet periods shows that profound changes in socio-economic conditions in our country have not led to an equally radical change in management style. These researchers also primarily classify leadership styles taking into account the degree of ordinary employees' participation in the process of preparing and making management decisions. How leadership style relates to business/relationship goal orientation is currently under-researched.

MATERIALS AND METHODS

The purpose of this study is to develop the authors' classification of leadership styles, based on a combination of two indicators: the degree of employee involvement in the decision-making process and the prevailing orientation at the enterprise either towards achieving organizational results or ensuring employees' satisfaction.

To achieve this goal, the following tasks were set:

1. A development of a classification of leadership styles depending on the nature of decision-making in the work group and the prevailing value orientation towards business/relationships.

2. A study of the prevailing leadership style at sample enterprises.

The sample size of enterprises was determined based on the calculation of the confidence interval using the formula:

$$n = \frac{z^2 pq}{e^2},$$

where n is the sample size; z is the normalized deviation of the estimate from the average value depending on the confidence probability of the result obtained; p — sampling variation; q = (100 — p); e — permissible error.

With a confidence interval level of 95%, the value of the variation determined on the basis of a preliminary qualitative study of the object is equal to 80%, and the desired accuracy of the results is ±10%, the sample size was 28 commercial enterprises. The sample makes up 2.9% of the total number of actually operating commercial enterprises in Naberezhnye Chelny.

The total number of employees at the enterprises we surveyed is 34 thousand people, which is 18% of the total number of personnel of commercial enterprises in Naberezhnye Chelny. The sample calculation was carried out on the basis of three indicators: 1) the form of ownership of the enterprise; 2) the time of formation of the enterprise (enterprises existing since Soviet times and post-Soviet enterprises created after 1991; the type of activity of the enterprise (industrial, construction, trade). The distribution of enterprises selected for the study is representative of the characteristics of the general population of enterprises in the city of Naberezhnye Chelny according to the indicators mentioned.

The respondents were lower and middle managers and ordinary employees. In total, we interviewed 123 low- and middle-level managers, as well as 587 ordinary employees working at commercial enterprises of various forms of ownership in the city of Naberezhnye Chelny in the Republic of Tatarstan (Russia).

The study used the following methods:

1. Analysis of regulatory documents of enterprises.

2. A questionnaire survey of ordinary employees of enterprises based on the tools developed by the authors.

3. Expert survey of lower and middle managers based on the expert sheet developed by the authors.

4. The method of focus groups formed from managers and employees of personnel management services of the surveyed enterprises.

RESULTS

Having conducted a study of the leadership styles used today in Russian enterprises, we offer our own approach to their typology.

The key problem regarding the determination of types of leadership is that the two most important indicators (the nature of the employees' involvement in the decision-making process and the prevailing aim orientation of the enterprise management towards achieving results or employees' satisfaction) should not be considered in isolation, but in unity. In *Table 1*, these indicators are correlated and, on this basis, there are identified the following types of leadership styles:

Table 1

Classification of leadership styles

Nature of decision making / Orientation type	Individual nature of decision making	Collective nature of decision making
Aim orientation is to achieve the result of the organization's activities	Individual authoritarian style	Collective style
Aim orientation is towards employees' satisfaction	Paternalistic style	Communal style

Source: compiled by the authors.

1. A one-person management style presupposes an individual nature of decision-making, and the goal of management is to achieve the results of the organization's activities. The main features of this style are:

• the manager concentrates all the main decision-making powers on himself;

• subordinates receive a ready-made management decision and are obliged to fully implement it;

• a categorical ban on discussion and, especially, criticism by subordinates of adopted management decisions;

• the manager is of little interest in the reaction of his subordinates to the decision made.

2. The collective leadership style presupposes predominantly joint adoption of management decisions and, at the same time, a pronounced focus on achieving previously planned organizational results. The following significant features of this style can be distinguished:

• the most qualified employees of the organization are involved in the process of preparing and making significant management decisions that are important for all personnel;

• the leader organizes the process of discussing and developing options for management decisions, assessing their prospects and importance, and selecting the most appropriate one;

• criticism of management decision options is allowed until the moment it becomes accepted.

3. A paternalistic leadership style presupposes the individual nature of management decision-making and a primary focus on the satisfaction of the organization's employees. The main indicators of this style are:

• the organization is considered as a special type of family, where concern for the well-being of its members is the leading organizational value;

• the formal leader is viewed as a wise father of the family, invested with the trust of his subordinates;

• the traditional type of power is of great importance;

• the organization strives to achieve a certain balance between the goals of the organization and the goals of employees.

4. Communal leadership style involves a combination of the joint nature of management decision-making and the prevailing goal orientation towards achieving employees' satisfaction. It has the following characteristics:

• the value of employees' interests dominates organizational values;

• informal leaders of the organization with charismatic power are of great importance in the decision-making process;

Our sociological study of leadership styles, conducted in 2019–2021, based on 28 enterprises in the city of Naberezhnye Chelny, shows that today at Russian enterprises the authoritarian leadership style predominates by a large margin.

Table 2

Predominant type of leadership style

Predominant type of leadership style	Share, %
Individual authoritarian style	72.3
Paternalistic style	17.1
Collective style	7.2
Communal style	3.5

Source: compiled by the authors.

Table 2 shows that the individual leadership style is by far the dominant one at the enterprises we surveyed; it was found at almost two-thirds of the enterprises. At modern enterprises the paternalistic leadership style is also of some significance.

It should be admitted that the predominance of a one-person leadership style is characteristic for the activity of all branches and types of enterprises. This is clearly shown by the research results presented in *Table 3*.

The study also did not show any fundamental differences in the dominance of individual leadership style depending on the time of formation of the enterprise (*Table 4*).

Thus, the study showed that at the enterprises we surveyed, an individual leadership style undoubtedly dominates, implying maximum concentration in the

hands of the first manager of decision-making rights and a clearly expressed aim orientation towards achieving results (even at any cost).

DISCUSSION

Let us touch upon some debatable aspects concerning the peculiarities of the one-person leadership style dominance at modern Russian enterprises.

According to W.I. Maslov, "authoritarianism at Russian enterprises is not unique, and authoritarian management methods are common in other countries, in particular in the USA" [43]. This thesis is also shared by a number of other domestic specialists in personnel management. And we think that it is difficult to agree with this statement. Authoritarianism, widespread in American enterprises, is predominantly situational in nature and is determined by the conditions of the internal environment of a particular enterprise. As for authoritarianism at Russian enterprises, it is almost equally represented at enterprises of various types and fields of activity — from mechanical engineering to education.

As noted above, the results of the study show that the individual leadership style prevails everywhere, both at enterprises formed in the Soviet period and at post-Soviet enterprises created after 1991.

Moreover, the leadership style in private post-Soviet enterprises is tougher than in Soviet ones. Post-Soviet enterprises bear the costs of maintaining the social sphere to a much lesser extent. There are clearly more violations of labor laws and safety regulations found here. It is true, that in the last two years, a severe crisis in the labor market has forced employers to somewhat ease the pressure on their employees.

The paternalistic leadership style, according to our research, is characteristic primarily of some small enterprises, mainly engaged in trading activities. A paternalistic management style is also characteristic of small post-Soviet organizations which activities are non-commercial (organizations related to management, etc.).

Thus, based on the results of the study, we can assert that the individual authoritarian management style at modern Russian enterprises does not depend either on the socio-economic system, or the form of ownership, or the period of existence of these enterprises, or on the content of their activities. This suggests that the authoritarian nature of power at Russian enterprises is not determined by the characteristics of the internal environment of the enterprises, but is based on the mental value attitudes of both managers and personnel of enterprises. Moreover, such value-motivational features are characteristic not only of the labor sphere, but also of vertical social relations in Russian society as a whole.

Our research did not confirm the hypothesis that the nature of decision-making in an organization depends on the nature of the leader's sources of power. The results showed that the one-person leadership style is characteristic of organizations with both formal and informal sources of leadership to a comparable extent. Both leaders whose power is based on the authority provided by the position (83.2%) and leaders whose power is based primarily on personal qualities (68.9) prefer a one-person

Table 3

The share of one-man leadership style in enterprises of various types of activity

Type of activity of the surveyed enterprise	Share, %
Industrial enterprises	78.3
Construction enterprises	88.7
Trade enterprises	65.1

Source: compiled by the authors.

Table 4

The share of one-man leadership style at enterprises with different periods of activity

Predominant type of leadership style	Share, %
Enterprises created during the Soviet period (before 1991)	68.7
Enterprises created in the post-Soviet period (after 1991)	75.3

Source: compiled by the authors.

management style in terms of decision-making. The collective style is to a certain extent adhered to by leaders whose power is based on personal charm. In organizations of this type, there is a practice of joint discussion of a draft decision (47.4%).

It is typical that when assessing the style used by a manager, the opinions of employees and managers differ significantly. A significant portion of the surveyed managers characterize their own management style as democratic: 43.2% say that they make decisions based on joint discussion with subordinates. However, the veracity of this thesis is strongly doubted by staff assessments. The majority of employees (68.3%) note a directive leadership style in the organization, noting that their manager, as a rule, does not discuss decision options with employees, but only announces decisions made after the fact.

CONCLUSIONS

The study suggests that modern Russian personnel management practice is clearly mixed and integrates Eastern and Western approaches to management. What Russian management practice has in common with the Western (American) model of personnel management is the one-person leadership style that dominates at all types of enterprises. Eastern practice of personnel management is similar to ours in the more informal nature of vertical relationships, relatively weak formal rules governing the relationship between managers and subordinates.

Our research allows us to outline further vectors of scientific research in the field of the specifics of leadership style at modern Russian enterprises. We see the following directions for further research on this issue:

1) research into the mental foundations of power values in Russian society;

2) research on regional characteristics of management style;

3) research into the factors that determine the widespread priority of authoritarian management methods at Russian enterprises;

4) research into the relationship between the personal characteristics of enterprise managers and the leadership style they use.

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Galiakberova A.A.— statement of the problem, development of the work concept, administrative support and management.
Mukhametshin A.G.— development of the research structure, literature review, description of the results.
Dyrin S.P.— statement of the problem, development of the work concept, preparation of the materials and conducting a longitudinal sociological study, analysis of the literature, description of the results, conclusions.
Asratyan N.M.— development of the work concept, setting of the objectives, analysis of the literature, description of the results, conclusions, technical design of the article.
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