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ORIGINAL PAPER

The Role of Artificial Intelligence in Creating New Business Models in The Digital Economy: From Digitalisation to Fully Automated Solutions

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ABSTRACT

Purpose of the article is to study the impact of artificial intelligence (AI) on the transformation of business models in the digital economy. Object of the study are companies implementing AI to automate processes and improve efficiency. Subject of the study is the changes in key elements of business models: the creation, delivery, and monetization of value. Methodology includes the analysis of practical cases, the calculation of return on investment (ROI), and the assessment of reductions in operating costs. Scientific novelty lies in the development of an approach to fully automating AI-based business processes, and identifying related challenges, such as problems with trust in AI systems, and ethical aspects of its use. Practical significance of this work is to demonstrate the need for reviewing existing business models, and investing in AI infrastructure, to increase the competitiveness of companies in the digital economy.

Keywords: artificial intelligence; business models; digital economy; automation; operational efficiency; ROI; personalization; AI ethics

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INTRODUCTION

Digital transformation influences almost all aspects of business practical activities and it is one of the key factors, which bring changes in the operational activities of companies. Introduction of modern digital technologies generate not only a growing efficiency of processes, but also improve interactions with customers, as well as open new opportunities for growth and development.

Artificial intelligence (AI), cloud solutions, Big Data analysis and Internet of Things (IoT) are among the most significant technologies that make a strong impact on this process.

According to the McKinsey report (2023), over 70 per cent of business entities have already integrated digital technologies into business process, which resulted in cost optimization and faster adaptation to market changes.[1]

Companies that actively use AI show impressive results in areas such as automation of production, supply chain management and tailoring personalized recommendations for customers. Studies indicate, that introduction of AI tools in supply chain management can reduce operating costs by 20–30 per cent and increase the speed and accuracy of order fulfillment.

98% of companies' executives forecast, that within the next few years, AI will become a basic instrument for business strategies to provide personalized recommendations and create new digital products.[2]

Large corporations, such as Amazon and Netflix, are actively using AI for analysing customer preferences and personalising content, which in its turn contributes to sales growth and retention of customer. Companies that effectively implemented AI in their business models have increased operational performance by 25–35 per cent, which indicates a high potential of these technologies.

Thus, AI contributes not only to optimising current business processes, but also to generating new business models. This allows enterprises to quickly get adapted to potential changes and respond more effectively to challenges of the modern market.[3]

METHODOLOGY

The current research used the following methods:

1. **Business model analysis.** Traditional and digital models were analyzed and examined, which allowed the authors to determine key changes in creation, delivery and monetization of value.

2. **Comparative analysis.** It employs data on traditional approaches to product development and their automation using Artificial Intelligence tools employed in order to identify its impact of tools on key elements of business models. Comparisons included using metrics such as operational efficiency and personalisation of recommendations for customers.

3. **Economic analysis.** It involves assessment of economic benefits with implementation of AI, particularly focusing on calculating the return on investment (ROI) for companies, which use AI in business.

A business model is a strategy that describes how a company plans to create, deliver and capture value for customers. The following three key components are fundamental elements of a business model (see *Figure* below):

1. **Creation of value** is an element reflecting the process of developing and offering products or services that meet the needs of the target market. This strategic guideline helps the company to determine how exactly it will create unique products that will be in demand on the market.

2. **Delivery of value** is the way a company delivers its products or services to customers. This element includes distribution channels,

[1] URL: https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai-in-2023-generative-ais-breakout-year

[2] URL: https://newsroom.accenture.com/news/2023/accenture-technology-vision-2023-generative-ai-to-usher-in-a-bold-new-future-for-business-merging-physical-and-digital-worlds

[3] URL: https://www.gartner.com/en/information-technology/insights/top-technology-trends

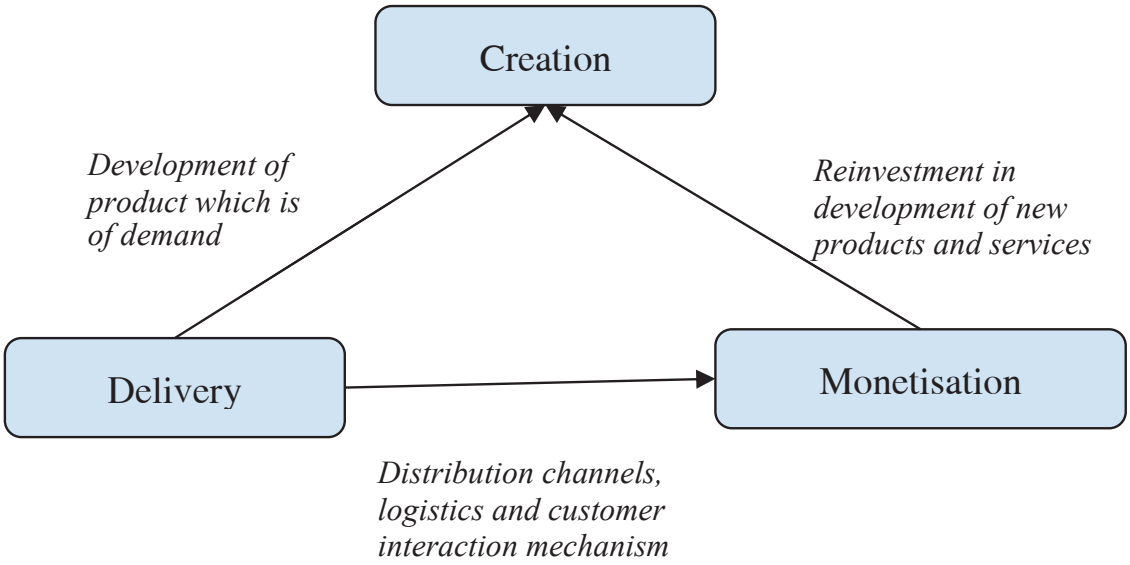

Fig. **Business model elements**

Source: [1].

logistics and mechanisms of interaction with customers.

3. **Value monetisation** is the way a business company transforms the value it created into the capital. This element includes pricing, revenue sources and financial models.

Classic business model includes the following elements:

- Key Partners;
- Key Activities;
- Key Resources;
- Value Proposition;
- Channels, Customer Relationship;
- Customer Segments;
- Cost Structure;
- Revenue Streams [1].

However, currently the employment of AI in digital economy transforms traditional models of business (*Table 1*).

AI tools allow economic entities improve the accuracy of forecasts and automate processes. Besides, they also transform the fundamental mechanisms of monetization through digitalization of the studied business models [2].

According to the 2024 Annual Report by PricewaterhouseCoopers (PwC), AI could contribute $ 15.7 trillion to the growth of the world economy by 2030 with 45 per cent of this amount attributed to improved products and services.[4]

[4] URL: https://www.pwc.com

Table 1

The changes in key elements of business model

Business model element	Traditional approach	AI changes in business models
Value creation	Product development	Automation, predictive analytics
Value delivery	Traditional channels	Personalisation, automation of customer interaction
Value monetisation	Traditional revenue schemes	New digital business models (subscriptions, platforms)

Source: compiled by the authors.

China and North America are expected to win more than most other countries with $ 10.7 trillion supplement in their GDP thanks to the application of AI technologies.

According to **the Boston Consulting Group** (2024), 54 per cent of executives expect cost-saving effect for their capital in 2024 due to implementation of AI tools in their companies. However, 90 per cent of companies only start testing new AI tools, which indicates a gap between leaders and those who lag behind.[5] In the near future, it is planned to reach 50 per cent in the level of implementation of AI technologies in the Russian economy.

In 2023, despite sanctions leading to restrictions on resources and access to international technologies,[6] the AI market in Russia reached 650 billion Rubles ($ 7.3 billion), which is a strong indicator of the growing interest in AI.

The content of the aforementioned studies indicates that Russian companies are following global trends, trying to implement artificial intelligence to increase operational efficiency and develop new products and services [3].

RESEARCH FINDINGS

The impact of AI on business models

Modern technologies make a significant impact on traditional business models, forming new approaches to monetisation and delivery of value to customers. Let's elaborate the technologies developed thanks to implementation of AI.

Platform models make a striking example of successful integration of AI into business operations, as far as corporations such as Amazon and Airbnb demonstrated.

These platforms use AI in processing Big Data by means of optimising interactions between buyers and sellers, improving personalisation of offers and increasing the effectiveness of recommendations.

Particularly, Airbnb uses machine learning algorithms for dynamic pricing, which helps to automatically adjust the cost of renting housing depending on demand, season and other factors.

[5] URL: https://www.bcg.com

[6] URL: https://interfax.com/newsroom/top-stories/89390/

Table 2

Particular changes that occur during the implementation of AI in specific entities

Business model element	Description of changes
Value creation	"Machine intelligence" used for information analysis and creation of new products. For example, Tesla uses AI to expand functionality of its cars and, simultaneously, to develop ecosystems of self-driving cars.
Value delivery	AI gets the most out of logistics and warehouse process activity. For example, Amazon uses AI to reduce costs by 20–30 per cent and speed up delivery of goods[1]
Value monetisation	AI helps to create new revenue models. For example, Spotify uses it to personalize music recommendations, which led to a 16 per cent growth of subscription and advertising revenue due to a rise in premium subscribers

Source: compiled by the authors.

Note: URL: https://www.mckinsey.com/capabilities/quantumblack/our-insights/how-artificial-intelligence-can-deliver-real-value-to-companies

Business entities also actively use AI in the format of subscription models. Thus, Spotify and Netflix rely on algorithmic solutions to analyse custom behavior data and offer personalised content, which helps to retain customers. According to Zuora, the revenues of companies, which use subscription-based business models, are growing six times faster, compared to those, which use traditional schemes.[7]

Artificial intelligence changes traditional business models significantly, by means of transforming their fundamental elements (*Table 2*).

Thus, it is definite, that nowadays Artificial Intelligence is drastically changing traditional approaches to making business, creating new opportunities for more accurate forecasting of demand, for product personalisation and increased efficiency in delivery value.

As it appears, application of "machine intelligence" systems is of especial importance in the sphere of industrial automation where the following three key activities should be determined:

1. **Predictive Maintenance,** which has become one of the key tools for preventing equipment breakdowns and minimizing downtime.

Siemens Corporation has successfully implemented predictive service mechanisms to use AI for analysis of data from industrial equipment sensors and predict possible breakdowns. This allows for timely replacement of dilapidated components, which increases productivity and reduces costs and operating risks.[8]

2. Collaborative robots (Cobots) in production employed along with people, become an integral part of modern industrial process.

Amazon Corporation actively employs such cobots in its system of warehouse complexes to perform complicated routine tasks, such as sorting and packing. On the one hand, this speeds up the processing of orders. On the other hand, it improves interaction between robots and staff members, which reinforces overall organizational productivity.[9]

3. **Automated production lines.** Rockwell Automation implemented analytics system FactoryTalk LogixAI with machine learning algorithms to forecast potential problems and optimise equipment operation. This solution has doubled the throughput of assembly lines and increases their efficiency by 20 per cent. Thus, "machine intelligence" has already influenced significantly traditional business processes by means of providing new opportunities for product personalisation, optimising operations and generating more flexible monetisation models.

The abovementioned AI implementation justify the point of view that AI becomes an important competitive advantage for companies focused on innovation and commercial growth.

From digitalization to complete automation

Digital transformation of business activities includes several stages. "Machine intelligence" plays a significant role in each of these stages: from basic digitalization of processes to transition towards a completely automated development and implementation of decisions [4] (*Table 3*).

Analysing the content of the Table above, we note that the applied use of "machine intelligence" consistently transforms organisational business processes at all stages: from simple conversion of information to comprehensive automatic accomplishment of key operations. This enables companies to improve efficiency, as well as to build entirely new business models based on data and forecasting [7].

Artificial intelligence plays a critical role in providing total automation of business processes and creating new approaches for data-driven business development.

[7] URL: https://www.businesswire.com/news/home/20200923005296/en/

[8] URL: https://blog.siemens.com/2023/07/predictive-maintenance-at-scale-is-entering-the-mainstream/

[9] URL: https://www.rockwellautomation.com/en-us/company/news/press-releases/ai-predictive-maintenance.html

Table 3

Stages of the digital transformation

Stages	Description	The function of AI
Digitalisation	Initial stage. At this phase, commercial companies start to use digital technologies to improve their own business operations, particularly, their document flow and communication. As an example, they implement CRM systems for a comprehensive support to work with clients [5]	It helps in automating data collection and storage, which makes it possible to convert analog processes into digital form, ensuring faster processing of information and its availability for further transition to automatic processing. For example, many companies start with the implementation AI-based CRM and ERP system to simplify management operations and data analysis*
Integration	At the second, integration stage, digital technologies begin to interconnect various business aspects. Companies generate digital integrated mechanisms (commonly, as ERP systems) to provide one solution for several processes at once	It integrates different systems and technologies into a single ecosystem. It helps combine separate operations and data, improving interaction between business units. One of the key application areas is logistics management, where machine learning algorithms help optimise logistics and forecast demand. It enables companies to solve multifaceted tasks (predictive maintenance of equipment, production line management, etc.) in a fully automated mode. In particular, companies are able to automatically manage production operations, predict potential breakdowns and minimise downtime in plants**
Automation	Third stage. AI technologies create conditions for robotisation of fundamental processes, particularly, in production and supply chain management. Corporations such as Siemens and Amazon actively implement predictive service and collaborative robots to optimise operational performance	Enables companies to solve multitasks (predictive maintenance of equipment, production line management, etc.) in a completely automated mode
Complete automation	At the final stage AI and digital systems become the basis of the business model, largely eliminating the need for human participation. This allows business entities to create new options for business models based on data and algorithms [6]	In particular, companies are able to automatically manage production operations, predict potential breakdowns and minimise plant downtime***

Source: compiled by the authors.

Note: * URL: https://www.botsandpeople.com/blog/automation-digitization-and-digital-transformation-these-are-the-differences;

** URL: https://www.emerald.com/insight/content/doi/10.1108/SL-01–2023–0009/full/html;

*** URL: https://www.mdpi.com/2071–1050/16/5/1790

By 2027, expenses for software of this kind will reach $ 297 billion, which indicates a rapid growth of automation of operational procedures in a wide range of industries, including manufacturing, logistics and finance.[10]

One of the key trends of the third decade of the 21st century is the introduction of generative AI mechanisms. According to forecasts, up to 40% of employees' working time can be mechanised, robotised and, accordingly, opti-

[10] URL: https://www.gartner.com/en/information-technology/insights/top-technology-trends

mised from an organisational and economic point of view using AI language models, which contribute to a significant increase in the efficiency of the functioning of economic entities.[11]

In general, it should be noted, that significant improvements in operational performance was reached among those enterprises that actively pioneered application of fully automated AI-based procedures in their production operations (in particular, the previously mentioned **Amazon** and **Tesla**).

It can be assumed that by 2030, such AI-based solutions will replace up to 50 per cent of manual production process and supply chain management.

It seems that in the long run, such implementation of operational activities will become the standard for the majority of business entities, which will open new opportunities for the creation of autonomous systems and business models where human involvement will be minimal or reduced to zero.

Approach to full automation of business processes

Comprehensive modernisation of business processes, their conversion into a robotic format by means of AI tools is the goal of many companies. It is worth noting that this approach requires a certain systematic approach. In our opinion, such transformation should include the following stages:

1. **Analysis.** Before implementing AI, it is important to perform a detailed diagnosis of existing business processes. For example, **Sberbank** uses process analysis methods to identify bottlenecks in customer service and this allows to identify the areas most in need of automation.

2. **Detemination of objectives.** It is important not just to aim some specific isolated goals and objectives, but also to make a comprehensive vision of the future state of modernised operations in the company [8].

3. **Implementation of AI technologies** is the main stage, which includes both the selection of the technology stack and the integration of the selected solutions. **T-Bank** applies machine learning algorithms transforming the process of lending and risk assessment into a new, automated format, which reduces failures and speeds up the approval process for loans.

4. **Integration with existing systems.** Transferring operations to a modern format requires integration of new AI systems with current IT solutions. Here it is of particular importance for them to competently "fit" into the already maintained IT infrastructure of the given business entity.

5. **Training and adaptation of the personnel.** To achieve the target indicators, it is necessary to train employees to operate new systems.

6. **Monitoring and adjustment of processes.** After integration is adopted, it is necessary to regularly monitor the flow efficiency of automated processes and make adjustment updates. For example, **LLC "Tander"**, the largest retail chain, uses AI for analysing sales and inventory management, which allows to update it timely with changes, including the updates in the management strategy.

AI technologies have made a noticeable impact on cost reduction and productivity growth in different areas of economy [9].

Specifically, in the financial sector, AI transforms routine tasks such as data processing and generation of reports into automated-mechanical forms, which help to reduce transaction costs.

According to Cloudera, companies that implemented AI were able to reduce information processing costs by up to 25 per cent, which had a positive impact on the quality of customer service.[12]

In industry, predictive maintenance technologies can significantly decrease equipment downtime and repair costs [10].

According to NextDeveloper, integrating predictive maintenance tools diminishes the number of unexpected equipment failures by 20–30 per cent. This not only reduces repair costs, but

[11] URL: https://newsroom.accenture.com/news/2023/accenture-technology-vision-2023-generative-ai-to-usher-in-a-bold-new-future-for-business-merging-physical-and-digital-worlds

[12] URL: www.cloudera.com

it also increases service life of equipment and minimises the risks of production activities.[13]

To make an assessment of AI economic efficiency it is necessary to determine a number of key indicators. One of them is Return on Investment (*ROI*), which should be determined and calculated by means of the following formula:

$$ROI = (\text{Income from IT} - \text{Implementation costs}) \div \text{Implementation costs} \quad (1)$$

This indicator allows it to assess the feasibility of investing in AI for a particular enterprise.

Another important parameter is reduction of operating costs, which is the difference in operating costs before and after the implementation of AI.

The third parameter is productivity, evaluated by the growth speed for tasks completion and reduction of time to complete such tasks.

Finally, the level of customer satisfaction is also a key factor determined by the increase in the degree of customer loyalty. It is obtained, as a result of personalisation of services and optimisation of interactions with the customers [11].

The stages of performance evaluation include:

- analysing the company's initial condition before implementing AI;
- assessment of short-term and long-term results;
- non-stop monitoring to adjust business processes and improve efficiency furthermore.

Investments in AI indicate different returns depending on the industry. Companies that have implemented AI are expected to get income nearly $ 3.5 per dollar invested, which equates to 250 per cent ROI.

In the financial sector, banks and insurance companies employ AI to automate data processing, manage risks and improve customer service.[14]

For example, **Siemens**, through predictive maintenance, has reduced the number of unexpected equipment breakdowns, improving ROI.[15]

In e-commerce, companies (in particular, **Amazon**) make ROI of 10–20 per cent due to supply chain optimisation and improved logistics.[16]

In retail, automation helps reducing inventory in warehouses by 10–20 per cent, which leads to 5–10% increase in profit.

The financial sector develops automated risk management and data analytics, which results to cutting operating costs by 20–25 per cent and increase profits by 15–20 per cent.[17]

By 2030, it is expected, that AI will replace about half of manual-labour processes in such industries as manufacturing, logistics and finance. Automation of manufacturing operations will increase flexibility of production process and reduce costs, meanwhile, the use of chatbots and recommendation algorithms in the service sector will improve customer service.[18]

Economic assessment of AI implementation for Russian companies

Currently, Resalt Region LLC actively implements AI in its operational processes. It made calculations to assess the impact on business models (including its value creation, delivery and monetisation).

1. **Reduction of operational costs.** Implementation of AI to automate warehouse management processes reduced transport costs by 14.2 per cent and inventory management costs by 9.4 per cent.

2. **Return on investment (ROI).** The revenues of Resalt Region LLC from the use of AI during the first year of operation amounted to 44.2 million Rubles, while the implementation

[13] URL: https://nextdeveloper.com/blog/reducing-operational-costs-with-ai-powered-automation

[14] URL: https://venturebeat.com/ai/idc-study-businesses-report-a-massive-3–5x-return-on-ai-investments

[15] URL: www2.deloitte.com

[16] URL: www.aiexponent.com

[17] URL: https://www.quixl.ai/blog/the-present-and-future-of-ai-based-automation-a-roadmap-for-business-leaders/

[18] URL: https://www.metadialog.com/blog/ai-for-business-automation-transforming-impact-in-2024/

costs was equal to 20.7 million Rubles. Thus,

$$ROI = (44{,}2 - 20{,}7) \div 20{,}7 * 100\% = 113{,}5\%.$$

This indicates a high economic feasibility of investment in AI, since the company's revenues significantly exceeded the integration costs.

3. **Time to Payback (TTP)** is the evaluation of the amount of time, within which the company will recoup its investment in AI.

$$TTP = \text{Implementation costs} \div \text{Annual savings from AI.} \quad (2)$$

Resalt Region LLC invested 20.7 million Rubles in AI and expected annual savings of 10 million Rubles, thus, the payback time was:

$$TTP = 20.7 \div 10 = 2.07 \text{ years.}$$

4. Automation Coefficient (AC). This is another key coefficient for consideration. It allows estimating the share of business processes automated thanks to AI against the total number of processes.

$$AC = A\,(Auto) \div A\,(General) * 100\%, \quad (3)$$

Meaning:

A (Auto) — the number of automated processes;

A (Total) — the total number of processes in the company.

Resalt Region LLC ran six out of eighty-four business processes automated with the help of AI. Thus, the automation ratio was 7.14 per cent (*Table 4*).

DISCOURSE

Problems and challenges

Although artificial intelligence opens the door to significant changes in business management processes, it brings a number of strong challenges in its practical application regarding interaction between the staff and AI systems.

1. **Lack of trust in AI** is one of the major challenges for its implementing in management processes. The complexity of AI algorithms often leads to the problem that their recommendations are too hard to understand even for specialists with a high level of qualification [12].

For example, if employees in the banking sector do not understand recommendations on lending issues generated by AI, they do not often feel confident enough about AI involvement in their job.[19]

2. **Loss of control over AI** carries a risk, which expands as the level of automation of business processes increases. In some situations, software products can make critical decisions leading to solutions without any human input. This raises risk security and liability concerns for professionals due to potential errors.

For example, Siemens has implemented predictive maintenance in manufacturing plants where AI manages processes with minimal human intervention.[20]

3. **Ethical aspects of using AI** become increasingly relevant. AI systems trained on high volume of data can be biased due to limited or distorted raw datasets, which increases the risk of discrimination and errors in decision making, especially, in such areas as HR and finance. This aggravates ethical issues that require stricter regulatory and auditing standards for AI mechanisms [13].

4. **Risks of AI adoption.** According to a McKinsey research,[21] about 70 per cent of AI implementation projects fail to achieve their goals. This occurs due to the lack of a clear and specific strategy, lack of qualified experts, as well as due to poor management in the company. It is critical, in our view, to consider these risks and develop strategies that will help organisations adapt to the new business environment.

5. **Data dependency.** The effectiveness of AI systems is directly dependent on the quality of the data trained on. For instance, IBM Watson could not successfully integrate into a cancer diagnosis system because the AI algorithms

[19] URL: https://www.mdpi.com

[20] URL: https://eng.vt.edu

[21] URL: https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai-in-2023-generative-ais-breakout-year

Table 4

Digital transformation indicators applied to Result Region Ltd.

Indicator	Evaluation
Reduction of operating costs (%)	20%
Return on investment (ROI)	113.5%
Time to Payback (TTP, years)	2.07 years
Automation ratio (AC,%)	7.14%

Source: compiled by the authors.

were trained on data that did not match the real clinical conditions. Therefore, it is extremely important that companies properly ensure a high level of data quality [14].

It is also worth considering that not all AI integration projects turn out to be successful. There are a large number of examples where automation has failed to meet expectations.

Amazon Corporation tried to automate the recruitment process with an AI product that analyses resumes and recommends candidates. However, the algorithm indicated a certain gender bias, as it was trained on data where men in their majority had engineering positions.

As a result, discrimination against women was revealed and they had to terminate the project.[22]

Microsoft launched a chatbot called Tay, which was trained on data from Twitter users. However, within 24 hours, computer trespassers misdirected its training, so that Tay started generating some kind of offensive messages. Consequently, the project was discontinued as well.

Such examples demonstrate the importance of extensive testing and monitoring of AI systems, especially in areas with potential risks and consequences, which are particularly high, such as recruiting and communications.

[22] URL: www.lexalytics.com

CONCLUSIONS

The results of the analysis show that AI technologies make a significant impact on transformation of business schemes, including the essential content of their key aspects: creation, delivery and monetization of value.

Examples of corresponding cases in such companies as Amazon, Tesla and Siemens indicate that in general AI integration contributes to increasing operational efficiency, reducing costs and optimisation of processes.

AI is particularly practicable in such fields as commercial retail services and logistics, where it contributes to improving supply chain management, forecasting demand and personalising services.

Thus, AI is not only able to modernise traditional business models, but it also creates opportunities to generate new, more flexible and sustainable business schemes for commercial activity based on automation and the use of Dig Data.

All-round automation to manage organisational processes opens up new horizons for the growth of productivity and competitiveness of business entities. However, this requires significant capital investment, development of infrastructure and revision of modern management approaches.

Prospects for further research include exploring long-term effects of full automation of

the labour market, assessment of moral, ethical and legal aspects of employment of AI tools, as well as development of models to evaluate cost-effectiveness of integrating AI mechanisms into operational activities of business entities in different industries.

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ORIGINAL PAPER

National Goals of Environmental Development until 2036

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ABSTRACT

The article analyzes the targets and tasks set by the President of the Russian Federation in May 2024 within the framework of the national goal "Environmental well-being". It has been established that these targets and tasks fully meet the need to solve the prevailing environmental problems fixed in strategic documents of a conceptual, doctrinal and strategic nature. The fact of the planned extension of measures to radically reduce harmful emissions into the atmosphere to all cities with high and very high levels of air pollution has been recognized as extremely positive. The provisions requiring clarification and detail in the development of specialized federal projects are noted. It is proposed to pay attention to the increase in the planned indicators of reforestation, taking into account the observed increase in the number and volume of forest fires in a changing climate. It is also considered advisable to supplement environmental protection projects with measures to restore degraded land in accordance with the provisions of the Environmental Safety Strategy of the Russian Federation.

Keywords: national goals; environmental safety; national project; state strategic planning; environmental protection; air pollution; production and consumption waste; untreated wastewater; reforestation; eco-tourism

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INTRODUCTION

Despite all difficulties encountered in the transition to sustainable development, this process has already led to major changes in the global distribution of strategic investments and structural shifts in the world trade.

Our country does not stay away from the global trends. The environmental factor is becoming one of the most important factors in the system of strategic and operational development plans of Russian companies. Nevertheless, the environmental situation is still quite complex. The territory is considered to be unfavourable in this respect, although it accounts for almost 15 per cent of the total terrain of the country, however, this is the area of massive concentration of majority of the population, the major production facilities and the most productive arable land.[1] The purity of atmosphere in cities and industrial areas has not still significantly improved, the volume of industrial polluted wastes dumped into the main water resources is high, and accumulation of production and consumption wastes remains a source of concern as well.

Economic damage caused by the growing of environmental pollution are estimated at 4–6 per cent of GDP.[2]

Unfavourable ecology affects the health level and mortality of population, which leads to negative social and economic consequences.

In economic terms, environmental programs become an important factor that needs to be taken into account in strategic planning due to inevitable increase in demand for human resources to be employed at waste re-processing facilities and variety of services. For example, by 2030, the Euro-

[1] URL: http://www.kremlin.ru/acts/bank/41879

[2] URL: http://www.kremlin.ru/acts/bank/41879

pean Union will need nearly 700 thousand-strong labour force [1].

Thus, under the current conditions, the environmental pillar inevitably makes an essential part of public administration in general and strategic planning in particular. As N.A. Piskulova noted quite correctly, "ecology is increasingly becoming a core element of the State and international strategy and, actually, it intercedes with the entire system of State and international regulation" [2, p. 208].

The basis for the implementation of environmental policy in our country is the national project "Ecology"[3] and the State program "Environmental Protection".[4] In May 2024, the Decree of the President of the Russian Federation updated the national development goals up to 2030 and in the perspective up to 2036, including certain environment issues. The adoption of a new package of national goals was made during a drastic change in the country's economy. As A.P. Prokhorov notes, "upgrading of implementation of national projects of the Russian Federation is carried out in the framework of a new model of economic development of the country" [3, p. 18; 3, p. 18]. In such circumstances, there is a growing necessity to build rationally and effectively the system of measures within the framework of perspective environmental federal projects. Therefore, it is feasible to reflect on the new environmental initiatives of the President of the Russian Federation in the current system of environmental protection and rational nature management, their interrelationship with the prior plans and projects, as well as to develop proposals to improve effectively their achievement and implementation.

METHODS AND MATERIALS

During the research, the methods of interpretation of normative acts, standard analytical procedures within the framework of the comparative method were employed.

The structure of the research work is based on consistent examination of the main provisions of the environmental section of the Decree of the President of the Russian Federation dated of 07.05.2024 No. 309 "On the national development goals of the Russian Federation for the period up to 2030 and in the perspective up to 2036"[5] (hereinafter — the Decree 2024).

Findings of the research work

Formation of a closed-cycle economy, ensuring by 2030 the sorting of 100 per cent of all annually generated municipal solid waste (MSW), dumping of no more than 50 per cent of such waste and involvement in economic turnover of no less than 25 per cent of production and consumption waste as secondary resources and raw materials.

The Decree 2024 determines achieving the national goal "Environmental Wellbeing", within the framework of which, target indicators and objectives are grouped into five blocks. The first one includes target indicators and objectives related to the sphere of production and consumption waste management. The first block also contains targets and tasks of the federal project "Closed-Loop Cycle Economy"[6] adopted within the framework of implementation of one of the forty-two strategic initiatives of the Government of the Russian Federation. One of the declared objectives includes foundation of a closed-loop circular economy. The term "foundation" should be understood as a process, not as a final stage, since the closed-loop circular economy means a whole system based on activity related to the integrated processing raw materials: from reducing the generation of waste disposal to re-cycling, reutilisation and recovery of materials [4].

A joint objective is declared in the sphere of production and consumption waste management to improve ecological conditions for 750.000 Russian citizens living in the territories of unfavourable ecological conditions. It also

[3] URL: https://ecologyofrussia.ru/proekt/

[4] URL: https://www.mnr.gov.ru/docs/gosudarstvennye_programmy/gosudarstvennaya_programma_rossiyskoy_federatsii_okhrana_okruzhayushchey_sredy_s_izmeneniyami/

[5] URL: http://www.kremlin.ru/acts/bank/50542

[6] URL: https://news.solidwaste.ru/wp-content/uploads/2022/07/EZTs_pasport.pdf

declares a more specific objective: reduction of waste generation of all hazard categories per unit of gross domestic product by 1.6 times. It should be pointed out that previously all strategic documents only stipulated the reduction of generated *solid municipal (household)* waste.[7] Later an expanded provision of measures aimed to minimise waste generation was included in the federal project "Closed-Loop Cycle Economy".

The Decree of the President of the Russian Federation No. 204 dated of 07.05.2018 "On national goals and strategic objectives of the development of the Russian Federation for the period until 2024" (hereinafter — The Decree 2018)[8] the main objective declared was to maintain the effective management of production and consumption waste, including the elimination of all unauthorised landfills within the urban boundaries, for which it was considered necessary:

a) to establish an integrated management system to deal with solid municipal waste [which was provided for by the Integrated Strategy for Solid Municipal (Household) Waste Management[9]];

b) to set up an effectively functioning public-control system aimed at identifying and eliminating unauthorised landfills. Despite the fact that production and consumption wastes are mentioned as the objective, in fact, only solid municipal waste are included in the list of measures.

The Decree of the President of the Russian Federation dated 21.07.2020 No. 474 "On the National Development Objectives of the Russian Federation for the period up to 2030" (hereinafter — The Decree of 2020),[10] duplicated the objectives of establishing a whole system of measures regarding solid municipal waste. However, it has an important clarification: to achieve a 100 per cent level of sorting and twofold reduction of waste transported to landfills.

The objective of the Decree 2024 "to ensure the disposal of no more than 50 per cent of solid municipal waste" looks like a complete duplication of the objective from the previous strategic document, so that one can make hastily conclusion that it is not an ambitious goal enough, especially taking into account the fact, that in recent years, the trend was obvious: solid municipal waste decreased and, accordingly, the maximum planned disposal volume is decreasing too.

Never the less, involvement of a certain share of production and consumption waste in economic turnover is a certain innovation, as it was not included in previous program and projects. At the same time, the 2018 Decree referred to generating conditions for recycling waste, but this only applied to waste which were banned for dumping. Involvement of a large amount of waste in the economic turnover logically leads to the goal of reducing the waste that are meant for waste dumping.

Currently, the main activities to achieve national goals and objectives in the sphere of solid waste management are carried out within the framework of the federal project "Integrated Maintenance System for Solid Municipal Waste".[11] By the end of 2022, the share of solid municipal waste driven for sorting was 49.9 per cent. According to the plan for 2024, this indicator was established as 50.2 per cent. The share of solid municipal waste aimed for disposal, including sorted stuff, in the total mass of generated solid municipal waste in 2022 was 81.7 per cent compared to 92.4 per cent according to the plan for 2024.[12]

Notably, despite the relative procedure of its calculation, in fact, the indicator of the share of landfilled solid waste is of an absolute character: it does not depend on the base level and does not allow for discrepancies in the calculation procedure. The methodology of accounting for disposed solid municipal waste is defined and information on its volumes is regularly published. At the same

[7] URL: https://www.garant.ru/products/ipo/prime/doc/70345114/

[8] URL: https://www.garant.ru/products/ipo/prime/doc/71837200/

[9] URL: https://www.garant.ru/products/ipo/prime/doc/70345114/

[10] URL: https://www.garant.ru/products/ipo/prime/doc/74304210/

[11] URL: https://economy.samregion.ru/upload/iblock/4b7/Pasport-FP-Formirovanie-kompleksnoy-sistemy-obrashcheniya-s-tverdymi-kommunalnymi-otkhodami-_red.-ot-21.12.18_.pdf

[12] URL: https://2022.ecology-gosdoklad.ru/

time, the indicator of the share of sorted municipal solid waste will require to be clarified when a federal project aimed at achieving this goal will be in development. The point is that sorting, per se, is not included, another words, it is absent in the classification of activities in the sphere of waste management constituted by the Federal Law No. 89-FZ dated 24.06.1998 "On Production and Consumption Waste".[13] A stage of waste management also includes, component disassembly and degreasing along with sorting. Obviously, it is necessary to rely on the concepts adopted in the legislation and conditioned technologically, when specific project activities should be developed.

If we speak about "involvement of production and consumption wastes into economic turnover as secondary resources and raw materials", we may recognise such quite acceptable brevity for formulating national goal. However, it should be noted that even meanwhile developing the relevant federal project, it will be necessary to specify the content of this concept. This conclusion is based on the fact, that there are several methods of rational waste recycling, the application of which depends on its type. In the Federal Law No. 89-FZ of 24.06.1998 "On Production and Consumption Waste" waste management was meant in the following terms:

- reusable management of the waste for its original intended purpose (recycling);
- return of the waste into the production cycle after a certain processing (regeneration);
- extraction of useful components from the waste (recovery);
- processing solid municipal waste as a renewable energy resource.

Obviously, all these methods vary in dependence of technological complexity, volumes of required investments, volume and cost of useful output. In the process of determination of objectives and development of federal project activities, it is necessary to take these nuances into account and specify the assignment in order to improve overall efficiency. If the share of waste management becomes a main target indicator, there are potential risks of non-comprehensive or exclusively volume-intensive approaches.

It is necessary to pay the utmost attention to economic mechanisms and instruments, because the existing ones do not fully meet the requirements for active recovery of secondary resources, specifically, they do not stimulate the costs of recycling [5, p. 53].

To develop an effective programme, it is also important to take into account the differentiation in the level of waste recycling and disposal, which ranges from 0 per cent in the Transbaikal and Altai area, Kirov and Ryazan regions, as well as in in other 14 regions to 33.3 per cent in the Moscow area.[14]

The discrepancy in the level of processing (sorting) of solid municipal waste is even more striking. In 13 regions households do not sort their waste at all, meanwhile the indicator in Moscow, Tambov and Tyumen areas is 100 per cent, and in Orel area and in the Republic of Kalmykia it has reached 99.7 and 98.4 per cent respectively.[15]

Such a problematic point — a significant degree of differentiation of regions by target parameters — hampers the development of universal mechanisms for achieving the set goals and objectives, which experts and analysts often pointed out in their scientific publications. [6, 7]. Subsequently, the set tasks oriented to the average target indicators for some regions will most probably become unrealistic for some others within the planning horizon, and this will have no incentive value due to the already achieved level.

By 2036, it is envisaged to make a gradual twofold reduction of emission of hazardous pollutants that have the worst negative impact on the environment and human health in cities with high and very high levels of air pollution.

Currently, air and water pollution makes a cardinal problem. The need for such solution was declared in the Ecological Doctrine of the Russian Federation.[16] Atmospheric air and water pollution is called a threat

[13] URL: https://base.garant.ru/12112084/

[14] Compiled by the author URL: https://rpn.gov.ru/

[15] Ibid.

[16] ULR: https://www.mid.ru/ru/foreign_policy/official_documents/1688732/

in the Strategy for Environmental Security of the Russian Federation until 2025,[17] which, particularly indicates the necessity of the following objectives:

a) prevention of pollution of surface and underground waters, improvement of water quality in polluted water bodies, restoration of aquatic ecosystems;

b) prevention of further pollution and reduction of atmospheric air pollution in cities and all other settlements.

In the initial version of the State Programme it was envisaged to cut the volume of pollutant emissions from stationary sources per unit of GDP by 2.2 times (base — 2007). Measures to cut air emissions were supposed to reduce the number of cities with high or very high levels of air pollution (air pollution index (API) >7) by 2.7 times and improve ecology for 36.1 million Russian citizens in cities that meet the named conditions.

The Decree of 2018 already referred to the reduction measures of lower air pollution, albeit not radically, and only in large industrial centres, and at the same time cutting the total volume of emissions by at least 20 per cent in the most polluted cities. The list of 8 cities, where the target was to significantly reduce air pollution, was later expanded to 12, and then the project was expanded to 29 furthermore.

Among the objectives, the introduction was envisaged to implement the best available technologies at all facilities which make a negative impact on the environment in order to reduce pollution as much as possible.

The Decree of 2020 did not contain such meticulous details, just only a national goal interpreted in the most general way: a twofold reduction in the volume of emissions of hazardous pollution that have the worst negative impact on the environment (relative to the actual volume of emissions in 2020). It should be pointed out, that this indicator was not featured in the federal project. Instead of it, the indicator was a reduction in the total volume of emissions in the cities which are involved in the project. Another words, the developers actually supported the concept in the Decree of 2018, which by the end of 2022 amounted to 88.9 per cent, against indicated in the plan — 92.0 per cent (if the basic value of 2018 is accounted as 100 per cent).[18]

As we can see, in 2024 the objective related to the reduction of emissions into the atmospheric air is formulated likewise as in the Decree of 2020, except the only clarification that reduction of emissions should primarily affect cities with high and very high level of pollution. If the objectives of the related federal project go fully in line with the formulated national goal, this should be evaluated as an obvious progress. The point is that the current approach, according to which measures of radical reduction of emissions account only for project participants (and the methodology how to select those participants was not quite clear), does not fully correspond to the scale of objectives worth of the national level [8]. As to the concept of reduction of air emissions of the most dangerous pollutants *in all cities* with high and very high levels of air pollution, it seems to be more in line with the national level. As a matter of fact, it is an attempt to reduce air pollution in cities on a mass, national level. It is also important to point out that meanwhile the current version of the federal project "Clean Air"[19] is aimed to reduce emissions in general, without specifying the class of their harm and danger inflicted to human health, it seems to be more reasonable and effective that the national goal in the Decree 2024 proposes focusing on reduction of the most harmful and dangerous emissions.

In fact, of all the cities which were participants in the project, only one of them indicated reduction of a very high level of pollution. But as a whole, there was registered a growing number of cities with a high and very high level of atmospheric pollution. According to the data provided by The Federal Service for Supervision of Natural Resources "Rosprirodnadzor", the number of cities with the index of atmospheric pollution, or IZA > 14 (which

[17] ULR: http://www.kremlin.ru/acts/bank/41879

[18] URL: https://www.mnr.gov.ru/docs/gosudarstvennye_doklady/gosudarstvennyy_doklad_o_sostoyanii_i_ob_okhrane_okruzhayushchey_sredy_rossiyskoy_federatsii_v_2022_/

[19] URL: https://www.mnr.gov.ru/activity/directions/natsionalnyy_proekt_ekologiya/federalnyy_proekt_chistyy_vozdukh/

is a very high pollution) in 2022, compared to 2016, has doubled (from 20 to 40), and with IZA > 7 (high pollution) almost tripled (from 44 to 129).[20]

Thus, the range of potential sites for inclusion in the list of a new version of the federal project is quite impressive. The situation became more complicated in 2021 when a downward revision of maximum permissible concentrations (MPC) was adopted for a number of polluting chemicals, which changed the assessment of the degree of air pollution in cities. In fact, it means that more rigid regulations impose increased requirements for the objectives of the future federal project.

Within the framework of the federal project "Clean Air", 29 settlements of the Russian Federation are involved in an experiment conducted on quotas for pollutant emissions based on consolidated calculations of atmospheric air pollution. In accordance with the Russian Government Resolution No. 1852-r dated 07.07.2022,[21] the list of settlements included in the experiment and the stages of its implementation were determined, so that consolidated calculations of atmospheric air pollution and assessment of risks to human health should be completed in 2024, and in 2025, a comprehensive action plans to reduce emissions of pollutants into the atmospheric air should be developed and approved. The implementation of these plans is scheduled by the end of 2030. In view of this planning horizon, it is obvious that the work on implementation of such measures should be included in the new federal project.

Elimination of no less than 50 hazardous sites of accumulated environmental damage by the end of 2030. By 2036, waste management and decontamination of at least 50 per cent of the total volume of wastes of class I and 2 class of hazard.

The 2018 Decree manifested the need to establish a modern infrastructure aimed to ensure the management of waste of I and 2 class of hazard. Obviously, the target in the 2024 Decree require the waste management and decontamination of at least 50 per cent of the total volume of this class of waste and it is based on the fact that the relevant infrastructure has been created.

One of the national goals determined by the Decree of 2020 was elimination of the most hazardous installations, which accumulated environmental damage, and this was also one of the tasks established for the government. The updated 2024 version specifies the number of installation of accumulated harm to be eliminated, but it does not specify whether they are classified as the most dangerous.

During the implementation of the federal project "Clean Country"[22] the number of unauthorised waste dumps within the city boundaries which were eliminated accounted for 58 (57 with regards to the plan), and the number of eliminated objects of accumulated danger for the ecology 74 (74 with regards to the plan). By 2030, it is scheduled to eliminate another 50 waste dumps of accumulated harm, which means the work goes on in this direction.

As part of the activities of the federal project "Infrastructure for Hazard Class I–II Waste Management",[23] Rosprirodnadzor reports the degree of readiness of production and technical infrastructure for hazardous waste treatment and neutralization at 35.7 per cent; by the end of 2024, this indicator should reach 100 per cent. Besides, the federal scheme, as well as the information system for accounting and control of class I and 2 waste of hazard management must be approved before that date. The share of decontaminated waste in the total volume of waste of hazard categories I and II should be no less than 65 per cent. If these targets are accomplished, the goal proclaimed in the new strategic cycle — to achieve utilisation and decontamination of 50 per cent of the volume of waste of hazard of class I and 2 seems to be somewhat underestimated.

Reducing twofold by 2036 the volume of untreated wastewater discharged into major water bodies and preserving the unique ecological system of Lake Baikal.

[20] Ibid.

[21] URL: https://base.garant.ru/404967269/

[22] URL: http://static.government.ru/media/files/B 3JtWzMSWVAHK Td6plVchwnOLWEYmF9f.pdf

[23] URL: https://dprea.adm-nao.ru/media/uploads/userfiles/2019/03/01/Отходы_I__II_классов_опасности_Паспорт_Q7P1XNH.pdf

The Strategy of Environmental Security accepts one of the most important areas of environmental policy the prevention of furthermore pollution of surface and groundwater, improvement of water quality in polluted water bodies and restoration of aquatic ecosystems.

The 2018 Decree set the goal of improving the quality of drinking water for the population, and one of the objectives was ecological rehabilitation of water bodies, including reduction of polluted waters discharged into the Volga River. The overall objective was to preserve unique water bodies, which, along with Lake Baikal, also includes the implementation of measures to clean up the coastal areas of Russia's largest rivers: the Volga, Don, Ob, Yenisei, Amur, Ural and Pechora, as well as lakes: Teletskoye, Ladoga and Onega.

In the Decree of 2020, the number of water resources subject to environmental rehabilitation was significantly reduced. The list of water bodies included the Volga River, Lake Baikal and Lake Teletskoye. A few federal projects determine measures to improve ecological conditions of the Volga River and preservation of Lake Baikal. The federal project "Conservation of unique water bodies" contains consolidated measures to rehabilitate Lake Teletskoye and a number of geographical water bodies not mentioned in the Decree of 2020 — Ladoga and Onega lakes, as well as the rivers Don, Ob, Yenisei, Amur, Ural and Pechora. Besides, the Federal Service for Supervision of Natural Resource Usage do not always indicate in their reports, which water bodies are subject to cleaning treatment measures.[24]

The reduction of polluted wastewater discharged into the Volga River is ahead of planned target schedule (2.20 cubic kilometers at the end of 2022 against 2.42 cubic kilometers according to the plan). As to natural territory objects of the Lake of Baikal, it is completely in accordance with the plan.

The 2024 Decree has a vague notion "main water bodies", which is noteworthy. While developing a relevant federal project of special profile, it is necessary to take into account that, like in previous years, the highest level of pollution occurs in such water bodies like the Volga and Ob river basins. They account for about 60 per cent of cases of high and extremely high pollution. The Neva, Dnieper, Amur, Yenisei, Don and other rivers are also among the objects of increased pollution level.[25]

Conservation of natural forests and biological diversity, sustainable development of specially protected natural areas and creation of conditions for ecological tourism in all national parks.

The Strategy for Environmental Security of the Russian Federation for the period until 2025 has determined, that declining biological diversity and, consequently, destruction of ecosystem integrity is one of the four global challenges.[26] Accordingly, the key condition in the strategic guidelines is "to preserve and restore the natural environment, ensure the quality of the environment necessary for healthy human life and sustainable economic development, eliminate accumulated damage to the environment as a result of economic and other activities under conditions of increasing economic activity and global climate change". The priority direction in Strategy for Environmental Security is "growing measures to preserve biological diversity, including rare and endangered species of animals, plants, other organisms, their habitats, as well as development of the system of specially protected natural areas". The main indicator is defined as "the share of the area of strictly protected areas of all levels in the total area of the Russian Federation".

The above mentioned document envisages a growing share of the area of the Russian Federation used for strictly protected natural territories (SPNTs) of all levels up to 13.5 per cent (the area under SPNTs in 2007 is taken as the base value).

The 2018 Decree envisaged to create at least 24 new strictly protected natural areas within the framework of the national goal of biodiversity conservation. In the list of objectives, it was determined to increase such territories by 5 million hectares. This goal has

[24] URL: https://www.mnr.gov.ru/docs/gosudarstvennye_doklady/gosudarstvennyy_doklad_o_sostoyanii_i_ob_okhrane_okruzhayushchey_sredy_rossiyskoy_federatsii_v_2022_/

[25] Ibid.

[26] URL: http://www.kremlin.ru/acts/bank/41879

almost been achieved: by the end of 2022, the number of federal strictly protected areas increased by 17 in relation to the base value of 2018, and by the end of 2024 it is planned to increase to 24 units.

The 2020 Decree did not specify the objective of forest conservation, meanwhile in the 2018 Decree this objective was mentioned as part of the national goal of forest conservation.— was set within the framework of the national goal of biodiversity conservation, including on the basis of reproduction on all areas of felled and dead forest territories.

To solve this problem, a federal project "Forest Preservation"[27]was developed. The main indicator is the cover of forest throughout the country's territory. Its basic figure as of 2020 is 46.4 per cent, and this figure should remain status quo. Reforestation and afforestation are the main drivers of the project aimed at eliminating negative consequences of loss or destruction of natural woods and their use in the national economy. In the course of implementation, the annual ratio of reforestation and afforestation area to the area of felled and dead forests exceeds the planned ratio. Thus, for example, in 2022, it was 119.2 per cent against 85.6 per cent according to the plan. While maintaining the course of the measures, which generally proved to be positive, the new federal project will require adjustments in the volume of reforestation to a larger extent, if to be taken into account a growing number and the area of forest fires, as well as deterioration of climatic conditions.

Besides, in order to preserve biodiversity, the 2018 Decree determined the task of creating infrastructure in national parks for ecological tourism, which is more in line with the concept of sustainable development than other types of tourism. Firstly, ecotourism contributes to socio-economic well-being of local communities involved in recreational activities. Secondly, the attracted funds "contribute to development of environmental preservation programs in protected areas, as well as to development and testing new approaches to preserve natural heritage" [9, p. 282]. The Strategy for the Development of Tourism in the Russian Federation for the period until 2035,[28] highlighted ecological tourism as one of the top priorities that require special measures of state support for its development. The document outlines the following objectives: by 2035, the number of visitors attending preserved areas should reach up to 16 million and the implementation of the model of ecological tourism on the territory should be used for at least half of the national parks. According to Rosprirodnadzor, in 2022 the number of visitors to strictly protected areas has already reached 14.0 million (in 2018 it was only 6.0 million).

At present, the national goals do not include an indicator to show the growth in the number of visits to strictly protected areas, but it is obvious that if such an indicator is used in the development of the federal project, the above figure — 16 million people by 2035 should be revised upwards, taking into account the actual level already achieved. The increase in attendance is due to the expansion of accessibility of national parks for ecological tourism: the new version of the major domestic goals determines the task of creating conditions for it in *all* national parks.

Let us briefly dwell on economic efficiency of the implementation of the national project "Ecology".

Its financing was planned in the amount of 4041 billion rubles, of which 701.2 billion (17.4 per cent) is allocated from the federal budget, 133.8 billion (3.3 per cent) from the budgets of the constituent entities of the Russian Federation, and 3206.1 billion (79.3 per cent) from extra-budgetary sources.

Inspections of the project's implementation made by the Accounts Chamber of the Russian Federation revealed a number of drawbacks related to its financing. In particular, its auditors operating in collaboration with independent experts came to the conclusion, that the planned financial resources were insufficient to achieve the goals in the national project 'Ecology'.[29]

In a few cases, significant adjustment to activities was revealed regarding postponing their

[27] URL: https://economy.samregion.ru/upload/iblock/4fd/Pasport-FP-Sokhranenie-lesov-_red.-ot-21.12.18_.pdf

[28] URL: https://www.garant.ru/products/ipo/prime/doc/72661648/

[29] URL: https://base.garant.ru/77408125/

implementation, which led to a lower level of allocations from the federal budget expenditures on these activities. In particular, this applies to the federal project "Revitalisation of the Volga River".[30] The auditors found out the reasons of shortcomings in planning process of activities of the federal projects. There were also some cases of misuse of funds in a number of regions, particularly, during the implementation of the federal project "Clean Water".

One of the most important problems is the actual lack of a detailed developed mechanism for attracting extrabudgetary sources, the role of which in financing project activities is highly significant. This is especially true for the Federal Project "Introduction of the best available technologies",[31] whose budget of 2427.3 billion Rubles was allocated to the "Clean Water" project and it was planned to consist of 98.9 per cent of extrabudgetary funding. Probably, the lack of certainty with extra-budgetary financing led to the fact that by 31 December 2020 this federal project was completed ahead of schedule, however, the activities of the project related to transition towards the best accessible technologies of the major industrial facilities were transferred for the other projects: "Clear Air" and "Revitalisation of the Volga River".

In the last two years of implementation of the abovementioned projects, the amount of funds allocated for the project activities from the federal budget was adjusted, which resulted in a lower level of funding by about 10 per cent. In 2023–2024 the most drastic reduction (by 50–56 per cent) influenced the project "Integrated System of Solid Municipal Waste Management", meanwhile the projects "Clean Air", "Revitalisation of the Volga River", "Preservation of Lake Baikal" received a 4–26.6per cent decrease in funding.

At the same time, the project "Clean Country" was funded with additional allocation of 4.2 per cent in 2023, and by 37 per cent in 2024, while all the others — '"Conservation of Unique Water Bodies", "Conservation of Biological Diversity and Development of Ecological Tourism", "Conservation of Forests" practically did not undergo any changes.[32]

An attempt to make a formalised and generalised assessment of effective implementation of the national project "Ecology" belongs to a scientific researcher E.B. Tyutyukina. She compared the results of the original methodology based on the ratio between the level of fulfilment of all target indicators and the level of fulfilment of the planned amount of funding for the year for each of the federal projects included in the national project "Ecology". To bottom-line, the author stated, that only five out of eight ("Clean Country", "Integrated System of Solid Municipal Waste Management", "Clean Air", "Revitalisation of the Volga River" and "Preservation of Lake Baikal") were effectively funded in the time-frame period 2019–2021 [10].

Thus, due to various reasons, financing of the national project "Ecology" in general does not look outstanding in regards of stability and compliance with the project tasks, which could not but affect the effectiveness of its implementation. The auditors of the Accounts Chamber of the Russian Federation and representatives of scientific and expert communities forwarded a number of comments and proposals to make the planning process and mechanisms of financing the project more sophisticated, which should be taken into account for the development of new editions.

Summing up the brief analysis of the new package of national environmental objectives, it is necessary to mention another significant layer of environmental problems, the solution to which, unfortunately, has not yet been implemented neither in the current projects, nor in the newly set goals and objectives. This is the problem of preserving land resources.

The Ecological Doctrine of the Russian Federation declares the need to introduce environmentally sound methods of land resources cultiva-

[30] URL: https://ksp.r52.ru/ru/11/?nid=892&a=entry.show

[31] URL: https://ecologyofrussia.ru/proekt/vnedrenie-nailuchshih-dostupnyh-tehnologij/

[32] URL: https://tass.ru/ekonomika/15834185

tion, to preserve and restore natural fertility of soils. The Environmental Security Strategy notes a continuing trend towards quality deterioration of land and soil conditions and the impact of negative degradation: water and wind erosion, waterlogging, underflood, etc., thus over 1 million hectares of the territory lost its economic value. Twenty-seven constituent entities of the Russian Federation have a problem of such desertification of land with more than 100 million hectares affected to a greater or lesser extent.

In view of this factor, it should be noted that the role of agricultural production in the economy of the Russian Federation is still steadily growing. Agriculture (and primarily the grain complex) remain the major component of the country's food security and becomes an increasingly important source of export revenues for the Russian Federation. Anyway, if such negative trends in the dynamics of land resources persist, the further perspective of active growth of agricultural production may be questionable. In view of that, as experience reveals, it is possible to drastically expand the directions of environmental policy, as, we believe, it is advisable to develop a special federal project, which would develop sanitation and rehabilitation measures of land resources.

CONCLUSIONS

The target indicators and tasks declared in the Decree 2024 fully meet the challenges in the field of ecology, which were recorded in strategic documents of conceptual, doctrinal and strategic nature. At the same time, the following top priority problems exist that are supposed to be solved within the framework of achieving the national goal "Environmental Sustainable Well-Being": generated production and consumption wastes (including solid municipal wastes), existence of objects of stock-piling damage and formation of waste of high hazard classes, emissions of harmful pollutants into the atmosphere, discharge of pollution wastewater into major water bodies, threats to biodiversity and forest conservation. However, the scale of these problems requires continuation of efforts to be taken in the short-term strategic perspective, which serves to updating environmental goals nationwide with the subsequent adoption of specialised federal projects as the main formats for consolidating practical efforts to achieve these goals.

In most cases, targets and objectives serve as an update of those targets and objectives declared earlier. Although, for example, the goal to bury no more than 50 per cent of solid municipal wastes by 2030 looks insufficiently ambitious, as 82 per center of solid municipal waste was already disposed by the end of 2022, and its furthermore reduction goes ahead of the plan.

All technological terminology used to formulate national targets in developing federal projects should be brought in line with the legislation. For example, the relevant legislation does not use the term "sorting". This stage involves treatment, which along with sorting includes disassembly and cleaning of waste. In addition to this, the content of some concepts used to formulate some national targets should be elaborated in a more detailed way, such as "major water bodies". Besides, the phrase "involvement of production and consumption waste into economic turnover as secondary resources and raw materials" implies the possibility of using different technology, which differ significantly in terms of complexity of the process, amount of investment required and the yield of a finished product.

In addition, it is necessary to take into account the existing traditional differentiation of regions in terms of degree of waste processing and sorting during developing measures for federal projects.

An important progressive approach in contrast to the current approach (which assesses reduction measures of extending radical emission to only a limited number of cities) is the concept of all cities involved with high and very high levels of air pollution – the approach outlined in the new package of national goals. This approach seems to us more rational and effective.

The objective of forest conservation within the framework of existing programme and project activities is being solved ahead of schedule. However, if generally successful approaches are maintained, the relevant federal project should envisage a major increase in reforestation volume, taking into account the growing number and volume of forest fires in the current changing climate conditions.

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The Impact of Sanctions on the Level of ESG Transparency in Russian Companies After the Start of the Special Military Operation

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ABSTRACT

Under the conditions of sanctions restrictions, there has been a change in the ESG involvement and ESG transparency of Russian companies. At the same time, the nature of such changes, as well as the impact of sanctions, ownership structure and industry affiliation, remains insufficiently studied. The article examines the level of ESG transparency of Russian business before and after the start of a special military operation in 2022, considering the ownership structure and industry affiliation of companies. The study sample includes ESG transparency estimates for 75 Russian public companies for the period from 2021 to 2023. According to the results of the study, it was revealed that after the start of the special military operation, there was a decrease in the level of information transparency in all three ESG aspects, especially in terms of social information and corporate governance information. In addition, it was found that the change in the level of ESG transparency varies depending on the ownership structure and industry affiliation. The results obtained can be used by investors, creditors and other stakeholder groups when making decisions about cooperation with certain companies, taking into account the specifics related to the capital structure and business profile.

Keywords: corporate governance; ESG-transparency; sanctions; stakeholders; transparency criteria; SMO; Russia

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INTRODUCTION

After the start of the special military operation (SMO) experts and have forwarded their point of view that the aspects of sustainable development and ESG agenda will lose their relevance. Experts understand ESG as "a set of environmental, social and governance indicators that are increasingly used to assess the sustainability of business and investments" [1]. Such scepticism was based on the following main reasons: foreign investors withdraw funds from the capital of Russian entities, foreign companies prominent for advanced 'green' technologies and practices abandon Russian markets, as well as Western countries impose alternating packages of restrictive measures against Russian businesses.

Indeed, such issues as maintaining business, re-orientation to other markets and retention of valuable employees became of paramount importance. However, the agenda of sustainable development has not been closed, while the emphasis of aspects 'E', 'S' and 'G' has changed. As some expert surveys revealed, the most relevant issues turned out to be social programmes and those related to the carbon agenda.[1] To run sustainable development in the context of limited resources and sanctions shocks, Russian businesses rejected the style of keeping up with international leaders and act like them to a different self-conscious approach based on their own interests and priorities.

The pressure of external sanctions forced domestic corporations to significantly change their information transparency. For security reasons, there were restrictions for government agencies and companies to provide information about their activities. In 2022, the Federal Customs Service suspended publishing information on exports and imports.[2] Only a year later, the publication of data on international trade was partially renewed. The Bank of Russia issued a resolution[3] to order restrictions on financial and non-financial reporting for companies under sanctions or threatened with sanctions. As a result, many state-owned companies and banks, as well as state-run entities related to certain industries and specified types of business, ceased to officially report on their activities.

At the same time, due to lack of transparency of financial and non-financial information, there is a growing risk of greenwashing and various types of violations of shareholders' rights, including minority shareholders. Investors and partners in Asian markets, which Russian companies re-oriented to deal with, are also involved in sustainability issues. Thus, ESG transparency issues become important for large public entities, if they are needed by investors and other stakeholders.

The purpose of the research is to assess the impact of sanctions restrictions on the level of ESG-transparency of Russian public companies within the period of 2021–2023, i.e. before and after the start of the special military operation. By ESG-transparency we mean disclosure of data related not only to financial, environmental and social aspects, but also to corporate governance, presented in the form of extended annual reports, sustainability reports, integrated reporting etc.

REVIEW OF THE RESEARCH

The impact of sanctions on business

Being an instrument of economic and political pressure, sanctions were imposed since old times. In terms of economic content, sanctions enforce trade restrictions on foreign trade transactions: embargoes on arms, military equipment, technology, food, etc. They also lead to financial limitations: cancellation of loans, ban on investments in countries or companies, financial trans-

[1] URL: https://chr.plus.rbc.ru/news/624598017a8aa90f36782a28

[2] URL: https://www.interfax.ru/business/837264

[3] Information letter of the Bank of Russia dated 22.04.2022 No. IN-02–28/59 "On non-disclosure of information based on the Resolution of the Board of Directors of the Bank of Russia dated 14.04.2022".

actions, etc. The article by I. N. Timofeev describes in detail the means and methods imposed against the Russian economy [2].

Sanctions affect not only the target countries, but also the countries, which initiate them against other countries, so that the consequences may not always be predictable for both sides [3].

Foreign experts give different assessments of the damage level caused by sanctions which hit the Russian economy. Experts from the World Bank,[4] the European Union[5] [4] and Ukrainian researchers [5] insist on a significant impact on the reduction of GDP and international trade.

Some other Western experts point out a limited damage of the sanctions, since Russian businesses import necessary goods through the countries of Central Asia and the Caucasus. According to their estimation, "exports from the EU to these countries grew by 46 billion Euros in 2023, which is 50 per cent more than in 2021, or equivalent to a 75 per cent drop in European exports to Russia over that time".[6]

Russian scholars acknowledge the drop in growth of economy and its losses, but the assessments are different. Their research works are related to the first-wave sanctions of 2014, including their geo-economic and geopolitical consequences [6–8], and those sanctions imposed at the beginning of the special military operation [3,9]. Besides, many scholars have an opinion that the impact on business was weaker than expected, since domestic entrepreneurs acquired a good experience of adaptation to the crises of previous years.

Some research works are also devoted to the assessment of information transparency [10], the impact of the special military operation on disclosure of financial data [11], and on sanctions affecting ESG strategies of Russian companies [12,13].

Drivers of ESG-transparency in the context of the special military operation

From the position statement of legitimacy theory, domestic companies employ ESG-transparency to obtain a decent image of their activity in the public opinion. In a way, it is a kind of "license to operate" which is built up by an increasing trust and forming a positive public identity — this is the reason to encourage entities to publish non-financial (environmental, social, etc.) reports [1,14].

From the point of view of the stakeholder theory, the information transparency of business in the field of sustainable development depends on the interest of investors, creditors, customers, partners, the society etc. in public disclosure of environmental, social, managerial and other significant aspects of companies' activities.

Thus, the demand for ESG-transparency of public companies is justified by the expectations of shareholders, the public and other stakeholders. All countries demonstrate an increasing interest in such information, which is confirmed by the multiple growth of ESG-ratings and indexes. Over 500 agencies worldwide provide services to assess companies in terms of their sustainability [15].

Sanctions restrictions have changed the drivers of ESG-transparency among Russian companies. In the first place, the regulatory environment transformed information transparency: easier terms of disclosure of financial and non-financial information were adopted. Withdrawal of foreign investors and partners from the domestic market diminished their influence on Russian companies, which in turn retained their positions in Western markets. On the other hand, ESG criteria are still relevant in the South Asian and Asian-Pacific regions.

[4] URL: https://www.weforum.org/agenda/2022/12/sanctions-russian-economy-effects/

[5] URL: https://www.weforum.org/agenda/2022/12/sanctions-russian-economy-effects/

[6] URL: https://www.economist.com/europe/2024/08/19/the-mysterious-middlemen-helping-russias-war-machine

Russian agencies,[7] which provide ratings and indexes, replaced foreign data providers. The risk of cross-border carbon regulation from Europe has been replaced by a similar risk from China.[8] As a top priority range of targets, market participants focus on economic and financial reliability issues, import substitution, supply stability etc. Thus, after the start of the special military operation, just an image per se is no longer a significant **driver** of ESG disclosure.[9]

Consultants and analysts claim that foreign stakeholders still become the drivers of ESG indication for export-oriented companies. However, industry affiliation, as well as foreign and domestic sales markets define the level of business partners. Companies, which re-oriented business activities from American and European to Asian markets meet the requirements of new partners to maintain or even demonstrate an information transparency related to their growing sustainability. Those companies that failed to substitute foreign markets and focused on domestic markets, show a slight decrease in ESG transparency.

Shareholders or investors play an important role as economic factors to influence ESG transparency as well. Asian investors do not put a strong pressure on businesses of Russian companies regarding transparency issues: their share in the equity capital is smaller than that of Western investors before they withdrew. The state assumes this function as a key driver of ESG-disclosure[10] [16].

Researchers provide different points of view: some do their best to prove a positive factor of the presence of the state in the share capital and ESG-transparency of companies [17–19], meanwhile others take the opposite point of view [20–24].

Analysing different industries, one of the studies demonstrated that, for example, metallurgical companies have a more explicit ESG-disclosure due to the fact that they have the strongest harmful impact on the environment [25].

Review of the research led to formulate the following questions:

1. Which of the aspects (E, S or G) in the ESG-assessment of Russian companies changed most significantly after the start of the special military operation?

2. How did the sanctions related to the special military operation affect the ESG-transparency of Russian companies with different structures of ownership (with or without state participation)?

3. How did the sanctions implicated in the special military operation affect the ESG-transparency of Russian companies in different industries?

Research methods and materials

Most often, Russian public companies, including those with state participation, disclose ESG information within the framework of their annual or sustainability reports, ESG ratings conferred, as well as by means of issuing data books of non-financial indicators. Based on this and other official publicly available information (including materials posted on companies' corporate websites), Russian rating agencies make lists of ratings and rankings of ESG performance and ESG transparency.

The sample of this research study includes 75 Russian public financial and non-financial companies (168 findings) involved in the ESG transparency ranking of Expert RA credit agency[11] in the period of 2021–2023. The authors put

[7] In Russia, ESG ratings are provided by National Rating Agency (NRA), Analytical Credit Rating Agency (ACRA), Expert RA and National Credit Ratings (NCR).

[8] URL: https://ao-journal.ru/esg-perestroyka-perekhodim-ot-liriki-k-fizike

[9] URL: https://mustread.kept.ru/interviews/esg/imidzhevaya-sostavlyayushchaya-poteryaet-znachenie-investirovat-v-esg-prodolzhat-te-komu-eto-deystvi/

[10] URL: https://trends.rbc.ru/trends/green/650432939a7947bc23ec82dc

[11] Expert RA is one of the oldest and largest rating agencies in Russia, holding leading positions in both credit and non-credit (ESG) ratings. Since 2021, it has been compiling an

Table 1

ESG transparency estimates of Russian companies per annum in ter of E, S, and G, in pts.

Criterion / Year	2021	2022	2023	Total
Total ESG-score	1.63	1.43	1.50	1.52
E-score	1.67	1.46	1.54	1.56
S-score	1.75	1.47	1.56	1.60
G-score	1.87	1.60	1.79	1.75

Source: compiled by the authors.

together all of them in accordance with the state presence in the share capital structure or without state participation and industry affiliation.

Within the framework of the analysis, in view of account the Expert RA methodology, the information disclosure is assessed according to the following:

- environmental policy and actual environmental impact (E);
- social responsibility policy and actual interaction with employees, clients and society as a whole (S);
- the management and actual protection of stakeholder rights (G);
- the non-financial reporting standards used (St).

Each indicator is valued on a three-point scale: 2 points — in case of full disclosure, 1 point — in the matter of incomplete/insufficient disclosure, 0 points — in case of no disclosure. Based on individual indicators, an overall score was formed, which was measured on the same scale. For separate companies, including financial, IT and telecom entities, a few environmental and social factors (e.g., disclosure on air pollution, as well as on safety and health protection) were not taken into account for the assessment process.

This research work analyses the overall assessment of ESG transparency, as well as its E, S and G aspects.

RESULTS

ESG-transparency: a trend analysis

In accordance with the results of the trend analysis in *Table 1*, the level of ESG transparency decreased by 12 per cent from 1.63 to 1.43 points after the start of the special military operation in 2022 and the introduction of anti-Russian sanctions. This applies to all ESG aspects, however, both social disclosure and corporate governance disclosure decreased most of all: by 16 and 14 per cent correspondingly.

Table 1 indicates that in 2023, Russian companies adapted and partially restored disclosure of non-financial information: the average ESG score increased by 5 per cent, from 1.43 up to 1.50. Russian businesses became more active in publishing information on all ESG aspects, with the most significant increase in transparency in the area of corporate governance: the average G-score increased by 12 per cent, from 1.60 to 1.79. At the same time, Russian companies did not reach the level of 2021 before the start of the start of military operation in any of the aspects.

ESG transparency ranking of Russian companies and banks, which assesses the degree of disclosure (transparency) of ESG information. In 2022, the methodology for compiling this ranking became public. URL: https://raexpert.ru/docbank//7bc/7f3/df1/de8a9e328f887ece378f281.pdf

Table 2

ESG transparency estimates of Russian companies in 2021–2023 in terms of E, S, and G, depending on the ownership structure, in pts.

Ownership structure	Overall ESG-score	E-score	S-score	G-score
Public companies	1.50	1.46	1.79	1.16
With state participation	1.55	1.71	1.70	1.08
Total	1.52	1.56	1.75	1.13

Source: compiled by the authors.

ESG transparency and ownership structure

After the start of the special military operation, when sanctions were developing in February 2022 to target a multitude of Russian companies and individuals, one of the main criteria for such restrictions was the degree of affiliation with the state. Therefore, no wonder that a significant part of sanctions was aimed precisely to hit the companies with state participation.

The comparison figures of companies with different ownership structures assessed in terms of information disclosure for all three aspects (E-score, S-score, G-score and overall ESG-score) is shown in *Table 2*.

Table 2 indicates that companies with state participation show a higher level of transparency of environmental and social information (1.71 and 1.08 points), than public companies without state participation (1.46 and 1.16 points, respectively). In contrast to this aspect, the degree of transparency of corporate governance information is higher among companies without state participation (1.79 points) than in companies with state participation (1.70 points).

Table 3 presents the year-on-year comparison figures of companies in terms of ESG information disclosure in all three aspects.

According to the results indicated in *Table 3*, in 2021, companies with state participation show a higher level of ESG transparency (1.67 points) versus companies without state participation (1.59 points). Meanwhile the level of disclosure of social and corporate governance information did not differ significantly (1.77 and 1.88 points in companies with state participation versus 1.74 and 1.87 points in companies without state participation). The degree of openness in the field of environmental information was significantly higher in companies with state participation (1.79 versus 1.58 points). Such openness of environmental information on the part of companies in which the state is one of the shareholders is easy to understand: it is the state that plays the main role in the formation of the regulatory and legal framework in the environmental sphere, as well as in the implementation of environmental policy.

In ESG transparency ranking for 2022 by Expert RA credit agency, companies with state participation reduced the amount of ESG information disclosed to a greater extent: their ESG transparency level dropped by 16 per cent, from 1.67 to 1.40 points, while that level of others decreased by 9 per cent, from 1.59 to 1.45 points. The level of transparency of corporate governance information plummeted most of all — by 24 per cent in companies with state participation: from 1.88 to 1.43 points, while in public companies it fell only by 9 per cent: from 1.87 to 1.71 points.

Such a significant decrease in corporate governance transparency of companies with

Table 3

ESG transparency estimates of Russian companies per annum in terms of E, S, and G, depending on the ownership structure, in pts.

Criterion / Year	2021		2022		2023	
Ownership structure	Public companies	With state participation	Public companies	With state participation	Public companies	With state participation
Overall ESG-score	1.59	1.67	1.45	1.40	1.46	1.57
E-score	1.58	1.79	1.38	1.58	1.41	1.75
S-score	1.74	1.77	1.44	1.52	1.52	1.62
G-score	1.87	1.88	1.71	1.43	1.80	1.78
St-score	1.12	1.02	1.25	1.08	1.11	1.14

Source: compiled by the authors.

state participation is obvious: in the context of sanctions and in the interests of national security these companies closed access to all sensitive information, including the composition of the Board of Directors. Whereas previously such information was available in the open access, Russian public companies were given the option not to disclose it, or to disclose it partially by Resolution No. 351[12] of the Government of the Russian Federation dated 12.03.2022.

Although this primarily involved only financial statements, many companies, mainly those with state participation, decided not to publish non-financial indicators as well, in their annual or ESG reports.

The current research work figured out 3 strategies for companies to respond in terms of ESG transparency during the analysed period. In 2022, some of the companies, namely, VTB, Transneft, PIK, KAMAZ, etc. completely removed sustainability reports for previous years from their websites. At the same time, most companies kept publishing non-financial reporting and reduced the amount of data provided. Disclosure of information related to corporate governance significantly decreased, for example, among such companies as Sberbank (from 2.0 to 0.4 points), AK Alrosa (from 2.0 to 0.4 points) and Gazpromneft (from 2.0 to 0.6 points). However, some entities did not change the level of transparency in corporate governance, including, for example, Gazprom (2.0 points), Tatneft (1.8 points). Some companies even increased the level, such as Moscow Exchange — from 1.8 to 2.0 points.

In 2023, companies with state participation increased their index of ESG disclosure by 12 per cent: from 1.40 to 1.57 points, while those companies without state participation increased by less than 1 per cent: from 1.45 to 1.46 points. At the same time, their corporate governance disclosure was almost at the equal level: 1.78 and 1.80 points, respectively.

[12] URL: https://www.garant.ru/products/ipo/prime/doc/403593706/

Table 4

ESG transparency overall estimates of Russian companies per annum, depending on industry affiliation, in pts.

INDUSTRY / YEAR	2021	2022	2023	TOTAL
Agro-industrial complex	1.36	1.02	1.57	1.32
Generating companies	1.79	1.46	1.65	1.63
Gold and diamond mining	1.73	1.74	1.76	1.74
Machine building	1.20	0.53	1.07	1.01
Oil and gas production	1.76	1.49	1.58	1.61
Retail trade	1.49	1.36	1.33	1.40
Communications and telecommunications	1.95	1.57	0.80	1.57
Network companies	1.60	1.48	1.49	1.51
Construction and development	1,28	1.57	1.39	1.40
Transport and infrastructure	1.32	0.99	1.09	1.13
Coal Mining	n/a	1.67	1.62	1.65
Finance	1.56	1.24	1.62	1.46
Chemical industry	1.36	1.95	1.95	1.60
Holdings	1.99	1.10	1.28	1.41
Non-ferrous metallurgy	1.90	1.93	1.67	1.81
Pulp and paper industry	1.80	1.23	1.22	1.42
Ferrous metallurgy	1.85	2.00	1.91	1.90
IT	1.48	1.37	1.61	1.49
TOTAL	1.63	1.43	1.50	1.52

Source: compiled by the authors.

ESG transparency and industry affiliation

Table 4 and 5 present the comparison by ESG transparency among the sample industries.

The analysis based on data of *Table 4* reveals that the highest level of ESG-transparency currently have non-ferrous (1.81 points) and ferrous (1.90 points) metallurgy companies, as well as gold and diamond mining companies (1.74 points). The first group includes MMK, NLMK, Nornickel, Severstal, Rusal, etc., and the second group includes AK Alrosa, Polymetal, Polyus and Seligdar.

Companies from the oil and gas sector, like Gazpromneft, Gazprom, Rosneft, Tatneft, etc. have an average disclosure indicator of 1.61, as do companies in the energy sector, including Inter RAO, Mosenergo, Rushydro, etc. (1.6 points) and the entities of the chemical industry (1.60 points). The least ESG criteria are disclosed by companies from the transport sector, such as Aeroflot, UTair etc. (on average 1.13 points) and mechanical engineering, including Kamaz, UAC, etc. (1.01 points).

Over the period of 2021–2023, the level of disclosure of non-financial information decreased in 11 out of 18 industries. ESG-transparency of companies in the field of communications and telecommunications dropped more than twofold by 41 per cent from 1.95 points in 2021 to 0.8 points in 2023; by 11 per cent in machine-building companies and by 17 per cent in transport companies; by 32 per cent in the pulp and paper industry and by 64% in holding companies.[13] However, certain industries showed an increase in ESG transparency: gold and diamond mining (by 2 per cent), finance (by 4 per cent), IT (by 9 per cent) and chemical industry (by 43 per cent).

Noticeably, the level of ESG disclosure after the start of the special military operation either unchanged or increased in the companies of such industries that were less affected by anti-Russian sanctions and retained their positions on the global market due to their monopolistic position, primarily the chemical industry. As to the industries that operate to a greater extent in the Russian market and were affected by Western sanctions, on the contrary, they showed a decrease in the level of information transparency in the ESG area (telecommunications, pulp and paper companies, as well as holding companies).

Table 5 presents disclosure of information by the sample companies selected by groups of social, environmental and managerial indicators for the period under study.

According to data from Table *5*, the worst disclosed are environmental indicators (1.56 points), and the best disclosed are social indicators (1.75 points). Among the exceptions are generating companies, gold and diamond mining, non-ferrous and ferrous metallurgy, IT.

The highest scores of information disclosure in the area of corporate governance are for ferrous metallurgy companies (1.96 points) and in the area of environment for gold and diamond mining companies (the highest is 2.00 points) as well as ferrous and non-ferrous metallurgy companies (1.95 and 1.94 points respectively).

The least transparency regarding disclosure of environmental indicators revealed by transport and infrastructure (1.11 points), machine building (1.11 points), retail trade (1.12 points) and construction (1.15 points).

DISCOURSE AND CONCLUSIONS

The given study reveals that ESG agenda was affected by negative events during the period under review. After the start of the special military operation and the sanctions, domestic companies of different industries with different ownership structures demonstrated uneven changes in degrees of involvement in their implementation of sustainability goals and ESG-transparency.

In response to the first research question, it can be noted that after the start of the special

[13] Under the methodology of Expert RA credit agency, the category of holdings includes such companies as Sistema JSFC, EN+ GROUP PJSC and SFAI PJSC.

Table 5

ESG transparency estimates of Russian companies in terms of E, S, and G in 2021–2023, depending on industry affiliation, in pts.

Industry	Overall ESG-score	E-score	S-score	G-score
Agro-industrial complex	1.32	1.24	1.73	1.67
Generating companies	1.63	1.85	1.78	1.67
Gold and diamond mining	1.74	2.00	1.76	1.75
Machine building	1.01	1.11	1.36	1.24
Oil and gas production	1.61	1.67	1.80	1.64
Retail trade	1.40	1.12	1.78	1.60
Communications and telecommunications	1.57	1.54	1.88	1.65
Network companies	1.51	1.56	1.83	1.66
Construction and development	1.40	1.15	1.83	1.71
Transport and infrastructure	1.13	1.11	1.57	1.23
Coal Mining	1.65	1.88	1.90	1.70
Finance	1.46	1.39	1.53	1.47
Chemical industry	1.60	1.80	1.84	1.60
Holdings	1.41	1.18	1.86	1.34
Non-ferrous metallurgy	1.81	1.94	1.91	1.74
Pulp and paper industry	1.42	1.23	2.00	1.60
Ferrous metallurgy	1.90	1.95	1.93	1.96
IT	1.49	1.78	1.47	1.40
TOTAL	1.52	1.56	1.75	1.60

Source: compiled by the authors.

military operation, the disclosure level of public companies in the whole sample decreased by 12 per cent for all three groups of indicators (E, S, G): from 1.63 points in 2021 to 1.43 points in 2022. To a major extent, this applies to social and corporate governance indicators. In 2023, the disclosure of non-financial data expanded compared to 2022, but none of the groups reached the level of 2021 with scores comparable to those in the period of time frame prior to the start of the special military operation.

As for the second question, companies with state participation cut to a large extent their disclosure of non-financial information. This is logical and related to the fact that one of the criteria for imposing anti-Russian sanctions was the degree of affiliation with the state. Consequently, such companies started to conceal essential corporate information aiming to safeguard national interests.

As regards the third research question, the research work revealed that the impact of sanctions was not homogeneous for ESG-transparency of companies in different industries. Some companies increased the transparency of non-financial information, for instance in the sectors of gold and diamond mining, finance, chemical industry, or IT-industry. On the other hand, some other industries concealed it: ESG-transparency decreased to the greatest extent in companies in the communications and telecommunications, transport, and engineering industries. The explanation is obvious: some of them manufacture dual-use products.

As for separate groups, the gravest situation in most industries concerns the disclosure of environmental indicators. The only exception is export-oriented industries, which may deal with requirements of foreign partners. The least transparent environmental indicators where shown by companies whose activities are on the domestic market: transport and infrastructure, machine building, retail trade, construction, etc. This indicates that Russian stakeholders among shareholders, clients, employees etc. do not consider participation in ESG-awareness and ESG-transparency to be among their priorities.

A clear example is timber industry companies, including PJSC Segezha Group,[14] which lost access to Western European markets. In 2022, the level of ESG transparency of such companies in this industry dropped by 32 per cent: from 1.80 to 1.23 points, and in 2023 it still did not show a recovery to stay at the level of 1.22 points.

In accordance with the results of the given study, one can also claim that the state becomes the driver of ESG-disclosure for the companies, which operate in the domestic market trying to get adapted to the conditions of a new wave of sanctions [16]. This happens due to increased transparency of companies operating with state participation in all three groups of indicators: environmental, social and corporate governance.

CONCLUSIONS

The research work contains the empirical analysis of 75 Russian public companies for the period 2021–2023. It has been revealed that after the start of the special military operation and imposing unprecedented anti-Russian sanctions, there was a noticeable decline of ESG transparency of the Russian business, especially in terms of social and corporate governance disclosure.

At the same time, the impact of the sanctions pressure on the level of information transparency regarding ESG turned out to be quite different, because an important role is played by such factors as ownership structure and industry affiliation. Thus, after the start of the special military operation, the ESG transparency of companies with state participation decreased most of all. Among the main reasons were the affiliation with the state and,

[14] Vertically integrated timber holding company within AFK Sistema Group JSFC

consequently, another more acute problem of safeguarding national interests at the level of each separate corporation and the interests of the country as a whole. As for the industry affiliation, its influence on the degree of ESG-transparency in the sanctions environment deals with the company's orientation: domestic or foreign market. In particular, despite the sanctions, many export-oriented industries have improved ESG reporting disclosure, primarily gold and diamond mining, as well as the chemical industry.

The obtained results have theoretical and practical significance. From the theoretical point of view, the authors carried out a quantitative assessment of changes in the level of ESG-transparency of Russian companies before and after the start of the special military operation. In practice, the results obtained can be used by investors, creditors and other stakeholders, when making decisions regarding certain companies, taking into account the specifics related to the capital structure and business profile. In particular, the findings obtained in this paper will be useful for agencies, which formulate sustainability ratings and rankings in the process of developing a methodology for forming estimates for comparative analyses of the ESG transparency of Russian companies.

It is worth pointing out that this research work analyses a relatively short period (2021–2023), the maximum available timeframe for which ESG transparency assessments of Russian companies existed at the time of writing. Thus, it seems relevant to conduct research using a longer time horizon and with a detailed analysis of the sustainability indicators of companies themselves.

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A Cooperative City. A Dream Come True

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ABSTRACT

The article explores the process of creating a large cooperative housing complex in a district of New York. It highlights the unique circumstances that made the cooperative City project possible in the United States. The article also examines the efforts of European countries to foster urban residents' involvement in urban development. It provides examples of innovative solutions implemented by the population of various European cities. The article delves into the Russian experience of utilizing public initiatives to enhance urban development and improve the quality of life. It emphasizes that the promotion of cooperation in urban life is supported by both governmental authorities and individual citizens and local communities. The article highlights a new phase in this process — changes in urban planning, with the transition from general to master plans becoming part of federal policy.

Keywords: cooperative city; initiative from below; transport infrastructure; communal infrastructure; territorial public self-government; housing cooperative; general plan; master plan

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The idea of a cooperative city is quite simple. If you can make a cooperative single house, then why not make a cooperative residential complex, a micro-district, a city district, or even transform them in an entire town into a cooperative town? Interestingly, initially the idea of a cooperative city was put forward by P.A. Kropotkin, almost a century before the first experimental urban area in the United States.

THE FIRST CO-OP CITY

The Bronx was a US pioneer in this endeavor. This northeastern borough, which makes part of New York City, is one of the largest cooperative city (or co-op city) in the world: in 2010, nearly 44.000 inhabitants lived there.

In 1965, plans were announced for the development of housing on the site of landfill, marshland and swamps. Construction was started in 1966 and completed in 1973. It was associated with many corruption scandals, repairs and reconstructions, some of which are still ongoing. To implement the project the cooperative hired the management of RiverBay Corporation. This non-profit entity with over 1.000-strong staff provided services at cost, however, with no markup.

The idea to create a cooperative city belonged to a Russian immigrant Abraham E. Kazan, who managed to solve the problem of improving living conditions for workers in garment factories of New York City. His Bronx project was supported by the US government. The chief architect was also an immigrant from Russia, Herman Jessor, who came to the United States as a teenager. Perhaps, this is why many Russians compare such American cooperative city with the Moscow district of Strogino.

The first members of this first US cooperative were mainly immigrants from Italy and Ireland. Now this is home for 20% white Americans, 25% Hispanics, and 55% Afro-Americans. Despite this composition, the Bronx co-op city is not like slums or poor areas at all. This has become a new US reality due to some of the following Bronx regulations.

The minimum number of rooms in each apartment is three, the maximum is six. Those who apply for cooperative membership will agree to

meet a special commission, who visits the family to check some aspects including the credit rating within or above the established standard and no criminal record of conviction in the restriction list of the cooperative.

School-age children are required to attend school. When the application is approved, such family is included in the waiting list. However, this expectation may last for more than one year.

It is impossible to buy an apartment in the Bronx: the cooperative provides only the right to rent housing. Anyway, one needs to make a down-payment upfront of at least 13500 USD, and then from 600 to 1200 USD each month to live in this apartment. If residents move to another place, the down-payment is reimbursed to them.

In addition to the management company, the cooperative city has its own public structure with such utilities as a boiler rooms, electrical power substations, a fire department and a centralized air conditioning system. Besides, the co-op has its own security service staff of guards, patrolmen, detectives and first aid specialists. Two weekly newspapers are published for the readers.

Residential co-op buildings occupy only its 20 per cent of the territory within New York City, the rest of space make lawns, trees and bushes, sports or playgrounds, as well as numerous pedestrian paths. There are separate buildings erected specially for citizens aged over 60, so that over 8.000 senior citizens live there.

Half a century has passed since the settlement of this co-op city, which is quite enough to consider this project seriously. Nevertheless, such initiatives have not become widespread, neither in the United States, nor in other countries of the world. Why did this happen?

In my opinion, the main reasons were that this first venture of the Bronx co-op city in was built from scratch, according to a pre-developed project, and a unique situation: empty landfills, marshland, the need for inexpensive (though not the cheapest) housing, the support from the state authorities and the energy of two talented enthusiasts, both from Russia.

The British experience of the same time period and of the same nature was less radical: they created a cooperative, which was more consistent in overcoming the social isolation of residents. The new borough with city status named Milton Keynes (or Keynes) is located at an equal distance from London, Cambridge and Oxford. by The British government determined the choice of location to distribute population more evenly across the country [1]. It should be the largest one among new cities in the UK with a foreplaned population of 250.000 people [2]. Currently, 207.000 residents live in Milton Keynes.

A specific feature of urban planning in Keynes is a network of citywide expressways with intersections at intervals of 1 km. Each grid cell of the structure makes an urban territory "for its own needs". There are no traffic lights at roundabouts of highway intersections, which is convenient to pass through. Pedestrian and bicycle paths run throughout the entire city with underground crossings or overpasses.

The idea of such a layout design belongs to American urban theorist Melvin Webber (1921–2006). Back in the 1960s, he was confident that in the time of digital economy, the tendency of high concentration of people in one place would become obsolete, as well as transport-free zones would be necessary for people to move freely and contact each other informally.

Neither the American, nor the British experience of co-operative constructions could be applied elsewhere universally. However, currently the idea of a cooperative city is still relevant all over the world, and, as a rule, could be used without exotic experience of the Bronx (at least, regarding its founding trail-blazers and in terms of discussing and thinking later about their original implemented ideas).

EUROPE MOVES TOWARDS CO-OP CITIES

On July 18, 2020, several public organizations from six European countries adopted the document entitled "Cooperative City Manifesto". It stated, that in the context of the Coronavirus pan-

demic, the controlling role of the state increased in many countries, but only in a few cases, the grass-root initiative regarding protective measures was launched. The anti-Coronavirus campaign revealed only one side of the problem, which covers far beyond the pandemic situation.

First, this applies to the growth of property stratification related to the epidemic. In such circumstances, communication between neighbors allows to find out quickly those who suffered more than others not only due to health problems, but also financially. As a result, the COVID-19 epidemic led 1 billion people in the world on the brink of poverty, including 45 million people in Europe. Official social services are not able to operate efficiently to cope with this even in the territory of the European Union. Public and local communities should have taken care of such mission.

"Cooperative City Manifesto" assigned the task to develop systems and procedures for organizing cooperation between neighbors to administer a more correct and fair distribution of efforts and provision of financial support. The document suggested promoting the experience of the city of Milan in distribution of food supply to those in need through a centralized network of municipally owned farms, commercial retail entities, delivery vehicles and free-of-charge soup-houses. At the same time, permanent surveys of the population needed to single out who among the neighbors should be included in list of food aid program, and who can do without it.

Besides "Cooperative City Manifesto" raised the problem of ensuring free access to reach some areas of urban territory for the needs of common people. For example, many poor families could not have a summer house outside the cities, but were ready to grow vegetables under their windows on in the backyards. Should municipalities interfere over such trifle issue? — No, this is a problem for local communities that must be structured for it.

This is not a new initiative for the European Union: the EU Urban Agenda, a kind of Agency for cities has been operating there for a long time. The only thing was to improve the system for its operation. Anyway, in addition to this, organizations of the grass-root level started to become actively involved in the process of transforming urban life.

In particular, there operates Eutropian, a non-profit organization, founded by enthusiastic communities from three European countries: Austria, Hungary and Italy. Its mission is to support interaction between people involved in the process of urban development, help in research and promotion of interaction, as well develop new means of communication. The organization has already gained an extensive experience in transforming urban space, creating attractive public areas and cultural heritage zones, reviving ecologically hopeless urban areas and involving local communities to improve their urban life.

Another, quite important initiative of Eutropian was the launch of an internet-driven version of Cooperative City magazine. It has already published many examples among cases of cooperation arranged at the level of local communities and aimed to develop European cities.

For example, in 2020, one of the public organizations in Budapest received a grant to arrange the location of Bartok Quarter cultural center.[1] The aim was to overcome the feeling of self-isolation among inhabitants of the surrounding houses by getting them involved personally in social network activity and in cultural events. Although cultural events in the Bartok Quarter attracted many people, the local inhabitants of this area did not join its essential cultural part in their daily lives. Besides, most students of two nearby universities were not significantly involved in the cultural life-style of this location as well.

Among the highlights of this project was activity of a knowledge center network Adapter, which provided online and offline sessions in combination to attract interest groups for training courses,

[1] Bela Bartok (1888–1945), a famous Hungarian composer, author of the opera Bluebeard's Castle, ballet Miraculous Mandarin, Wooden Prince and many symphony concerts.

exhibitions and cultural events. This venture keeps on going to gain momentum.

Another international public organization, the European Urban Initiative, stimulated similar projects in many European cities: Košice (Slovakia), Ghent (Belgium), Tilburg (Netherlands), Almeria (Spain), and Athens (Greece) [3].

Pigneto, an urban district in the eastern part of Rome is the area, where few tourists visit, but many artists and musicians live. In 2017, cooperative Nonna Roma (Roman grandmother) was founded to provide firstly food delivery for 2.000 families with sick people and for another 300 families on the brink of poverty survival. Traditional number of volunteers for such districts increased from 50 enthusiasts to 200. Such charitable activity went along with the process of improving housing conditions for needy families. Thus, banks approved individualised mortgages, taking into account financial capabilities and living conditions of specific families.

Traditionally, state support for poor families is limited financially and is accompanied by so many lengthy procedures. Those most needy often have to find themselves deprived of state financing. For this reason, Nonna Roma set up a system of mutual aid within the neighbourhood communities, which was considered a more reliable method of supporting those who find themselves in difficult financial situation. Besides, if a person spends subsidies carelessly, for example, wasting money for drinks, neighbours inevitably and openly disapprove him or her to stop this. Keeping in mind such neighbourhood control, his or her family will behave in a more civilised way to spend the subsidies. Such social involvement of participation within local (neighborhood) communities provides some room for hope to pay off the funds for back up of the needy [4].

The Italian city of Prato 20 km North-West from Florence generated the project Prato Urban Jungle with involvement of local citizens. Activists ran meetings with residents in three areas of the town to select enthusiastic volunteers for the project. They teamed up enthusiasts in working groups to plant greenery in their micro districts. For some time, a city laboratory operated there with some of these volunteers and reinforcement group of professional architects, specialists in urban management and landscape. At the third stage, residents discussed the revision of landscape projects at general meetings. Such approach gives a firm feeling of confidence, that people will preserve lawns, flowerbeds and every tree in good condition [5]. Besides, as a result, Citizens' Council, a new non-profit organization was founded to take on new urban projects.

Such project to maintain urban spaces stands out as unique of all similar initiatives in the European Union, where the main task is the so-called revitalization of streets. Meanwhile streets became simply transport arteries in the overwhelming majority of cities in the world, and local people usually have to spend time inside buildings and very rarely in the streets there.

Debrecen is the second largest city in Hungary. The residents initiated "car-free day" there, when the main street of the city is closed for traffic, meanwhile the roadway offered space for recreation, outdoor games, meetings, training sessions and other cultural events. No doubt, this worsened the transport situation at least for this day there, but the city residents made a choice, which citizens of other cities cannot make. This is exactly why local communities must have ways to represent and accomplish people's interests.

THE RUSSIAN WAYS: FIRSTS FROM HIGHER LEVEL

In my opinion, no changes in Russian legislation are necessary to transform any city into a cooperative one, neither at the federal, nor at the local level.

In 1957, the Council of Ministers of the Soviet Union took measures to intensify residential construction: it authorized housing construction of cooperatives (HCC) and granting loans for the construction of residential buildings. What should happen to the HCC after the construction was completed was not clear from regulatory acts.

Eighteen years later, all public organizations received the status of "entity of public initiative" if they still operated after completion of such houses. These were street committees, quarter's committees, house committees, parent committees, women's councils, as well as voluntary civilian squads for the protection of public order in the Soviet Union. Another ten years passed and in 1985, the Decree of the Presidium of the Supreme Soviet of the Russian Federation approved the Regulation on public rural, street, quarter's committees in rural settlements.

Article 161 of the Housing Code of the Russian Federation[2] defines a few types of management (except management companies) for apartment buildings: homeowners' association, housing cooperative, specialized consumer cooperative, or cooperative of direct owners of the premises, if a building has no more than 30 apartments.

Thus, residents themselves were supposed to determine one of the forms of management of their building, when it is already accomplished. Interestingly, there is no legislatively established automatic transition: while the house is under construction, the housing cooperative operates to manage it, but when the house is ready to accommodate inhabitants the housing cooperative is being transformed into association of homeowners.

What is the difference between Russian housing cooperatives and homeowners' associations at present? Firstly, their definitions are determined in different legislative acts. Article 110 of the Housing Code of the Russian Federation classifies housing cooperative[3] as consumer cooperative, and Article 50 of the Civil Code of the Russian Federation[4] defines homeowners' association as peoples' owners-of-property association. Nevertheless, the Housing Code gives classifications for both entities — housing cooperatives and homeowners' associations.

Due to blurred boundaries between them, functions of both of them retain the style of work of the housing cooperative. Homeowners' associations mainly focus on the category of property in their activities and not on organizing common life of their association neighbours. Access to those functions, which currently carry out local public organizations in Russia, was not officially blocked, people simply were not aware of them.

A new question arises: what is the difference between a cooperative and an association? The difference is in details. Homeowners' associations have more comprehensive regulations about responsibilities of the governing bodies. Besides, its Association Board cannot neglect the decisions of the general meeting of homeowners.

When someone signs an agreement to join a housing cooperative, he/she does not receive ownership of the apartment, but acquires a share and cannot demand transfer of the shared construction object from the developer. Ownership of the apartment is officially registered as soon as the share has been fully paid. On July 1, 2018, it was prohibited to raise citizens' funds for the construction of houses by means of creating housing cooperative societies.

The competencies of the General meeting for members of a housing cooperative society and its Board are still not legislatively established in the Housing Code of the Russian Federation. The residents themselves are authorised to determine these competencies.

This is why many housing cooperatives made up a decision at their General meetings to become homeowners' associations, since this is permitted by article 122 of the Housing Code of the Russian Federation. As a result, this transformation has changed nothing, only powers and competencies of some elements of the management system have become more clearly expressed in regards to the terms of the General meeting, the Board, or the Chairman.

Due to the fact, that the scope of powers does not adequately specify the statute in the charter

[2] URL: https://www.consultant.ru/document/cons_doc_LAW_51057/

[3] URL: https://www.consultant.ru/document/cons_doc_LAW_51057/a23123b6d315e8ada8c8e969f66e8e6a0e709258/?ysclid=m2k7fv2by3309103743

[4] URL: https://www.consultant.ru/document/cons_doc_LAW_5142/3a585d0351c74adc4c9878b6019d704cdd9d3699/?ysclid=m2k7gr04x7819201663

of the housing cooperative, sometimes abuse of power and infringement of interests of some members of the cooperative are possible. According to Article 147 of the Housing Code of the Russian Federation, a member of the Board of the housing owners' cooperative cannot combine his/her activities with work in the same cooperative under the employment agreement. It is also impossible to transfer to someone else the performance of his/her duties as a member of the Board in the housing owners' cooperative.

There are no such restrictions for housing cooperatives. Besides, according to Article 111 of the Housing Code of the Russian Federation, membership in a housing cooperative is not directly related to existence of ownership in the apartment building. Therefore, any outsider can be elected to the Board and even become the Chairman of the housing cooperative. On the contrary, only owners of the apartment can become members of the housing owners' cooperative, as well as only they exclusively can become members of the Board or Chairman of the housing owners' cooperative.

Residents have the right to decide in each specific case, whether it is necessary to transform a housing cooperative into a homeowners' association. If member of the housing cooperative adopted a working charter (with all clear powers and competencies) for all management bodies of their cooperative, including detailed interaction algorithms (which are not in the Housing Code of the Russian Federation), then, it is rather no need to transform the housing cooperative into a homeowners' association.

Article 110 of the Housing Code of the Russian Federation provides some clarification: both housing cooperatives and homeowners associations are consumer cooperatives, which means, that provisions of Article 123 of the Civil Code of the Russian Federation apply to both of them. In particular, their members bear subsidiary liability for the debts of housing cooperatives and homeowners associations. Sometime before, this was coined "collective responsibility" and it drastically reduced the level of risks for the vertical power.

Another aspect, which clearly presents the current legal situation of self-government at the lower level is related to gardening non-profit partnerships (GNPP), or, more precisely, to the transfer of such non-profit partnerships шт relation to a populated area or only to a part of it. Today, entire cottage villages are founded on non-profit partnerships territories, which are *de facto* cooperatives. Paragraph 12 of Article 54 of the Federal Law of July 29, 2017 No. 217-FZ "On the conduct of gardening and vegetable gardening by citizens for their own needs and on amendments to certain legislative acts of the Russian Federation" defines the status of GNPP land in the following way: it can be changed to "lands of populated areas" with permitted use for individual housing construction.

There are several conditions for this: the General Meeting of the partnerships approved of such decision; the partnership is located within the boundaries of the settlement; all buildings on the plots of land are considered residential houses. If the decision is positive, they close their gardening non-profit partnership and set up a housing owners' cooperative instead of it, or select a management company.

This situation is very much like a parable about a mathematician who needed to explain the algorithm for making tea. He started in the following way: "Take a kettle, pour water into it, turn it on and wait till it boils." Then someone interrupted him: "What if the kettle is already filled with water?" Without hesitation, the mathematician replied, "Take the kettle, pour out the water, and then use my algorithm." So, here we are: instead of simply equalizing the rights of their gardening non-profit partnership with the housing owners' cooperative, it should be closed and a new housing owners' cooperative should be founded from independent owners of houses and plots — according to the old principle: "destroy it up to the foundation, then rebuild it all anew."

Summarising the first way, we can note, that here we deal with what could be called "an eco-

nomic materialism". Building housing, providing it with heat and other amenities is some material and tangible process. However, it is impossible to plan and make schemes, how comfortable the rooms will be for people to live there.

The management company is an external structure, which provides services to the residents of the residential complex. Nevertheless, it was obvious, that if the management company operates harmoniously with the residents, its activity is more successful with less probable debts and higher turnover of funds [6]. Thus, the boundary between the management company and the homeowners' association, which exists in the legal field, is not fundamental for residents.

ANOTHER WAY: FROM GRASS-ROUTE LEVEL

In 1988, the first territorial self-government body (TSGB) started to function in the district of Brateevo of Moscow. In the same year, such local communities were established in other districts of Moscow: Golyanovo and Arbat. Two years later, this initiative from grass-root level was employed by the city administration to impose district community councils aiming to break up the old system. The so-to-say De-Sovietisation imposed by the authorities as part of the process to replace Soviet-style hard-liners among officials with modern-minded personnel.

Likewise, the first legislative act that consolidated and removed local self-government entities from the structure of local councils was the USSR Law No. 1417–1 of 09.04.1990 "On the General Principles of Local Self-Government and Local Economy in the USSR".

At the same time, Article 145 of the USSR Constitution "On Amendments and Additions to the Constitution (Basic Law) of the USSR regarding improvement of the system of state administration" gained the following statement: "In the system of local self-government, in addition to local Soviets of People's Deputies, territorial public self-government bodies, meetings of citizens, other forms of direct democracy may operate in accordance with the legislation of the republics". Thus, local self-government was envisaged as part of the unified system of socialist self-government, and the necessity of participation in the management of the previously established "bodies of public amateur activity" was acknowledged. The term "amateur activity" was quite closely associated with people's song and dance activity. Gradually, this terminology disappeared from the context of self-government.

In the second half of 1993, the powers and credentials of the Soviets of People's Deputies of all levels were terminated. In 2003, due to adoption of the Federal Law of 06.10.2003 No. 131-FZ "On General Principles of Organisation of Local Self-Government in the Russian Federation", the legal framework for the regulation of territorial public self-government appeared. Bodies of territorial public self-government were removed from the sphere of legal regulation of the constituent entities of the Russian Federation.

For 15 years, they existed separately as independent, unrelated hotspots of civil initiatives. Then their integration in separate cities began, and this process continues. In December 2010, Association of Management Companies was founded on the basis of a construction self-regulatory organisation (CSRO) The Union of Builders in St. Petersburg. The association included 124 companies in St. Petersburg.

Initially, Association of Management Companies performed the main functions of the self-regulatory organisation, namely: control over the activities of management companies, improving the quality of its services and providing its members with relevant and useful information. However, since 2020, The Association started to deal with issues of interaction between management companies and non-profit company Fund — Regional Operator for Major Repairs of Common Property in Apartment Buildings. This was a major step towards creating a cooperative city.

At the same time, another process was underway in Russia: councils of territorial public self-government were set up, and their activi-

ties were defined in Article 27 of Federal Law No. 131-FZ "On General Principles of Organization of Local Self-Government in the Russian Federation"[5] (quote):

"Territorial public self-government are considered as self-organization entities of citizens at their place of residence on a part of the territory of a settlement, intra-urban territory of a city of federal significance, a municipal district, urban district, intra-urban district, as well as in populated areas located on inter-settlement territory (or in a part of their territory) for independent and under their own responsibility implementation of their own initiatives on issues of local importance."[6]

This form of territorial self-governance was introduced for development of social infrastructure in cities: construction of children's playgrounds, sports grounds, car parks, clubs, etc. Before the foundation of territorial self-governance councils, such projects were discussed between neighbours, but this did lead to any feasible results. Now the needs or requirements of residents can get materialised.

At present, territorial self-governance councils are engaged in activities that go beyond the functions stipulated by law:

- , repair and maintenance of children's and sports grounds, recreation areas; landscaping of the territory, road repair; water supply;
- of activities of sports sections in yards and neibourhood;
- of museums and reconstruction of historical and cultural monuments;
- of territory development projects with their subsequent inclusion in funding programmes;
- cultural events, event and recreational activities (health trails, running competitions, etc.);
- assistance to large families, war veterans, low-income families, disabled and sick people;
- provision of socially useful services (opening paramedic stations, social bakeries; organizing free lunch centers).

The main difficulty in establishing and operating territorial self-governance councils is lack of certainty to find financial support and pay salary to employees, or expenses for the rental of premises, etc. If the council is registered as a legal entity, then it also needs to pay taxes and fees, the minimum wages and control over possible violations of applicable laws. This is why, by the end of 2022, over 2.500 such entities out of 28.000, which operated in Russia, had official registration of legal entities.

Let us compare these figures with the related international statistics. In the European Union, 2 million organizations operate in the social sphere, which is about 10 per cent of all legal entities. They employ more than 11 million people, which is about 6 per cent of all employed people in Europe. At the same time, 160 million people are involved in voluntary work in the social sphere there and as a rule, they work for free doing it pro-bono.

Territorial self-governance councils, being legal entities, have a number of advantages: they can use grants to implement projects, enter into joint activity agreements, etc. At the same time, they have additional responsibilities, such as financial and statistical reporting. Regardless of whether a territorial self-governance council is a legal entity or not, they are authorised to represent the interests of citizens who live on its territory; to promote the implementation of decisions taken at meetings and conferences; to propose drafts of local legal acts to municipal authorities. In addition, they have the right to implement measures of landscaping territories with financial participation of citizens or with support from the municipal budget.

The system of Russian territorial self-governance councils reached the federal level in 2016, with the foundation of The National Association of Territorial Public Self-Government aimed to support socially oriented projects, legal assistance, educational activities, supervision of volunteer-

[5] URL: https://www.consultant.ru/document/cons_doc_LAW_44571/

[6] URL: https://www.consultant.ru/document/cons_doc_LAW_44571/8dca12e4c57dcd9672a34eadf15e13b4455e1519/

ing, etc. With support of the Ministry of Justice of the Russian Federation, the Association annually monitors the activities of territorial self-governance councils in the country.

A NEW STAGE

The Bronx, being one of the world's largest co-op housing complex, established the city's role quite limited — maintaining order, ensuring the safety of citizens and providing emergency assistance. Everything else is the responsibility of the co-operative.

When a city transforms into a co-operative, decisions about power of authority look very different. Currently, there is a gap between management companies and city authorities: they are independent of each other and therefore function separately. Positive experience of co-operation between these two structures exists in many Russian cities and, particularly, in Novosibirsk — due to personal initiatives of the Vladimir Filippovich Gorodetsky.

As the Mayor of Novosibirsk, and later as the Governor of the Novosibirsk Region, Vladimir Gorodetsky subsequently shared with authorities of neighbouring cities the valuable experience of collaboration between territorial self-government entities and the local authorities. He supervised the foundation and activity of the Coordinating Council for the Development of Territorial Public Self-Governance in the Novosibirsk region. Recently Vladimir Gorodetsky was promoted as the First Deputy Chairman of The Federation Council Committee on Federal Structure, Federal Policy, Local Government and Northern Affairs of the Russian Federation in Moscow. However, territorial self-government entities in Novosibirsk region actively operate, except that the coordinating functions of the Mayor's office became more modest. Nowadays, Novosibirsk, in my opinion, is one of the leading cities in Russia in development of the grass-root level of public self-government.

Why do municipality services have to accept, that a significant part of management functions is made by informal territorial self-government bodies? As mentioned before, door-to-door neighbours know better than the authorities, who needs financial support, and how beneficial is such support.

In Russia, as in many other countries, people prefer to help those who they know personally. In 2023, according to the survey of The All-Russian Public Opinion Research Center, over the past 12–18 months, more than half of Russian citizens have donated things or money to their relatives, friends, or acquaintances. For comparison, only 10 per cent make their contribution to charity events. The reason is that the majority of our fellow citizens perceive charitable activity as a private type of business [7]. Therefore such contributions are considered as a gesture of help to a businessman, not to those in need.

Currently, some important events occurred to pose a new problem of interaction between city authorities and grass-root initiatives from local societies. This concerns the principles of urban development planning, which started abroad somewhat earlier than in Russia.

For a long time, the essential element of strategy of urban planning was A General Plan of Urban Development. Discussions and debates often occur during public hearings to determine the most significant aspects and elements of the planning structure in the draft of General Plan.

Now architects have a hard time facing the process of transition from The General Plan to The Master Plan. The latter has not been included yet into the Urban Planning Code of the Russian Federation, but Master Plans are already in use for urban planning. What is the difference between these two documents and what changes this may bring?

General Plans include the planning schemes of the territory. Master plans involve the socio-economic territorial strategy and determine significant elements of the structure of the urban territory and their content, as well as methods of implementing what will be located on this territory. The opinion of local communities is taken

into account when General Plans are in development and when the finished project are assessed. Meanwhile local communities are involved in assessment of drafts of Master Plans.

The difference is clear in a relatively simple example. According to The General Plan of the city of Perm, a while ago a tram rail line across the river was laid to develop the urban transport network. This worked well also for additional argument to justify the construction of a new bridge. Indeed, both the bridge and the tram rails were built. However, later, they removed the tram rails to improve the traffic of motor vehicles across the bridge. This was not a violation of rules for the adopted General Plan, since it dealt with the use of the territory, and with not transport services for passengers. Such cases would not occur regarding Master plans: they take into account the interests of citizens, who use public transportation instead of cars. When the Master Plan for the city of Perm was developed, the system of city transport improved and the number of traffic jams decreased [8].

Transport Infrastructure Development Plan is another strategic urban document. General Plans are worked out in accordance with the Order of the Ministry of Economic Development of the Russian Federation of 09.01.2018 No. 10 "On approval of the Requirements for the description and display in territorial planning documents of objects of federal significance, objects of regional significance, objects of local significance and in view of recognizing as invalid the Order of the Ministry of Economic Development of Russia dated 07.12.2016 No. 793". It does not specify which objects should be displayed on the maps. Many General Plans for Russian cities do not match up with transport infrastructure schemes, as well as with detailed plans of urban districts. Besides, they do not provide development for pedestrian streets or zones: there is no such category in the requirements for drawing up General Plans [9].

Russian President Vladimir V. Putin noted in his Address to the Federal Assembly on February 29, 2024, that Master Plans had already been drawn up for 22 Russian cities. The Russian President instructed the Government to determine a list of another 200 Russian cities, where Master Plans need to be put in effect in the near future.

In the same Presidential Address, the main essence of the transition from General to Master Plans was stated: "Residents of cities and towns should become co-authors for development of Plans. We must actively use mechanisms where citizens themselves determine, which problems are of top priority for allocations. I propose increasing co-financing of such people's projects."

Thus, the Russian President highlighted the most important direction of supporting the grass-root level of public self-government: city residents should determine their future life, and not wait for someone to build it for them. This is the essence of the idea behind the concept of a cooperative city. Currently, this is only in development, both in Russia and in many other countries of the globe.

It is a complicated task to involve public opinion at the grass-root level in the context of economic research. The involvement of territorial public administration and other similar bodies in agent-oriented models, as new elements, could become far-reaching possibilities for socially useful functions [10]. It is quite possible to evaluate financial savings in such models that do not require municipal funding, thanks to activists' support at their level.

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ORIGINAL PAPER

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Changes in Approaches to the Analysis and Forecasting of Domestic Mechanical Engineering Within Manufacturing Industries

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ABSTRACT

Relevance: The article analyzes the relationship between the development of domestic mechanical engineering and relevant scientific schools within the framework of the concept of sustainable development. The functioning of domestic mechanical engineering is considered in the context of international associations. The following methods were applied in the study: a systems approach, functional, comparative economic, and statistical analyses, as well as the authors' methodological developments. The **scientific novelty** of the article lies in the implementation of the authors' approach to studying mechanical engineering as an interaction between scientific schools and economic and environmental factors. The **results and conclusions** of the study may be useful for decision-making within the existing economic model of the Russian Federation when forecasting, developing, and adjusting strategic programs for industry development.

Keywords: sustainable industrial development; sustainable development factor; mechanical engineering forecasting; mechanical engineering forecasting schools

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INTRODUCTION

In the current development of world economies, it is relevant to study the impact on economic life by environmental risks, including man-caused emergency situations and disasters [1, p. 7]. In this regard, the responsibility for the use of promising technologies in various spheres of the economy is inevitably increasing, which should correspond not only to the increasing pressure of the environmental factor, but also meet the requirements of competitiveness. One of the major role in solving these problems, is played by the structural branch of manufacturing industry — mechanical engineering, which determines technical and technological basic composition of fixed capital in the economy. Therefore, it is necessary to substantiate the prospects for the development of mechanical engineering and make analysis, how different scientific schools changed their points of views on this topic.[1] In view of the above, we shall explore here three interrelated issues:

- assessment of the role of domestic mechanical engineering in the economy and in the global division of labour within the framework of the theory of sustainable development;
- specific features of mechanical engineering that should be taken into account when making forecasts of its development;
- how scientific researchers made forecasting and analysed functions and features of mechanical engineering.

About forecasting in mechanical engineering and manufacturing industries

Mechanical engineering encompasses a multitude of brunches, sub-sectors and industrial sectors, specialised in machine building, as well as equipment, units, parts and components for providing technological support to the economic reproduction process.

[1] We purely leave out the technical factor of forecasting mechanical engineering and then focus on the economic content of the problem.

Besides, moreover, mechanical engineering is able to ensure a sustainable innovation-driven development of the nation's economy by means of embodied technology in machine-building.

In recent years, the domestic mechanical engineering has confronted a number of challenges. The resolution of these challenges will be of paramount importance to determine Russia's position in the contemporary paradigm shift from the Global West to the Global South. The domestic mechanical engineering is either doomed to serve the domestic market as a mechanical repair-assembly hub, as it has been since the mid-1980s, or take its pivotal place in the sphere of high-technologies, investment equipment, defense products and technically sophisticated consumer goods. To have a clear idea of this issue, we shall consider how Russian mechanical engineering sector and domestic industry function as a whole within the framework of the emerging conglomerations of the Global South in comparison with the Global West (*Fig. 1)*.

Referring to *Fig.1,* the share of Gross Value Added (GVA) of mechanical engineering sectors in GDP has been higher in the G7 countries (the green curve). The sharp increase in the GVA share of BRICS countries in 2011 (the blue curve) can be attributed to South Africa's accession to the BRICS union. The GVA shares among the BRICS and the EU countries looks more stable and less volatile than among the rest of the countries in the world (the red curve).

The following analysis will consider the same indicator in the context of a specific nation. (Refer to *Fig. 2*). In this regard, among the leaders are China, Japan and Germany, as well as India and Italy, historically outperforming Russia in this parameter. In general, the country has experienced a consistent growth in the share under consideration, in contrast to more volatile growth observed in the leading countries. However, it is important to note that stability in the volume of machine-building production does not necessarily indicate constant qualitative development.

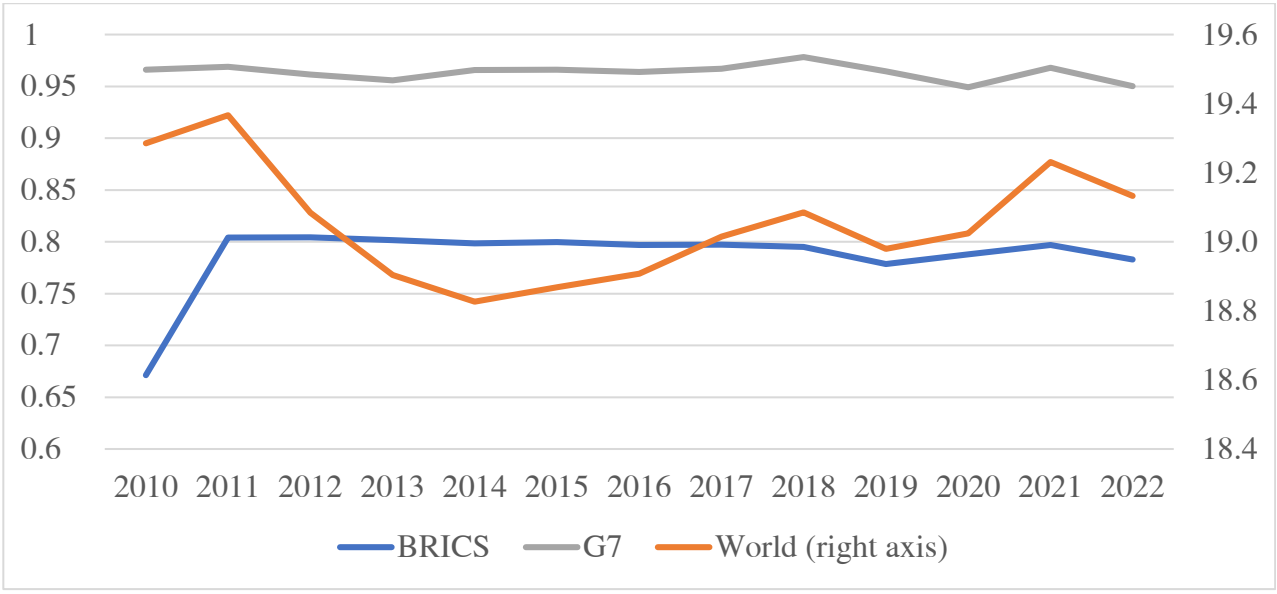

Fig. 1. **Share of Mechanical Engineering Gross Value Added (GVA) in GDP Across Country Groups, %**

Source: compiled by the authors on: URL: https://stat.unido.org/data/download?dataset=cip

Note: the right axis is the share of machine-building sector of GVA in world GDP.

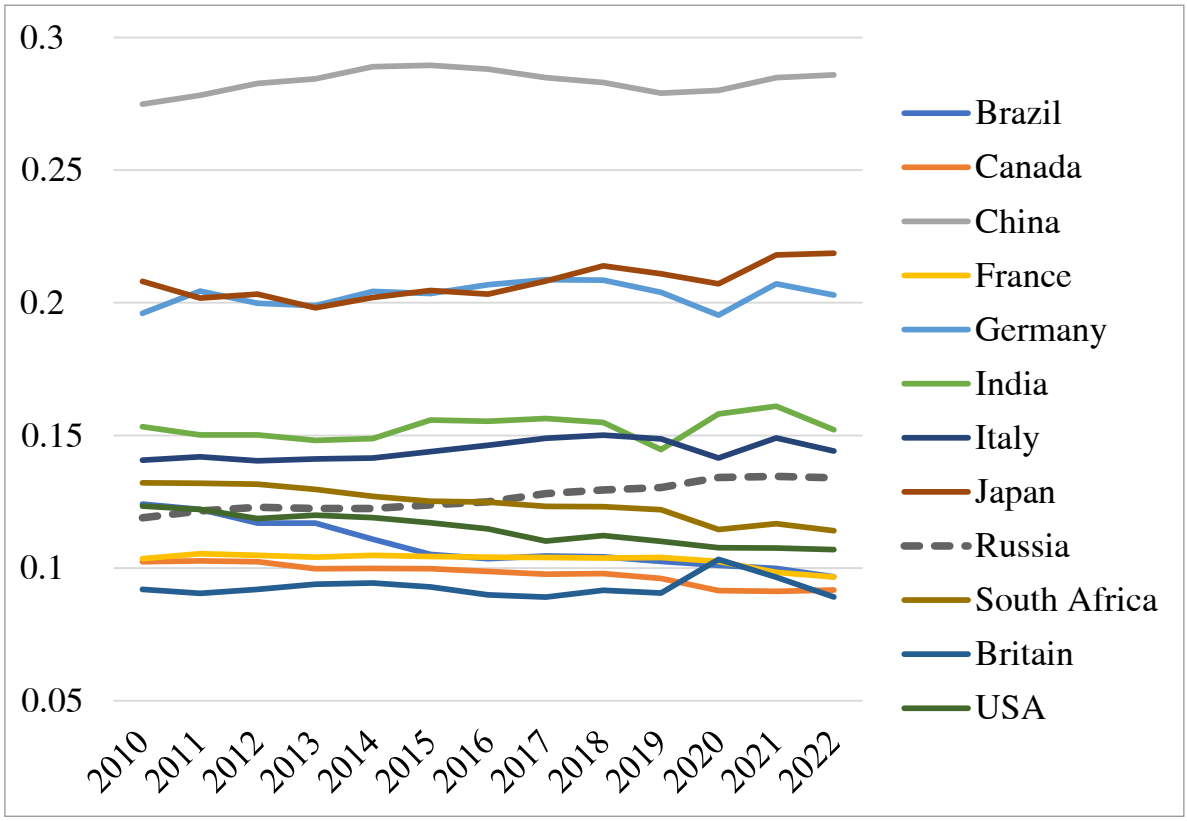

Fig. 2. **GVA share of mechanical engineering in GDP for countries, %**

Source: compiled by the authors on: URL: https://stat.unido.org/data/download?dataset=cip

In order to gain a more comprehensive idea of the state of mechanical engineering, it is important to consider not only the scale, but also the level of technological manufacturing sector. For this matter, a comprehensive analysis of the general context is necessary to assess the dynamics of share for medium and high GVA technology industry including an examination of the general volume of the sector. (Refer to *Fig. 3*).

Russia's performance here is not one of the best one: until 2020, it was in the penultimate place among the countries under consideration. Then the situation slightly improved: Russia's share keeps growing, while the share of Canada was shrinking, yet the overall situation has remained relatively unchanged. We may point to a significant progress of the United Kingdom, Italy, India, China and the USA with France, Japan and Germany among the leading nations.

It is curious to contemplate the role of nations and their corporations during the timeframe period at the very start of the current trends. For instance, between 2000 and 2010, China's share increased from 6.6 to 30.6 per cent, while the EU's share decreased from 37 to 29.9 per cent. Similarly, the USA's share fell from 29 to 19.5 per cent, and Japan's share decreased from 21 to 12.6 per cent. The Russian Federation maintained a consistent balance of share with 2.3 per cent throughout the entire period, a development that is worthy of note.[2]

When considering the index of industrial production (Refer to *Fig. 4*), with the year of 2015 noted as the base period, it is evident that Russia's industrial production indicates a steady notable progress in the context of the BRICS countries. According to the latest available statistics, in 2021 the index value for Russia was 121 per cent. In comparison, only three G7 countries performed an increase in such index in recent years (the UK had the record highest value of 109 per cent in 2021), while the other countries experienced a real decline in industrial production compared to their indexes of 2015 (Refer to *Fig.* 5).

In light of the aspects mentioned above, the following topics have been identified for the research study: firstly, our system analysis and, secondly, at least a framework forecast of mechanical engineering for the period of turbulent development in 2022–2030. However, first of all, it is important to note that machine building, as a conglomerate of economic activities, is designed to fulfil certain macroeconomic functions, namely:

- technological support for the economic reproduction process through innovation and investment activities, maintenance of existing basic technologies;
- fulfilment of household demand for technically sophisticated consumer goods;
- supply of military equipment to the Armed Forces to ensure the country's defence capability;
- technological potential for the current and future development of the national economy, capable to ensure sustainable development of the country, particularly, within the "green" trend.

Concurrently, mechanical engineering has the following inherent fundamental and largely distinct specific aspects in comparison to other industries:

- variety of manufactured products for material filling of any technology
- contradiction between flexibility and mobility of production and efficiency, between specialisation and autarky;
- mandatory accuracy of serial reproduction of assemblies, component parts and machine systems during the transition from development through innovation activities to serial production;
- high intensity and scale of inter-sectoral relations between industries;
- the acceleration and multiplicative effects;
- production of dual-use products;

[2] Study on the Competitiveness of the EU Mechanical Engineering Industry. EU 2012. FN 97615-FWC Sector Competitiveness-Mechanical Engineering. 320 p.

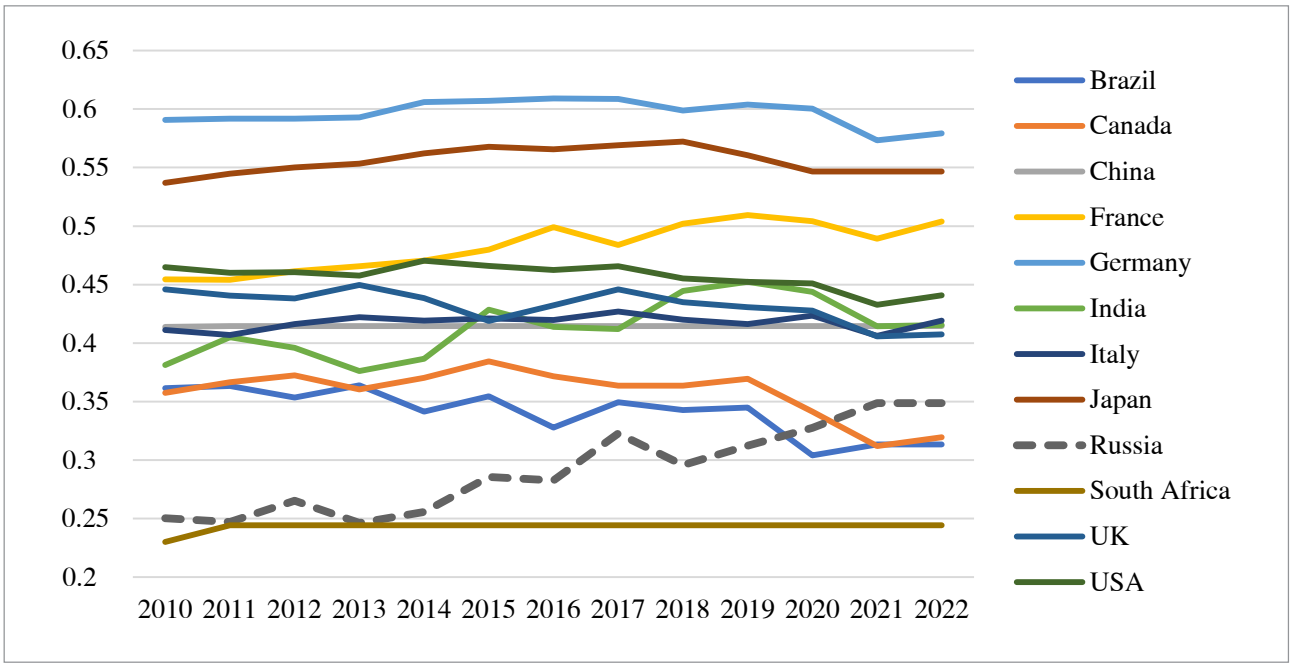

Fig. 3. **Share of Medium- and High-Tech Mechanical Engineering GVA in Total Mechanical Engineering GVA**

Source: compiled by the authors on: URL: https://stat.unido.org/data/download?dataset=cip

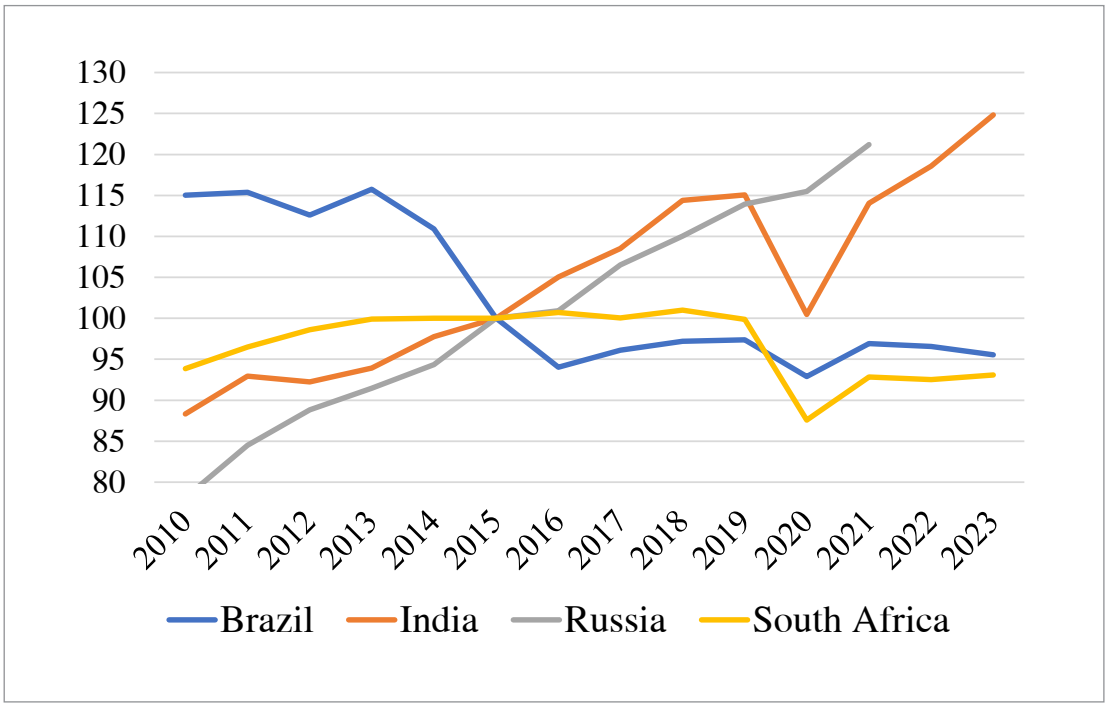

Fig. 4. **Industrial Production Index in BRICS Countries, in %**

Source: compiled by the authors on: URL: https://www.oecd-ilibrary.org/economics/data/main-economic-indicators/production-and-sales_data-00048-en

Note: 2015 г. – 100 per cent.

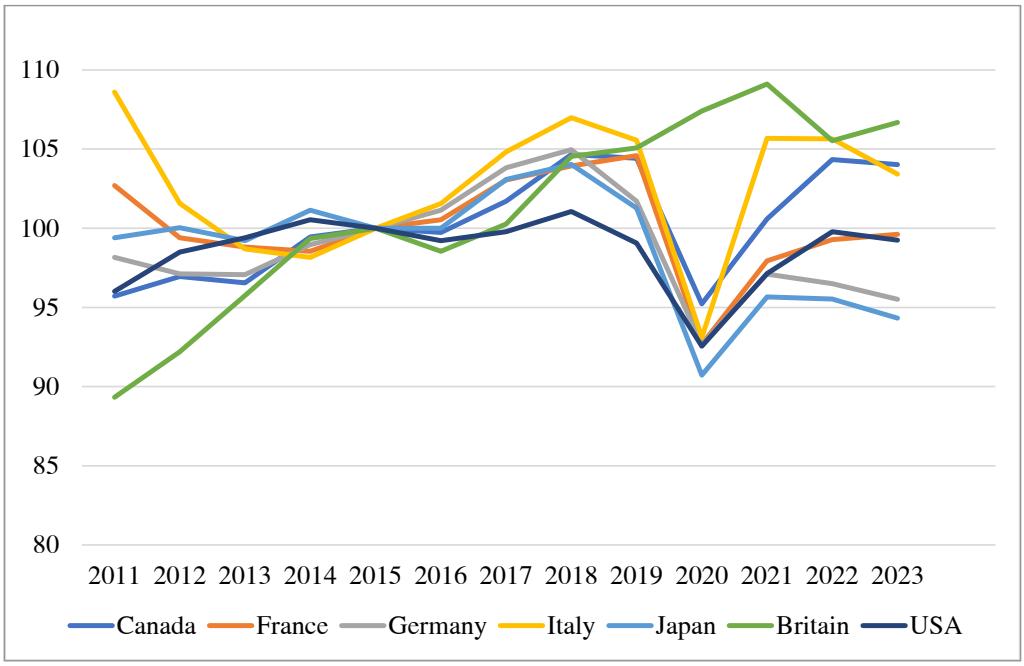

Fig. 5. **Industrial Production Index in G7 Countries, in %**

Source: compiled by the authors on: URL: https://www.oecd-ilibrary.org/economics/data/main-economic-indicators/production-and-sales_data-00048-en

Note: 2015–100 per cent

- significant impact on the environment, both positive via "green" technologies and negative through increased pollution.[3]
- engineering, its products and services operate within a full innovation cycle, which includes the following:
  - exploratory research;
  - R&D regarding dissembled technologies;
  - innovation activities that transform dissembled technologies into embodied technologies;
  - mass production, market development;
  - withdrawal from markets and production;

Distinctive phases to forecast machine-building include: scientific and technological (pilot studies, pre-discovery, R&D), production (innovation, serial production, market supply) and market (market operation and recycling). It is evident that within the stages of the full innovation cycle, mechanical engineering conveys the ecological function, both in its own internal functionality and in the technologies for consumers of mechanical engineering products. Furthermore, scientific research in the forecasting and analytical domain can encompass one or multiple macroeconomic functions of mechanical engineering.

Prior to the early 1960s, it was hardly possible to define precisely any forecasting technology in machine building and other manufacturing industries, with the exception of some macroeconomic technologies and sub-industries. At this current stage, we can employ a predominantly planned (non-forecast) assessment of machine-building prospects. In that time, it lacked the following important aspects:

- theory, methodology and instruments for forecasting;
- the demand for qualitative forecasts.

In the late-1950s-early 1960s, specialists started to operate with such advanced tools in mathematical economics developed as factor models, production functions, and interindus-

[3] Some authors also emphasised the importance of the trend towards miniaturisation of many types of engineering products.

try balance (ISB). The world acknowledged the concept of the role of machine-building in the technological structure of the economy and its significance in production systems and the world technological pyramid. Specialists developed algorithms for calculations, which as many people believed, would describe the relevant processes in the economy, particularly in mechanical engineering. Investment matrices developed in the USA by A. Young, L. Mally, S. Reed and R. Seaton included 75 items [2]. These matrices interconnected the advancement of machinery production with investment in fixed capital and manufacturing of product. The development of factor forecasting models in domestic science and practice is attributed to A.I. Anchishkin, and these models become an effective forecasting tool in a predominantly trendy economy [3].

As a follow-up of the aforementioned approaches, the equations of the model of inter-industry interactions by Yu.V. Yaremenko [4, p. 4] and the complex balance of equipment by V.K. Faltsman [5] were developed and used in practice. These two authors demonstrate the merging process with simultaneous divergence of planned activities and the forecasting stage in the research of machine building prospects.

SCIENTIFIC SCHOOLS OF FORECASTING MECHANICAL ENGINEERING

In 1970s-1980s, three major schools of forecasting the development of mechanical engineering emerged. Two of them were in Moscow headed by Y.V. Yaremenko and V.K. Faltsman at the Research Institute of Forecasting Economy of the Soviet Academy of Sciences [6–9], as well as by S.A. Heinman and D.M. Palterovich at The Research Institute of Economy of the Soviet Academy of Sciences. One more school was located in Novosibirsk under the guidance of A.G. Aganbegyan, E.P. Amosenok and V.A. Bazhanov at The Research Institute of Economics and Industrial Organization of the Siberian Branch of the Soviet Academy of Sciences. Their distinctive studies were complex system analysis and forecasting of machine building, not only individual sub-sectors. Experts of the Central Economic and Mathematical Institute of the Soviet Academy of Sciences under direction of V.L. Makarov and A.E. Varshavsky developed scientific and technological forecasting with special attention to machine-building sector.

Significant scientific contributions were made by Y.K. Kozlov in the field of location analysis of machine-building enterprises and by V.K. Faltsman in the field of equipment supply to the economy and complex balance of equipment. It is worth noting, that Y.K. Kozlov is among the pioneers in the field of spatial economics [10] and that he played an important role in development of organising guidelines, particularly in the research and development of machine-building [11].

The oldest school of machine-building forecasting was established at the Research Institute of Economics under the leadership of S.A. Heinman [12–14] and D.M. Palterovich [15, 16]. The characteristics of this school were distinguished by all-round interpretation of machinery as a means of production and by adoption of the normative-target approach. However, this school did not use extensive mathematical instruments for forecasting methodologies and lacked research of innovation and environmental factors in mechanical engineering. At the same time, it is noteworthy that S.A. Heinman's contributions encompassed the generalisation of predominantly all functions, factors and characteristics of the industry, while D.M. Palterovich's research delved extensively into the issues of the reproduction function of machine building.

The next in progress was the scientific school of the Institute of Economics and Forecasting of Scientific and Technological Progress founded by Y.V. Yaremenko and V.K. Faltsman. It was distinguished by the maximum integration of mechanical engineering into the production process, full mathematical and instrumental support, and the development of the genetic approach to forecasting [17].

In the same time-frame period, the scientific school of the Institute of Economics and Industrial Production Organisation of the Siberian Branch of the Soviet Academy of Sciences was founded under the leadership of academician A.G. Aganbegyan and his partners in science E.P. Amosenok and V.A. Bazhanov [18–20]. This school played a distinguished role in application of extensively input-output model tools aimed at the resolution of significant major economic challenges and tasks for the development of Siberia and the Far East. In addition, the school provided a robust foundation in political and economic substantiation of its research work.

A bit later, another scientific school, directed by V.L. Makarov and A.E. Varshavsky [21], who subsequently developed the research work ideas of A.I. Anchishkin on scientific and technological forecasting [22]. The school pinned a significant emphasis on the continuity of the complete innovation cycle, development of methods and instruments for scientific and technological forecasting [22].

Since the late 19th century, the necessity to envisage environmental and climatic factors for economic activities was always a fundamental reason for alterations in industrial production, with the objective to safeguard ecology and public health. Currently, this fact has been recognised as a mandatory item of the global agenda for sustainable development, which makes it possible to solve a number of problems from different spheres in an integrative way — economic, social and environmental.

The Russian economic model can be characterised as environmentally intensive. At present, the process of optimising environmental-economic relations is at the initial stage aimed to make an ecologically balanced economy. Today's urgent part of the agenda is the concept of "double dividends", which refers to the simultaneous achievement of high performance indicators in the economy and environmental friendliness of products and production technologies. In this regard, it is clear, that the ecologically balanced economy requires consideration of the sustainable development factor in the forecasting of industrial production.

In the context of Russian practice, three stages (or directions) of greening policy in industrial process could be determined:

1. Introduction of the quotas mechanism for greenhouse gas emissions within the framework of the Kyoto Protocol (1997).
2. Introduction of the system of payment for harmful environmental impact (1998).
3. Implementation of the model of the best available technology to reduce waste, discharges and emissions (2014).

It is hard to overstate the role of industry in mitigating the negative effects of production activities, including:

- introduction of modern, advanced technologies aimed to preserve resources and reduce production waste;
- industrial collaboration aimed to optimise utilisation of resources and the circularity of raw materials and waste streams;
- optimising the sectoral structure of production, avoiding nature-intensive high-waste production;
- development and production of new types of long-life-cycle products, suitable for the production re-cycling after wear and tear;
- enhancement of environmental-friendly production by means of introduction of efficient systems for capturing harmful substances and hazardous waste utilisation;
- development of "ecological engineering" within the framework of the ecological engineering industry.

The abovementioned directions will contribute to solution of various local objectives. Their combined application could be used in modern approaches to develop mechanical engineering.

ORGANISATIONAL ASPECTS OF FORECASTING

Nowadays, a system of forecasting centres and a hierarchical structure of forecasts is operating in Russia, primarily providing scientific

and technological forecasts with a special focus on ecological factor.

In the contemporary world, the USA takes priority in this sphere, involving such national entities as the RAND Corporation, The Massachusetts Institute of Technology (MIT), Department of Energy, Management Association, Hudson Institute, Council of Economic Advisers, Board of Governors of the Federal Reserve System, Industrial Research Council, Stanford University, Harvard University. In the PRC, the Academy of Sciences deals with such issues.

In Russia, it was N.I. Komkov, who pioneered and carried out the most outstanding research work in this area. He supplemented the functional "what to do" with "how to do" relating not only to machine building, but also to the sequence of the industrial process: "extractive industry →processing industry →manufacturing industry" [23, 24].

The peculiarities of mechanical engineering started to study within the framework of the following investment industries:

- investment engineering;
- metallurgy;
- construction;
- production of synthetic materials.

This approach was used furthermore during the development of the Comprehensive scientific and technical programmes in the 1970s-1980s and partly within the framework of the Programme of fostering mechanical engineering (1984).

The comprehensive targeted programme to foster machine tool construction occurred in the period of 1983–1985. The programme's fundamental elements were outlined in the Decree No. 773 of the Council of Ministers of the USSR dated August 7, 1985, "On measures to radically improve the technical level, quality of machine-building products and the development of machine-building as the basis of scientific and technological progress in the 12th five-year period with the perspective up to the year of 2000[4]".

[4] URL: https://docs.cntd.ru/document/765705293

The idea of the programme, which coincidentally commenced during the perestroika period, stated that the rise of machine building would serve as the catalyst for boosting technical and technological level of production and labour productivity to foster the economy. For this purpose, following 1985, the volume of capital investments in machine-building was doubled. However, this did not yield any considerable effect: the technological "stuffing" of investments lacked a strong support by innovative technology. In reality, technological capabilities remained status quo.

The much-anticipated acceleration in machine-building development did not work out, and the planned 1.5-fold increase by 2000 (compared to 1985) did not work out too, due to the gap between R&D and production activity. The national programme of machine-building recovery was not consistent within the framework of the stages of the full innovation cycle. It lacked specific target points and specific measures. Thus, by the end of the 1980s, due to the change of the vector of functioning of the domestic economy, the programme became obsolete and it was deactualised.

Almost in the same time-frame period, a different academic discipline, Environmental engineering, emerged in the West, as a reaction to the public concern about water and air pollution and other environmental problems. In the 1970s, the term "environmental engineering" replaced "sanitary engineering", since the focus of the discipline expanded to include the reduction of air, water and soil pollution [25]. In the USSR, the term "ecological engineering" appeared a few decades earlier, with the adoption of the Order of the People's Commissar of the USSR for Chemical Industry No. 153 dated April 22, 1944 "On Arrangement of production of electrostatic precipitator equipment required for completion of gas cleaning plants".

GENERAL EQUILIBRIUM MODELLING UNDER THE DOUBLE DIVIDEND HYPOTHESIS

Nowadays, the mathematical apparatus operating to forecast in the field of sustainable in-

dustrial production is mainly focused on models that are based on the impact of the energy sector on the long-term goal of making the climate neutral. Such models test the possibility of a so-called "double dividend" — the positive environmental and economic effects of mitigation policies to change the climate through environmental taxes and their reallocation. The objective is to ensure a transition cost-effectively to carbon-free technologies.

The environmental aspects in economic system analyses are completely evaluated by Computable General Equilibrium (CGE) models. Currently, these models have become a staple tool for analysing the economy-wide ramifications of environmental policy, including environmental taxes, resource allocation, and income of diverse economic agents.

CGE models are originated from the traditional "input-output" model developed by V. Leontiev in 1953, which is based on the method of estimating exogenous shocks under certain restrictive assumptions, such as fixed technology [26].

In 1968, V. Aysard with co-authors put forward a methodology with more alternatives for decision-making industrial policy based on "input-output" tables [27]. Later, in 1970, A.W. Kneese and colleagues used a similar "input-output" approach to develop environmental policy [28].

The aforementioned models are based on the assumption that environmental impact or the use of resources are proportional to output (similar to the assumption of fixed coefficients in the traditional "input-output" model). Therefore, they do not admit technical changes following an exogenous shock. These and some other limitations made researchers to develop more sophisticated methods.

Johansen's model (1960) became the first empirical model of general equilibrium without the assumption of fixed coefficients of "input-output" analysis [29]. Nowadays and already for several decades, CGE models for analysing the double dividend hypothesis have been extensively developed and applied worldwide.

Dynamic general equilibrium (DGE) models make another class that can take into account factors related to sustainable development policies. These models tend not to disaggregate data by sectors, but take into account the dynamics of the modelled variables over time, which allows obtaining the results in the form of a trend graph.

Practically, CGE models work well in the period of stability in economy, however, they are not effective in the crisis period.[5] Nevertheless, it is important to note, that from the point of view of forecasting and economic analysis these models serve to give an adequate response to the criticism of the use of econometric approach for solving applied problems to justify the directions of economic policy, since they are based on the theory of the real business cycle and try to simulate changes in the behaviour of economic agents to various shocks of macroeconomic nature [30].

NEW INPUTS IN FORECASTING MACHINE BUILDING IN THE FRAMEWORK OF MANUFACTURING INDUSTRIES

Structural and technological stagnation in the 1980s prompted changes in approaches to forecasting mechanical engineering, including:

- consideration of the dominance of demand in foreign and domestic markets;
- active allocations of the financial factor and overestimated role of international differentiation of labour;
- maximum consideration of export-import flows of machinery;
- determination of a new position of the Russian Federation in the world technological pyramid.

From 1990 through 2010, the following changes took place:

- shifting from forecasting of large industry aggregates and complexes to corporate forecasting;

[5] URL: https://infraeconomy.com/tpost/ibbeh40zm1-intervyu-s-aleksandrom-shirovim

- shifting the focus to spatial development and regional economy;
- separation of machine-building into a regular type of economic activity, beyond the full innovation cycle or scientific and technological forecasting;
- acceptance of the hypothesis that there are no restrictions on entry into the world markets of technologies, machinery and equipment;
- global adoption of the sustainable development factor in production processes at the level of international legal documents[6] and change of approaches to forecasting with regard to the sustainable development factor (environmental factor) in the practice of Western countries;
- understanding of the need to develop the ecological engineering industry[7] in Russia;
- adoption of the declaration of the necessity to develop the ecological engineering industry in Russia at the level of federal goal-setting documents.

Consequently, the following changes took place:

- decay of activity of the leading scientific schools of machine building forecasting and their integration into scientific schools of macroeconomic research;
- development of branch schools in accordance with the demand of corporations and authorities;
- Russia, much later than Western countries experienced transition to the implementation of sustainable development policy in industrial sectors, harmonisation of national legislation with the norms of international law, as well as taking into account the environmental factor (sustainable development factor) in the forecasting of production processes.[8]

CHANGING THE MODEL OF FUNCTIONING OF THE DOMESTIC MACHINE-BUILDING INDUSTRY

In the 2020s, the development of approaches to machine building forecasting started with:

- consideration of mechanical engineering as a sequence of technologically interrelated industries and productions;
- taking into account real financial constraints;
- restoration of the full innovation cycle for key machine-building industries;
- transition to the implementation of sustainable development policy in industrial sectors, including mechanical engineering.

In this area, the scientific research works by I.E. Frolov and his followers are of considerable interest: the peculiarities of the forecast approaches of the 2020s were organically taken into account [31–33].

Currently, the use of CGE- and DGE-models to analyse the possibility of double dividends is quite a common practice all over the world. For example, there is a predictive dynamic general equilibrium model that is sufficiently detailed to consider the main areas of reform of climate change strategy discussed in the EU.[9] The model is disaggregated by sectors, which in their turn are divided by the degrees of environmental impact into energy sources — "dirty" (greenhouse gas emitting) and "clean" (non-polluting). It also takes into account the reduction of emission of greenhouse gas by means of carbon taxes or government restrictions. The results of modelling present the magnitude of the costs of transitioning to a net zero-emissions economy.

[6] In 2015, the UN General Assembly adopted the Resolution "Transforming the World. The 2030 Agenda for Sustainable Development". It implied an increase in global resource efficiency in consumption and production systems. At the same time, economic growth should not lead to environmental degradation.

[7] The branches of ecological engineering are those whose main activities are the design, production and maintenance of machines, technological equipment and components for them, used to prevent and reduce the negative impact (influence) on human health and the environment.

[8] Regarding the concept of extended producer responsibility, Russia began to implement such legislative regulation only 25 years after the emergence of the concept of extended producer responsibility in the West.

[9] URL: https://economy-finance.ec.europa.eu/publications/e-quest-multi-region-sectoral-dynamic-general-equilibrium-model-energy-model-description-and_en

The research work of J.V. Gonzalez [34] is of considerable interest from the point of view of studying the prevalence of such models: the author analysed 69 different CGE- and DGE-models of different regions of the world, mostly the models of the USA, Canada and EU countries.[10] The author also found out that the developed models achieve double dividend in 55 per cent of cases. The rest of the models, which he studied, indicated that the environmental dividend can be almost always achieved, while the economic dividend is still an ambiguous issue that requires further study.

In Russia, the use of both types of models is not as widespread as abroad [35–37]. Nevertheless, it is in demand from the management of the Federal apparatus.

For example, the Bank of Russia actively uses the model, which was developed by N. Turdiyeva in 2024,[11] for analysis of the consequences of our country's climate policy. The specific part of the model regards the integration of climate and trade policy within the framework of universal equilibrium. The author believes, that active domestic climate policy would refrain the carbon intensity of Russian GDP from growing and increasing the physical risks of climate change. A necessary measure to reduce them would be the development of 'green' industries in the domestic economy, including export-oriented industries.

Currently, the transition to the implementation of sustainable development policy in industrial sectors in Russia proceeds in several directions. Firstly, based on the fact, that the State is striving for the transition to the sixth technological model, the consideration of various factors of sustainable development is an integral part of industrial policy. Such criteria as 'sustainability' and 'efficiency' have become key factors in the design, production and operation of machinery and equipment.

Sustainability in mechanical engineering requires minimising the negative impact on the environment during production and operation of machinery and equipment by means of reduction of harmful substances emission and noise levels. It also requires using resource- and energy-saving technologies and environmentally friendly materials. Environmental aspects in the new paradigm in the development of machinery and equipment need to be taken into account within the framework of the full life cycle: from prospecting research of the production up to its utilisation. Modern technologies and innovative materials in production contribute to higher efficiency in mechanical engineering.

Secondly, the Government takes legislative measures to develop a new sub-sector of ecological engineering to produce equipment that helps preventing harmful effects on human health and the environment.[12] As of the end of 2022, the national ecological engineering included nearly 250 enterprises.[13]

It is important to point out, that the sustainability factor in mechanical engineering contributes not only to clean-up environment, but also to economic and social benefits. Efficient use of resources and reduction of raw material costs lead to effective balance of financial performance of enterprises. Thus, environmental aspects become an integral part of the development strategy of the mechanical engineering industry.

Currently, experts developed an algorithm for the field of agricultural production. The algorithm is based on the assessment of the impact of machine technologies on three main components of the natural environment: atmospheric air, hydrosphere and soil, with the possibility of predicting changes in the sustainable state

[10] URL: https://www.researchgate.net/publication/321305017

[11] URL: https://cbr.ru/StaticHtml/File/158735/wp_125.pdf

[12] Order of the Government of the Russian Federation of June 6, 2020 No. 1512-r (ed. 21.10.2024) "On Approval of the Consolidated Strategy for the Development of the Manufacturing Industry of the Russian Federation up to 2030 and for the period up to 2035". URL: https://bazanpa.ru/

[13] Ibid.

of the natural environment depending on the applied technical and technological solutions [38]. Naturally, the results of such approaches will be taken into consideration for decision-making on the development of certain types of production in mechanical engineering.

CONCLUSIONS

The basic issues of development of mechanical engineering, except for market and environmental factors within the framework of the sustainable development concept, have been studied earlier. This industry in Russia has been maintaining its position in the markets since 2000, with only exceptions related to the relocation of people and cargo. Recently there was a need to set up a system of forecasting the development of mechanical engineering in view of technological and environmental factors. At the same time, the existing strategies should take into account the impact of technologies on the environment.

The objective to reach the UN Sustainable Development Goals encourages countries to develop new diagnostic and monitoring tools to assess their own performance. Nowadays international organisations already use the UN Industrial Development Organisation's (UNIDO) indicators: Industrial Competitiveness Index (CIP) and the Inclusive and Sustainable Industrial Competitiveness Index (ISCIP), which include social and environmental indicators. In this regard, the sub-branch of environmental engineering will be paid a strong focus, so that it would have a decent status in the engineering complex of the Russian Federation.

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Business Activity in the Context of Western Sanctions and Turbulence in Russia's Strategic Development

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ABSTRACT

The article examines the trends in the development of the Russian economy in the period 2020 — April 2024. For this purpose, the Business Activity Index of the Institute of Economics of the Russian Academy of Sciences (IE RAS Index) is used, the construction of which is based on monthly statistical data on basic areas of the economy. The results obtained are compared with the Index of output of goods and services by basic types of economic activity of Rosstat (Rosstat Index). Authors analyze the impact of business activity on economic growth in 2020–2021 during the coronavirus pandemic, as well as in 2022–2024 during the special military operation in Donbas and Ukraine (SVO). It is noted that the structural restructuring that began in Russia under these conditions has become the main factor in accelerating strategic development. Business activity also had a strong impact on this process. As a result, the authors conclude that the IE RAS Index provides a more accurate estimate of gross domestic product than the Rosstat Index. This is an additional justification for its advantages, which should ensure its wider application both in the analysis of trends in the economic development of the state, and in the forecasting and analytical work of the Ministry of Economic Development of Russia and Rosstat.

Keywords: economy; business activity; GDP; investment activity; turbulence; sovereignty power; SVO

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INTRODUCTION

The time period under consideration — from 2020 to April 2024. It is characterised by highly unsteady strategic development of industries and spheres of Russia's national economy, which requires from public administration very selective steps in choosing flexible and sensitive tools to detect and eliminate negative processes that hinder economic growth and social progress.

Business activity becomes the most important indicator and, at the same time, a tool to overcome growing obstacles in order to accelerate strategic development and increase the level of state sovereignty of the country. In the last four years, its dynamics has not been stable enough due to the coronavirus pandemic, as well as unprecedented Western sanctions after the start of the special military operation (SMO).

Business activity, along with evaluation of economic sentiment, become the leading indicator of state economic development and GDP growth [1–3], which makes it even more important for the study.

Exploration and selection of new methods remain relevant to evaluate the level of business activity, based on the use of its quantitative measures, despite a long history of research and many domestic and foreign research works [4].

The most well-known evaluation instruments are the Rosstat Index of Output of Goods and Services by Basic Types of Economic Activity (Rosstat Index), the Economic Activity Aggregate of the Centre for Macroeconomic Analysis and Short-Term Forecasting (CMASTF) and rating assessments of the level of business performance, primarily within the framework of the "Doing Business" rating.

The CMASTF aggregate has advantages over other indexes: it is based on the dynamics' indicators of value added of goods and services created by industries. It also includes fee-based services to the population, which are not included in the Rosstat index.

However, the most complete evaluation of the national economy is covered by the integral index of business activity by the Institute of Economics of the Russian Academy of Sciences (IE RAS Index), with the data provided by ten major industries and spheres of the national economy.

A critical review and analysis of approaches for assessments of business activity in Russia and worldwide were covered in the previous publications of the authors in the articles [5–7], as well as in some other domestic [4, 8, 9] and foreign research works [10–12]. This paper highlights three new circumstances, related primarily to the special military operation.

Firstly, the authors identified and analysed a growing dependence of the quality of gross domestic product (GDP) and gross value added (GVA), which was clearly manifested in 2023 and the first half of 2024 in accelerated business activity of high-tech industries and spheres of the national economy.

Secondly, in 2023 and the first quarter of 2024, in the context of the special military operation, structural transformation and significant changes occurred to change specific weights of high-tech industries and spheres of the national economy, which influenced the level of the IE RAS Index.

And, thirdly, structural transformation and mobilisation of the economy and other spheres of the national economy aimed at advancing the success of the special military operation, especially from the beginning of 2024, contributed to the convergence of turbulence indicators of the dynamics of the business activity indexes of IE RAS and Rosstat, which, in January-April 2024, resulted to the maximum growth of the paired correlation coefficient between them for the entire period under study.

These novel circumstances become an indicator of the advantages of the IE RAS Index compared to the others, primarily over the Rosstat Index.

METHODOLOGICAL BASIS FOR CALCULATING THE INDEX OF BUSINESS ACTIVITY

The main difference between the Rosstat Index and the IE RAS Index is that the latter takes into account a number of macroeconomic indicators, which specify more accurately the development of the Russian economy.

Within the period from 2020 to April 2024, IE RAS Index takes into account macroeconomic indicators of ten basic industries and spheres of the national economy, which predominantly determine the dynamics of GDP and GVA growth.

It should be noted, that this index is calculated on the basis of their growth rates, rather than on the basis of value figures of indicators, as their dynamics is more stable within the framework of constant revision by Rosstat of average annual prices.

The weights of individual indicators are characterised by their share in the integral index. Thus, the condition is observed, according to which the sum of weights should equal one. Therefore, the weight of each private indicator should be regulated through their sum.

Among many ways of calculating the weights of indicators, the authors of this research work have chosen the method based on calculating the weights of private indicators of business activity by the pair correlation coefficients between them. This approach and its mathematical justification were described in detail in the previous works of the authors [5–7].

The proposed method allows us to more accurately take into account the impact of the real sector of the domestic economy and non-production spheres on the dynamics of the business activity index.

The methodology used to calculate the weights and the IE RAS integral index in the most concise form is presented by the following calculations [6].

Let us assume, that r_{ij} constitutes the pair correlation coefficient between the private indicators of business activity i and j (X) ($i, j = 1, 2, \ldots, m$). If so, then the weights for the index Wj are determined by the following formula:

$$W_j = \frac{\sum_{j=1}^{m} |r_{ij}|}{\sum_{i=1}^{m} \sum_{j=1}^{m} |r_{ij}|}, \quad (1)$$

where: j and m are the serial number of the industry and the number of industries, respectively.

In general, the integral indicator of business activity (Y) can be presented as follows:

$$Y = \sum_{j=1}^{m} X_j W_j, \quad (2)$$

where: Xj as a private indicator of business activity j; and m is the number of X.

In the considered practical application of this methodology $m = 10$, in accordance with the number of private indicators used in the IE RAS Index.

BUSINESS ACTIVITIES AND ECONOMIC GROWTH

The Russian economy in the period from 2020 to April 2024 has achieved higher development indicators despite all pessimistic Western and domestic forecasts and even despite the increasing impact of a good deal of negative factors of the collective efforts undertaken by Western states due to the special military operation.

GDP, output of goods and services by basic types of economic activity, real incomes of the society turned out to be all above the forecast values, as well as labour, demographic and other social indicators have improved [13, 14].

The trend is also clearly proved by the dynamics of GDP and GVA, which serves to characterise the quality and level of economic diversification and social progress.

These new trends were apparent most extensively in early 2024, during the period mobilizing of resources, when all factors of acceleration of strategic development by the public adminis-

tration system were pulled together to achieve success in the special military operation.

Thus, in the first quarter of 2024, GDP growth was 5.4 per cent, as compared to 1.6 per cent decline in the first quarter of 2023.[1] The growth rate of output of goods and services by basic types of economic activities reached 5.8 per cent in the first half of 2024. The share of value added in the GVA in the national economy turned out 14.2 per cent in comparison with 11.7 per cent in the first quarter of 2023. In the field of manufacturing industries of the machine-building complex, it increased from 13.0 to 13.6 per cent, and in the field of information and communication reached 2.7 per cent (in the first quarter of 2023–2.5 per cent). It should be noted that, according to Rosstat data[2] in 2023 the situation related to the dynamics of value added in these industries was obviously quite negative. A particularly deep concern was caused by a shortfall in the sector of high-tech industries (extractive, manufacturing, etc.). Therefore, its acceleration, mainly in such industries, as well as in the spheres of digital development, robotics, artificial intelligence, research and development etc., which indicate the level of national technological sovereignty, should become a task of absolute priority for decision-making process of strategic planning development. Exactly these areas provide the absolute maximum of growth of value added in GDP and generate the level of its quality, especially in the circumstances of developing digitalisation of the national economy [15, 16].

Business activity, and especially investment activity[17], are of paramount importance for the resolution of this problem.

The high upward trend of growing investments in fixed assets which was registered by Rosstat in 2023 and the first quarter of 2024 gives a clear evidence of an immediate relationship between the quality of GDP and business activities.

Thus, within the first quarter, the first half of the year, three quarters and the whole year of 2023, the investments increased from 0.7 per cent to 7.6, 10.0 and 9.8 per cent, respectively, against 6.7 per cent in 2022.[3]

In early 2024 the upward trend maintained. The first quarter of 2024 revealed supplementary reserves and opportunities for the growth of business activities, providing a record figure of 14.5 per cent increase of investments in fixed assets. Taking into account the time lag, the results of this phenomena should become apparent already by 2024–2025, which will obviously have a positive effect on the level and quality of GDP and GVA.

PRACTICAL ESTIMATION OF THE IE RAS INDEX IN COMPARISON WITH THE ROSSTAT INDEX

In accordance with the stated methodology, this study presents calculations of the weights of industries and spheres of the national economy of Russia (*Table 1*) for the timeframe period starting from 2020 to April 2024 inclusive.

This timeframe period involves all the most turbulent years: pandemic 2020, then post-pandemic 2021 and 2022–2023 of the initial stage of economic mobilisation in response to the initial stage of economic unprecedented sanctions of the collective West states [18] followed up by the period of large-scale structural adjustment of the national economy in January-April 2024 as the final phase of the special military operation started.

This time is generally distinguished by a higher turbulence in the dynamics of macro-indicators, which was caused by specific conditions of socio-economic development [5, 6] compared to the previously studied by the authors from January 2016 to June 2021 and from January 2018 to July 2022.

The analysis of turbulence of the weights of industries and spheres of the national economy is of paramount importance for making prognosis of changes in the indicators of business activity in such extreme conditions.

[1] URL: https://rosstat.gov.ru/storage/mediabank/osn-06–2024.pdf

[2] URL: https://rosstat.gov.ru/storage/mediabank/osn-12–2023.pdf

[3] URL: https://rosstat.gov.ru/storage/mediabank/osn-02–2024.pdf

Table

Weights of the IE RAS Index for Basic Spheres of the National Economy

No. of indicator	Macroindicator	Weights of the industries
		2020 — April 2024
1	Volume of industrial output	0.147
2	Volume of agricultural output	0.005
3	Volume of construction operations	0.105
4	Transportation turnover	0.122
5	Passenger transportation turnover	0.139
6	Retail trade turnover	0.133
7	Wholesale trade turnover	0.094
8	Volume of paid services to the population	0.155
9	M2	0.004
10	Total accounts payable of entities	0.096

Source: compiled by the authors.

Sectoral turbulence

In the given period under consideration — from 2020 to April 2024 — the first three positions of the ten top-list take the sphere of paid services to the population, industry and transport passenger turnover in terms of variability of dynamics and, accordingly, the weights of the level of business activity.

Retail trade takes the fourth position, which is quite close to the previous trio. It indicates a high instability in the dynamics of development, primarily in the social sphere and significant structural changes in industry. At this stage these industries are of remarkably highest turbulence of dynamics with specific weights of 0.155, 0.147, 0.139 and 0.133 respectively (*Table 1*).

Moreover, the indicated weights of the industries significantly exceed the similar indicators of the other previously studied periods [5, 6].

Thus, these industries also maintained the first four positions in the same sequence in the top-list from January 2016 to June 2021, only with lower indicated weights: 0.127, 0.121, 0.118 and 0.116, respectively [6].

From January 2018 to July 2022, the composition changed among the industries ranked in the first four positions in terms of turbulence [5]. Passenger transportation turnover took the 1st position with a weight of 0.148, while industrial production, paid services to the population and transport freight turnover took the 2nd, 3rd and 4th positions, respectively, with weights of 0.143, 0.130 and 0.127.

It should be especially emphasised that industry, as the most advanced high-tech sector, has consistently maintained the second place in terms of the level of influence on the IE RAS Index within all these three periods under consideration.

The new stage of the industry's re-structure launched in 2024 aimed at increasing the share of value added in the national economy and ensuring technological sovereignty, should be accomplished by means of a more significant change in business activity in all its constituent national economic complexes: machine-building, fuel and energy, chemical, forestry etc.

New national projects and state programmes are developed and implemented within the framework of the budget process for the period of 2025–2027 aiming to accomplish these objectives.

From 2020 to April 2024, rather similar weighting coefficients were detected in the

sphere of transport cargo turnover (0.122), construction operations (0.105), total accounts payables and other debts of entities (0.096) and wholesale trade turnover (0.094).

However, the most interesting part of the research work is the comparison of the weights of industries with minimal variability in the dynamics of macroindicators.

Thus, from 2020 to April 2024, the minimum variability was found in the monetary aggregate M2, which took the last, 10th position in the top-ten list with a weight of 0.004, and agricultural production in the 9th position, with a slight difference of the weight — 0.005.

Besides, in the time periods studied earlier, they also occupied the two last positions in terms of turbulence. However, from January 2018 to July 2022, the maximum stability of agricultural production dynamics was observed with a record low turbulence level of 0.002 [5].

In the period from 2016 to June 2021, agriculture also took the 10th position in terms of the turbulence rating with the coefficient of influence on the IE RAS Index of 0.041, surpassing the monetary aggregate M2 with a weight of 0.068 [6].

The indicated minimum values of the weights of industries could be attributed to the most stable dynamics of these macroindicators both in the periods of exacerbation of the pandemic and tightening regime of Western sanctions and in the period of economic growth recovery during the special military operation.

Thus, we can conclude that the dynamics of the weights of high-tech industries and the observed trend of increasing their turbulence confirm the growth of business activities aimed at increasing the quality and the level of diversification of the national economy in the period from 2020 to April 2024.

This conclusion is also confirmed by research work and studies, which compared regional business activities. Usually, the financial and economic centres of highly developed regions and developed regions with diversified economies show high volatility in business activities, while the less developed agrarian and raw materials regions show low volatility [19].

Turbulence in business activity indexes

The calculated weights of industries in the period from 2020 to April 2024 (*Table* 1) gener-

Table 2

Dynamics of the IE RAS and Rosstat indexes in the period of 2020 — April 2024 (in per cent of the previous year)

Month & Year	IE RAS index	Rosstat index	Divergence between the indexes of IE RAS and Rosstat
01.20	103.0	101.8	1.2
02.20	104.0	104.7	–0.7
03.20	98.2	102.3	–4.1
04.20	77.3	91.1	–13.8
05.20	77.4	90.8	–13.4
06.20	76.1	93.5	–17.4
07.20	88.3	95.8	–7.5
08.20	91.9	97.1	–5.2
09.20	94.5	98.2	–3.7
10.20	93.1	95.5	–2.4
11.20	93.2	98.8	–5.6
12.20	95.1	102.4	–7.3
Annual average indication	**91.0**	**97.7**	**–6.7**

Continued Table 2

Month & Year	IE RAS index	Rosstat index	Divergence between the indexes of IE RAS and Rosstat
01.21	95.1	98.5	–3.4
02.21	95.7	97.9	–2.2
03.21	103.3	103.4	–0.1
04.21	129.3	113.7	15.6
05.21	125.9	114.3	11.6
06.21	120.6	111.3	9.3
07.21	120.5	106.2	14.3
08.21	113.4	104.0	9.4
09.21	110.7	104.1	6.6
10.21	113.0	106.0	7.0
11.21	114.3	107.0	7.3
12.21	112.7	105.6	7.1
Annual average indication	**112.9**	**106.0**	**6.9**
01.22	112.7	108.5	4.2
02.22	110.0	106.0	4.0
03.22	104.7	102.7	2.0
04.22	99.0	97.6	1.4
05.22	98.2	97.2	1.0
06.22	97.1	96.2	0.9
07.22	98.4	98.3	0.1
08.22	99.2	99.8	–0.6
09.22	96.9	97.7	–0.8
10.22	96.7	98.1	–1.4
11.22	98.9	98.8	0.1
12.22	99.2	97.4	1.8
Annual average indication	**100.9**	**99.9**	**1.0**
01.23	100.6	96.8	3.8
02.23	102.4	97.5	4.9
03.23	104.8	100.0	4.8
04.23	108.9	105.0	3.9
05.23	110.3	108.5	1.8
06.23	109.9	108.5	1.4
07.23	109.8	107.8	2.0
08.23	109.8	107.7	2.1
09.23	109.7	108.8	0.9
10.23	110.3	107.6	2.7
11.23	109.5	105.3	4.2
12.23	108.2	105.2	3.0
Annual average indication	**107.9**	**104.9**	**3.0**
01.24	107.6	105.6	2.0
02.24	109.9	109.7	0.2
03.24	107.1	105.0	2.1
04.24	107.3	105.5	1.8
Average indication for 4 months	**107.9**	**106.5**	**1.4**

Source: Rosstat, compiled by the authors.

ate the basis to determine the IE RAS Index and comparing its dynamics with the dynamics of the Rosstat Index (*Table 2*).

Analyzing the dynamics of IE RAS and Rosstat indexes for this period, it well indicates that, despite the convergence of trends, nevertheless, the rates of growth and decline in business activity 'change their positions', which is particularly clear in the graph (see *Figure*). For example, in the recession periods (in the years of 2020 and 2022) the IE RAS Index had a dramatic drop, meanwhile in the periods of revival of business activity (from the 3rd quarter of 2021 and from the beginning of 2023 and 2024) it significantly outstrips the growth of the Rosstat Index.

It is necessary to point out, that the numerical values of the level of business activity indexes and their gaps do not always converge, although they are registered for the same calendar years and months in the periods considered.

This occurs mainly due to the fact, that Rosstat introduces adjustments to make more clarifications for estimates to statistical data on the results of the development of industries, including those involved in the definition of indexes.

Comparative analysis of both dynamics for the period from 2020 to April 2024 indicates, that the maximum average annual decline in the indices of IE RAS and Rosstat was registered in the pandemic year of 2020: –9.0 and –2.3 per cent, respectively.

This conclusion is also verified by the results of index calculations for the periods from 2016 to June 2021 and from 2018 to July 2022.

In these periods, it was established that average annual weights of the drop of the IE RAS Index were nearly converging: –8.9 and –8.5 per cent, respectively [5, 6], with the Rosstat Index falling by –2.3 per cent.

It should be pointed out, that the decline in business activity in 2020 started in March: –1.8 per cent, whereas, according to Rosstat, it occurred in April: –8.9 per cent. However, according to the IE RAS Index, the decline in business activity in April was already –22.7 per cent, and the downward trend in both indexes maintained its decrease until December 2020.

The time estimates of the maximum decline of indexes did not converge either.

Thus, in the period from 2020 to April 2024, the maximum downturn of the IE RAS Index (–23.9 per cent) was recorded in June 2020, as –22.3 per cent in the period from 2018 to July 2022 [5]. However, according to Rosstat estimates, such a month is May with a drop in the Rosstat Index of only –9.2 per cent.

By the way, the maximum gap in the level of indexes' decline is also noted in June (*Table 2*).

According to our calculations [6], the maximum decline in the IE RAS Index in the period from 2016 to June 2021 was registered in April and it amounted to –22.2 per cent, and, according to Rosstat data, it occurred in May (–9.2 per cent).

Moreover, the maximum gap in the level of decline of the indexes in April (13.3 per cent) indicated a deeper drop of business activity into negative territory than the Rosstat Index.

In the period from 2018 to July 2022, according to our calculations [5], the maximum plummet in the IE RAS Index also occurred in June 2020 and it amounted to –23.9 per cent, and, according to Rosstat data, in May of the same year: –9.2 per cent.

An important feature of the period from 2020 to April 2024 is the wave-like nature of the dip in the dynamics of business activity, which began in April 2022, into the negative area, which can be traced in both indices (*Table 2*).

An important specific aspect of the period from 2020 to April 2024 is the undulating nature of the decline curve in the dynamics of business activity, which began in April 2022, into the negative area, which can be traced in both indexes (*Table 2*).

During the first wave, the indicators of the Rosstat Index (from April to July inclusive) were less optimistic, and the gap was in favour of the IE RAS Index.

The second wave started from August to October inclusively and the IE RAS Index made a deeper nosedive. However, the third wave from January 2023 to April 2024 again changed the

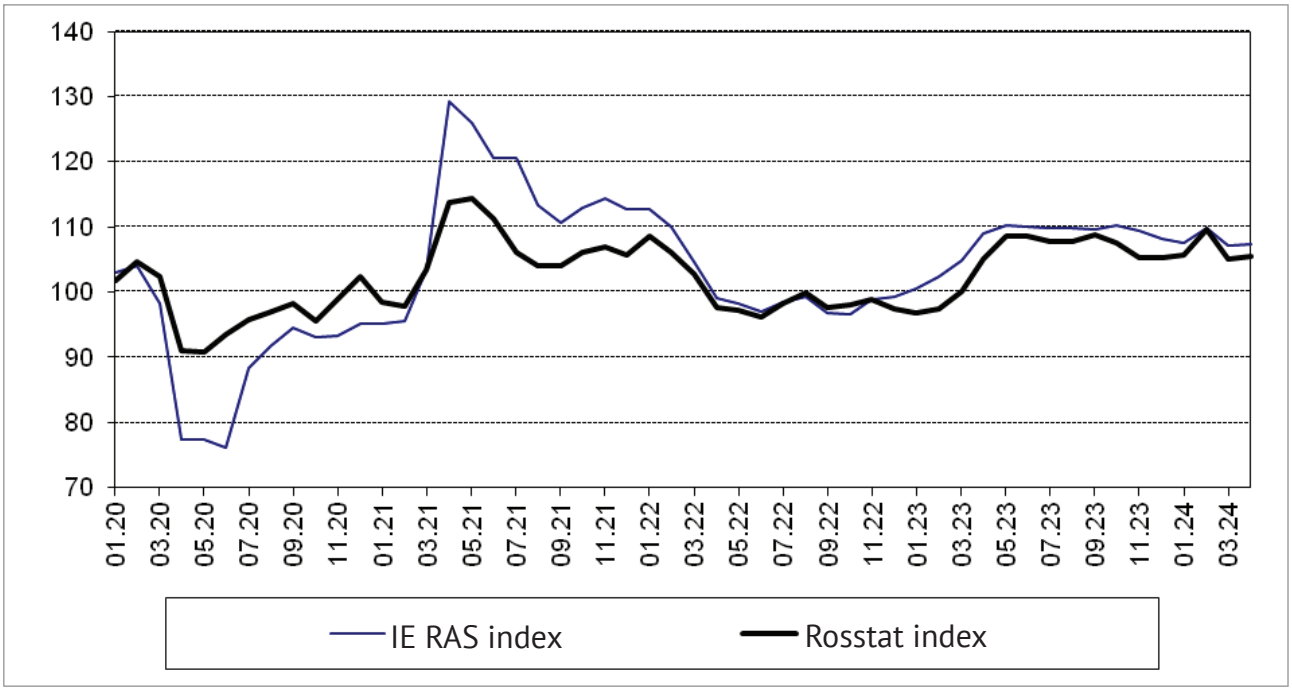

Fig. **Dynamics of the IE RAS and Rosstat Indexes in the period 2020 — April 2024 (in per cent of the previous year)**

Source: Rosstat, compiled by the authors.

dynamics of turbulence, so that the gap was again in favour of the IE RAS Index.

The IE RAS Index ceased indicating negative values in December 2022, while the Rosstat Index followed the suite only at the end of February 2023, reaching the zero level only by March 2023 (*Table 2*).

In addition to the above point, in 2022, the IE RAS Index indicated an inconsiderable growth by 0.9 per cent, while the Rosstat Index still showed a slight decrease by –0.01 per cent.

In general, the dynamics of curves for the indexes converge in the recovery period of 2023, when the sanctions impact on the domestic economy levelled off [20]. The maximum values of the indexes are in May-June (10.3 and 9.9 per cent for the IE RAS Index and 8.5 per cent for the Rosstat Index) and in September-October (9.7 and 10.3 per cent for the IE RAS Index and 8.8 and 7.6 per cent for the Rosstat Index). At the same time, the recovery rate of the IE RAS Index in 2023 is higher (average value for the year — 7.9) per cent than that of the Rosstat Index (4.9 per cent).

This indicates a higher mobilisation of state and business resources within the framework of the adopted anti-crisis measures (which is to related the preparation and implementation of the special military operation) than in the pandemic year 2020.

Analytical advantages of the IE RAS Index over the Rosstat Index are also evident when considering the dynamics of maximum growth of business activity. Comparison of annual trends of both indices for the period from 2020 to April 2024 reveals their maximum average annual growth in post-pandemic 2021: by 12.9 and 6.0 per cent, respectively, with the maximum growth gap of 6.9 per cent in favour of the IE RAS Index.

These estimates are also largely valid for the periods from 2018 to July 2022 and from 2016 to June 2021 [5, 6].

Thus, from 2018 to July 2022, the maximum average annual growth of IE RAS and Rosstat indexes was observed in 2021 and amounted to 13.2 and 6.0 per cent, respectively, with a maximum gap of their growth level by 7.2 per cent [5].

In the period from 2016 to June 2021, the maximum surge was also observed in 2021, despite the fact that the dynamics were analysed only for the first half of the year. At the same time, the indexes went down at a lower level of 9.5 and 6.8 per cent, and the gap was only 2.7 per cent in favour of the IE RAS Index, which is quite lower than the maximum gap for this period, equal to 2.9 per cent, observed in 2017 [6].

Even more significant fluctuations in the indexes' growths were found when comparing their monthly dynamics.

Thus, the maximum increase in the IE RAS Index for the period from 2020 to April 2024 by 29.3 per cent was observed in April 2021 with the Rosstat Index of 13.7 per cent, which is lower than the maximum estimate of 14.3 per cent established by Rosstat and adopted for May of 2024. That is, compared to the Index of IE RAS, it lags by a month (*Table 2*).

It is necessary to pay attention to the convergence of the changes of both indexes at the beginning of the economic mobilisation period and during the reorganisation of the national economy structure for the needs of the special military operation, taking into account the experience accumulated during the coronavirus pandemic.

At the same time, the synchronisation of both indexes' dynamics is confirmed by exceptionally high correlation coefficients of their dynamics — both for the entire period under study from 2020 to April 2024 (0.947) and by years (*Table 3*).

If we take into account relatively stable indicators in 2024, it is worth noting the positive values of both indexes.

Thus, we can make the conclusion that both indexes in stable periods have the same dynamics of changes, but in such conditions as pandemic, sanctions, etc., the index of IE RAS fixes the change in dynamics earlier and determines its level more accurately.

As a result of the performed calculations (*Table 2* and *Figure*), additional evidence of advantages of the IE RAS Index has been obtained. The main advantage is that it more accurately determines the critical moments of trend change, the level of business activity and the terms of overcoming crisis processes in socio-economic development.

Table 3

Correlation of the IE RAS and Rosstat indexes in the period from 2020 to April 2024

Year	Correlation
2020	92.5
2021	95.5
2022	97.7
2023	97.3
2024	98.6
Total period	94.7

Source: compiled by the authors.

CONCLUSIONS

The time period from 2020 to April 2024 is generally characterised by variability in the dynamics of macroindicators, which is caused by the unique conditions of strategic development, including the COVID-pandemic, the initial stage of economic mobilisation in response to the sanctions of the collective West and a large-scale structural adjustment of the national economy in January-April 2024 in the framework of the start of the final stage of the special military operation.

The dynamics of GDP and GVA, as well as the trend of increasing turbulence of the share of value added in high-tech sectors of the national economy observed during this period, confirm the increase in business activity in order to improve the quality and diversification of the economy and social sphere.

The absolute priority in making decisions on strategic development issues should be to increase the share of value added in industry, primarily in the extractive and manufacturing industries, as well as in digital development, robotics, artificial intelligence, research and

development, etc. The calculations revealed that the main advantage of the IE RAS Index over the Rosstat Index is that it more accurately determines the critical moments of change in the trend of business activity and the timeframe for overcoming the crisis processes.

The calculations helped to reveal, that the main advantage of the IE RAS Index over the Rosstat Index is that it more accurately determines the critical moments of changes in the trend of business activity and the timeframe for overcoming crisis processes in socio-economic development.

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Effective Contract in the Sphere of Higher Education in the Russian Federation

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ABSTRACT

The relevance of the research topic. The effective contract system is a crucial tool for developing the university's human capital. An effective contract is a contract that includes a clear system of indicators, the achievement of which will serve as the basis for calculating incentive payments to employees, thereby driving the growth and development of the university's activities. Moreover, it can reduce the transaction costs that arise when coordinating the interests of stakeholders and improve the efficiency of work processes within the organization. **The method** of the research is based on the scientific works of domestic and international scholars and practitioners in the fields of institutional and market economics, economic theory, and contract theory. **The scientific novelty** of the work lies in the author's proposed definition of transaction costs in the context of higher education, and the attempt to justify the use of an effective contract system to minimize them. **Research findings**: The author provides a theoretical overview of the definitions of the concept of transaction costs, considering the types and characteristics of such costs in relation to higher education. **Practical significance**: The article may be beneficial for university administrators in making managerial decisions, as well as for researchers and economists working with transaction costs. The research aims to develop theoretical frameworks in the field of regulating social and labor relations in higher education.

Keywords: transaction costs; effective contract; higher education; opportunism; information asymmetry; organization management system

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INTRODUCTION

Raising performing efficiency of employees involved in the higher education is one of the key tasks of its leadership. The main official documents aimed at transforming the system of remuneration of labour in the social and scientific sphere were the following: the Decree of the President of the Russian Federation # 597 dated May 7, 2012 "On Measures to Implement the State Social Policy"[1] and Decree of the Government of the Russian Federation #2190-r dated November 26, 2012 "On Approval of the Programme of Phased Improvement of the Remuneration System in State (Municipal) Institutions for 2012–2018".[2]

There were the following reasons for reforming labour remuneration systems for state and municipal institutions: poorly developed indicators of performance for employees, lack of correlation between labour efficiency and remuneration, as well as big difference between wages among management and ordinary employees. As it was supposed, the system of performance indicators adopted by the executive authorities would bring labour relations to a new higher level.

Following the assignment of the Government of the Russian Federation,[3] the Ministry of Labour of the Russian Federation issued the Order # 167n dated April 26, 2013 "On Approval of Recommendations on Structuring Contractural Labour Relations with Employees of State (Municipal) Institutions when Introducing an Effective Contract".[4] As a follow-up, the Ministry of Education and Science of the Russian Federation approved methodological recommendations for the development by universities of performance indicators for teaching staff.[5]

[1] URL: http://www.kremlin.ru/acts/bank/35261

[2] URL: https://mintrud.gov.ru/docs/government/91

[3] URL: http://government.ru/docs/all/85095/

[4] URL: https://www.garant.ru/products/ipo/prime/doc/70312852/

[5] URL: https://www.garant.ru/products/ipo/prime/doc/402744422/

Within the past decade, the community of high education institutions often discussed approaches to introduce an effective contract system, but there are still no criteria used to dovetail labour efficiency with the system of remuneration.

The study of efficiency how to introduce an effective contract in higher education from the point of view of institutionalism theory will allow to develop managerial solutions aimed to minimise transaction costs, which, due to their specific hidden and implicit nature, makes it difficult to account for them.

REVIEW OF PUBLICATIONS

The problems, which arise both in the process of introducing an effective contract and in its application in various spheres of economic activities are covered by many contemporary scientists in their research works [1–7].

N.N. Abakumova considered both positive and negative consequences followed up by introduction of an effective contract in higher education. She studied the aspects, which create conditions for it, and identified difficulties based on the opinions of representatives of the scientific community [1].

The research work by M.V. Kurbatova and I.V. Donova described the results of implementation of an effective contract in higher education in such issues as the achievement of target indicators to increase the level of teachers' salaries and stimulate their professional effectiveness. To sum it up, the conclusion was that the target indicator of salary level had been achieved, however, there were drastic problems due to economic factors [6].

I.E. Nikulina and A.A. Smirnova studied foreign experience, analysing potential risks for Russia [7].

R. Coase, O. Williamson, P. Milgrom, J. Roberts [8–12] and other economists made a major contribution to development of the theory of transaction costs [8–12]. A whole variety

of current existing opinions leads to vagueness and misunderstanding of the essence of transaction costs.

This problem is covered in scientific articles by Russian researchers such as R. Kapelyushnikov, S. Malakhov, A. Oleinik, V. Radaev, V. Ryazanov, V. Tambovtsev, A. Shastitko and others. [13–20].

The theory of transaction costs is applied in all spheres of national economy. Thus, V.N. Yolkina and L.N. Goncharenko developed an algorithm of business engineering based on the analysis of transaction costs [20].

L.N. Kiyanitsina and V.F. Islamutdinov suggested a scheme of incentive system for medical workers based on effective contract by means of reducing the opportunistic behaviour of employees and their employers [21].

A.G. Furin analysed transaction costs in education, defined them and outlined the reasons for their origin [22].

An interesting analysis by E.A. Yarushkina of transaction costs in financial, managerial and tax accounting, which presents ideas how to optimize such accounting in educational organizations [23].

V.V. Volchik, P.O. Savko, M.A. Korytsev, AA. Oganesyan, A.I. Maskaev revised the main approaches to definition and typology of transaction costs in higher education in the context of its reforms based on the in-depth interviews with actors of the educational process [24].

RESULTS OF FINDINGS

In a broad sense, transaction costs occur in functioning of any economic system or economic entity. They are associated with scarce information market, difficulties in finding counterparty for transaction etc.

Currently, economic literature in higher education provide a number of definitions of transaction costs (*Table 1*).

Table 1

Definitions of transaction costs in higher education

Author	Definition
A.G. Furin	Additional costs of material and moral resources, which market players have to bear due to information asymmetry and subsequent opportunistic behaviour in the planning process, adaptation and control over the implementation of educational services, which market players are committed to fulfill
V.V. Volchik, P.O. Savko, M.A. Korytsev, AA. Oganesyan, A.I. Maskaev	Additional costs for actors in the form of moral and material resources during their labour activity
L.N. Kiyanitsina, V.B. Orlov	Any kind of losses arising from ineffective joint decisions, plans, concluded contracts and created structures, ineffective measures to changed conditions, ineffective defense of agreements
E.N. Zharova (the author of this research work)	Costs or risks that lead to their occurrence, manifested in the process of making managerial decisions aimed at mutually beneficial alignment of interests of academic staff and administration of the higher education institution

Source: compiled by the author.

One of the most important problems in the field of transaction costs is their measurement and quantity assessment. These issues were frequently described in research works of scientists, who were engaged in the study of this subject.

The article by I. Sh. and K. I. Hasanovs describes the approach of Douglas North and George Wallis [25]: they formulated the problem of "observability" of transaction costs and introduced a new category: "transactional service". The latter refers to transaction costs related to the market, which can be measured, meanwhile what is beyond the market (or non-productive) sector cannot be measured quantitatively.

In 1996, V. E. Kokorev put forward the approach to assessing the value of transaction costs in Russia, taking into account the overhead costs of enterprises and turnover for the whole economy [26].

L. N. Kiyanitsyna and V. F. Islamutdinov described in their article [21] the approach to minimisation of transaction costs by means of introduction of effective contact based on the experience at a medical institution. They developed a methodology of the system of incentives for medical workers based on effective contract, aimed at "maximum reduction of opportunistic behaviour of employees and employers". According to the authors, it will be possible to improve the quality of medical care through such achievement of this goal. However, their article does not provide specific calculations to draw conclusions about reduction of transaction costs.

Thus, the problems of assessment and quantitative measurement of transaction costs remain relevant and play an important role in management activities of institutions, however, they are not widely clarified in the sphere of higher education (including before and after the implementation of an effective contract). The reason for this is that transaction costs are implicit: it is hard to foresee them in accounting or in tax accounting. Moreover, it is not possible to quantify the effect of implementing an effective contract system in a higher education institution.

For example, the costs of opportunism depend on behaviour of an individual or a group of individuals under certain conditions. It is worth pointing out, that each high educational institution has its own transaction costs — depending on its own peculiarity and the specifics — so it would be incorrect to compare them. However, despite the lack of possibility to quantify the costs, ignoring them will lead to a decrease in the efficiency of the organisation's activity.

Scientific literature features approaches to quantitative assessment of transaction costs in the production sector of the economy. However, it is impossible to assess such costs in the social sphere due to their obscure nature and lack of cost estimation.

This article analyses types and specific nature of transaction costs only in higher education sphere, since other sectors have already been described in detail by scientists engaged in research of this subject.

The initial cost in any transaction is **the cost of information search**, since no one can take even the simplest decision without corresponding information. According to D. North, "the cost of information is the basic part of the cost of concluding a transaction" [27]. Problems arise due to complete or partial absence (or uneven distribution) of necessary information among the participants of contractual relations.

The costs of information search are not production costs for universities, it is related to communication and provision of information to the staff. Information asymmetry (or information inequality) occurs in different forms in higher education: between staff members, as well as between them and the university management. This type of costs also includes the costs of searching for information on fi-

nancial support of different categories of employees. Besides, due to limited availability of proper information, strategic manipulation of information often occurs in high education institutions, so that sometimes employees do not clearly understand why the administration take some decisions. All this triggers growing transaction costs.

One more significant type of transaction costs is the costs of negotiation. J. Downs and S. Hill attribute to them the costs of negotiating, monitoring and conducting the transaction, which allow the parties to come to an agreement [28].

In the field of higher education, this type includes time costs of hiring job applicants, negotiating with both applicants and employees, conducting various levels of interviews and competitive selection for academic teaching positions.

Measurement costs are the costs of time spent on assessing a set of characteristics of an object and carrying out activities to identify inaccuracy or error in this process, as well as to identify possible risks or losses. The more accurate the assessment, the higher are measurement costs.

A. V. Biushkin points out: "Humanity achieved tremendous savings of measurement costs when standards of weights and measures were introduced. Company's brands make an example of such standards, since they guarantee the reputation of the company". [29]

Due to the fact, that under an effective contract, indicators of evaluation of performance for the staff of high education institutions may change in accordance with its priorities, there will always be measurement costs. When it is impossible or too difficult to make such an assessment accurately and correctly, the costs increase.

The costs of opportunism include those that arise in case of dishonest fulfilment of commitments or obligations. A. N. Oleynik points out: "If during the conclusion of transaction the parties have full information about behaviour of the counterparty and about possible outcome of the transaction, opportunistic behaviour in the course of its implementation is excluded" [15]. Asymmetry of information allows using the situation for one's own benefit, to the detriment of the other side interested in the transaction.

This type of costs occurs when the parties involved in transaction try to minimise the provision of services or reduce their quality to the satisfactory level for their interests. Sometimes, an employee prefers to pass discreetly as much as possible of his or her work or duties to another employee. There are two forms of opportunism: shirking and hold-up. The term "shirking" is used by A. Alchian and G. Demsetz to denote the way of working with less commitment and responsibility than it should be according to the contract [30]. According to both abovementioned authors, shirking is especially convenient, when a joint working activity is run by a group or "a team".

Opportunistic behaviour in the broad sense of the word means, when a manager passes the fulfillment of his duties to his subordinates. As it was pointed out by V. V. Volchik, P. O. Savko, M. A. Korytsev and other researchers, "due to specific and excessive bureaucratization in the sphere of education, informal relations are clearly observed; as a rule, an employee performs a large number of tasks which are not determined in his/her job description" [24].

There is a wide range of possibilities for shirking or for providing a service of poor quality in the educational process. E. A. Yarushkina believes, that since large teams are involved in teaching and scientific research in educational institutions, successful results depend on the contribution of each employee [23].

Shirking is regarded as dishonest fulfilment of one's duties when working in a scientific team. In this case, it is quite hard to determine the contribution of each individual participant.

Table 2

The impact of effective contract system on reduction of transaction costs in higher education

Type of transaction costs	The influence of effective contract on reduction of transaction costs
Information search costs	Effective contract implies established norms and indicators, so that incentive bonuses are granted for their achievement. A local normative act (Regulations on the assessment of employees' performance) leads to the reduction of asymmetry of information: who gets an incentive bonus and what for. A concept of material incentives approved by the high education institution allows saving time for negotiations and discussion of labour conditions of employees. The contribution of professional staff in specialised structural units dealing with effective contracts will also have an impact on reduction of information search and negotiation costs
Negotiation costs	
Measurement costs	Measurement costs to assess the performance indicators and criteria of employees in high education institutions are minimized. The system of such assessment, as well as distribution of incentive bonuses becomes clear and transparent
Costs of opportunism	Costs are reduced due to: - precision and coherence of performance indicators for employees of high education institutions; - activation of employees' performance to achieve the established indicators, which leads to higher performance of the whole university; - transparency of bonuses from incentive fund structure; - less pushing through with lobbying personal interests to management of the university
Costs of influence	Decrease in the number of decisions made by the university management without consulting the employees
Costs of control and legal protection for contract performance	Reduction of this type of costs is ensured by a legal department in the institution, which is responsible for legal support of contractual relations (including within the framework of the effective contract). Maintaining strict order and control over the compliance of moral and ethical norms

Source: Compiled by the author.

The same situation occurs in an educational department in case, if the management is practically unable to run a feasible control over the employee's working activities.

According to L.N. Kiyanitsina and V.B. Orlov, "if the personal contribution of each agent to the overall result is measured with large errors, the assessment of reward will be a far cry from the value of actual efficiency of this particular labour. Hence, there are negative incentives which encourage shirking" [31].

Another form of opportunistic behaviour is a hold-up considerably described in the studies by O. Williamson [11]. In the essence, this means "the possibility of highly qualified employees with unique professional skills to blackmail the administration to terminate labour relations" [32].

Influence costs in an institution arise when a manager makes decisions that do not always meet the interests for the major part of employees and without coordinating it with them.

Teamwork in collectives leads to various kinds of conflicts, the reasons for which may be a different level of wages or subjective attitude of employer to subordinates. Employees happen to join in groups aiming to push their interests and use the practice of putting pressure on the management with various schemes of manipulation.

The costs of control and legal protection of contract implementation include the costs of courts, arbitration, recourse to other instances in order to defend rights, as well as the costs of legal support within the framework of contractual obligations.

The impact of the effective contract system on reducing transaction costs in the sphere of higher education is presented in *Table 2*.

Transaction costs occur in any contractual relationship, no matter if it deals with a labour contract or an effective contract. In addition, the latter based on the principles of openness, fairness and transparency, serves as a tool to minimise such costs in strategic framework. Initially, during the implementation of an effective contract, transaction costs may increase, but in the long run it will contribute to their reduction by levelling information asymmetry and opportunism costs.

CONCLUSIONS

It is common knowledge, that there are costs related to functioning of any economic system. These are transaction costs in all spheres of society's activity: economic, social, political and immaterial; in any economic system they exist both in market conditions and under centralized, or planned management; both in production and trade sectors. However, the types of transaction costs will be different in each economic system and in each sector of economy. Thus, for instance, an industrial enterprise may have a large proportion of activities related to the costs of negotiation, but a very small share related to the costs of information search. The trade sector of the economy may indicate a multiple increase of information search costs, but decrease of costs of opportunism. In public sector, unlike the others, the share of opportunism and information search costs is high.

According to the theory of institutionalism, institutions are made to concentrate and transmit information, which is necessary for participants of transaction, meanwhile reducing transaction costs: the lower their level, the more efficient is cross-communication. However, it is impossible to expect a complete absence of transaction costs.

Material production ensures growing welfare of the population. The sphere of higher education provides immaterial development of people. From the point of view of transactional costs approach, reduction of transaction costs means a certain positive result. Transaction costs do not create value in the sphere of higher education, therefore, it is not possible to assess their quantity. Besides, no official statistics is available for high education institutions to make an assessment of these costs.

The study of contractual labour relations, specifically, the effective contract, within the framework of transaction costs makes it possible to identify approaches towards management decisions which allow to minimise costs.

A decently structured system of effective contract makes a positive impact on the overall climate in the institution and stimulates the achievement of goals set by the management, as well as it leads to reducing the level of transaction costs. This is realistic if this system is definite and objective in assessing the performance of scientific and pedagogical staff and based on transparency of indicators and criteria that take into account the specifics of working activity of both employees and the university.

Adequate choice of criteria of assessment of employees' performance and clear regulations of labour relations are crucial for reducing risks of

opportunistic behaviour and also for optimising the ratio of labour activity and remuneration of employees.

Efficient contract should be based on principles of comprehensiveness and aimed at creation of objective evaluation system that reflects the following: the level of qualification and intensity of working process of research and teaching staff, development of priority areas of the university, degree of satisfaction among research and teaching staff with evaluation of their work and remuneration received, the possibility of redistributing the fund's incentive payments in order to motivate employees, as well as reduction of transaction costs.

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The Role of Research and Development in Global Technological Competition

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ABSTRACT

Subject. Research and development in science and technology, as well as the development of the innovation sector, are top priorities for the country's socio-economic well-being and security. **Purpose.** The competitive strategy is based on the analysis of the market for modern technologies and the identification of key areas for the development of competition. The goal is to ensure the country's future economic competitiveness and the national security of Russia and other developed countries. **Methodology.** The study of priority scientific areas within the context of national scientific and technical policies in developed countries. It also explores the key characteristics of the information technology market and the unique features of its development and operation. Furthermore, the research evaluates the financing of research and development activities. It analyzes the costs associated with these activities and their impact on economic growth. **Results.** The rationale for financing research and development in priority areas lies in the targeted strategic development of the economy. This development should be innovative, involving the creation of a high-tech complex and the effective use of the results of intellectual activity. The focus is on ensuring the security and competitiveness of the country in science, technology, and socio-economic well-being. The most important condition for the efficient use of public funds is the effective management of relevant programs and projects.

Keywords: Russia; China; EU countries; scientific policy; national priorities; digital technologies; innovations; technological sovereignty; advanced technologies; competitiveness; financing of scientific research

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INTRODUCTION

In accordance with N.D. Kondratiev's theory of cycles, the beginning of the 21st century was distinguished by the first manifestations of the sixth technological cycle, or the so-called "sixth technological cycle", which marked the start of the global transition process in the sphere of high-tech production. The new cycle is based on fundamentally new technologies, including convergent (nano-, bio-, information and cognitive), digital, managerial, production, transportation, medical innovations, etc.

The rapid technological development has spurred an impetus to emergence of new global markets of high-tech goods and services and, consequently, has intensified global competition. In particular, it is related to such areas as 6G, batteries and photovoltaics, where China has taken the top-list position in the world [1, 2].

As similar problems are detected in the economy and in the field of technological security, many experts turn to such concepts as "technological sovereignty" and "strategic autonomy", i.e. in an era of intensified global competition, the State should be able to act strategically and autonomously, including in the field of science, technology and innovation policy [3].

Thus, nowadays, due to sanctions restrictions, the need for research and development focused on the creation of breakthrough technologies is on the agenda [4].

US SCIENCE AND TECHNOLOGY POLICY

Funding for science

The report "U.S. Research and Development: Trends and International Comparisons", published under the auspices of the U.S. National Science Foundation and the U.S. National Science Board, states that the key factor for the country's success in the global economy, its ability to solve problems and seize new opportunities, is investment in research and development (R&D). The report is mainly devoted to statistical analysis of the results of research and innovation activities of American industry and universities. The table presents data on R&D funding in the United States in a few sectors:

Today, the business sector is the largest actual perpetrator and investor of R&D in the United States. In 2022, it funded 76 per cent of all U.S. R&D (69 per cent in 2000 and 61 per cent in 2010) at a cost of $ 672.9 billion.

- In 2022, the federal government funded 18 per cent of R&D at $ 159.8 billion (meanwhile subsidizing 40 per cent of basic research). The largest recipients were the higher education sector (30 per cent) and intramural federal research (29 per cent).
- As of 2019, the share of R&D spending in the U.S. exceeds 3.0 per cent of GDP. In 2022, the figure accounted for 3.4 per cent.
- In 2021, five industries accounted for 79 per cent of the $ 602.5 billion spent on R&D

Table

R&D costs in the USA in 2021–2022, USD billion

Sector / Year	2021	2022	2022 / 2021
Business	608.6	692.7	13.8%
Higher education sector	85.8	91.5	6,6%
Public sector	66.8	73.3	9.3%
Non-profit organizations	27.1	27.3	0.7%
TOTAL	789.1*	885.6*	12.2%

Source: URL: https://ncses.nsf.gov/pubs/nsb20246/

Note: * the data were subject to rounding.

which were performed by companies with 10 or more employees:

- Information and Communication Technologies (including software) — 25 per cent;
- chemicals manufacturing (including pharmaceuticals and drugs) — 18 per cent;
- manufacture of computers and electronic devices (including semiconductors) – 17 per cent;
- professional, scientific and technical services (including R&D services) — 11 per cent;
- manufacturing of transportation equipment (including automobiles and aerospace products) — 8 per cent.

- In 2021, manufacturing of semiconductors and other electronic components was one of the most science-driven industries (the ratio of R&D to the volume of sales was 20 per cent, which accounts for an increase of 9.8 per cent in current prices, and in 2020 for 22.8 per cent.
- In fiscal year 2022, the Department of Health and Human Services (HHS) and the Department of Defense allocated nearly 3/4 of the $ 196.6 billion in federal R&D obligations. At that time, 24 per cent ($ 45.4 billion) of the federal budget allocation for R&D went to fundamental scientific research, 25 per cent to applied scientific research ($ 48.4 billion), and 51 per cent to experimental development ($ 96.6 billion). Funding for life sciences was considered the highest among all knowledge areas throughout all agencies at 44 per cent ($ 41.6 billion) and was primarily granted through the Department of Health and Human Services.
- In accordance with the Semiconductor Manufacturing and Science Stimulation Law of 2022, $ 52.7 billion funding was made to rebuild the US semiconductor industry throughout the supply chain, including $ 13.7 billion for R&D, workforce development, and related programs.
- In 2021, the U.S. had the world highest domestic spending on R&D (expenses for internal research and development) accounted for $ 806.0 billion. The top five countries in this area are the US, China, Japan, Germany and South Korea accounted for 73% of global spending.

Priority areas for R&D

In August 2023, a memorandum was published in the USA regarding R&D for the fiscal year of 2025, that identified 7 priority areas that Federal Executive Bodies (FEB) funding requests must meet:

1. Developing secure and dependable drive technologies of artificial intelligence (AI) that protect the rights and safety of people.

2. Leading the way in maintaining global security and stability within the framework of enormous geopolitical change and growing risks:

- advancing critical and emerging technology areas such as microelectronics, biotechnology, quantum information science, advanced materials, high-performance computing, and nuclear energy;
- mitigating emerging and evolving national security risks, including those related to biosecurity and nuclear weapons;
- generate risk mitigation options in the field of cybersecurity risks through resilient architectures, building security into the design process, and strengthening the security and resilience of critical infrastructure;
- curbing the impact of autonomous systems and artificial intelligence on national security;
- investing in science, advanced manufacturing, digital engineering, and robotics to enhance industry capabilities aiming to accelerate the transition from demonstration to deployment;
- leveraging scientific and technical (S&T) intelligence and analytics capabilities to make assessments and define U.S. competitiveness.

3. Confronting the global climate crisis by rethinking our “relationship” with nature and maintaining environmental green-ecology justice.

4. Providing better health care services for everyone.

5. Reducing inequality, including by means of support of innovation and developing the science, technology, engineering, and medical workforce in all regions, with a special emphasis on new research institutions and historically low-income sections of communities.

Promote R&D and industrial innovation that will contribute to the country's

economic competitiveness in all spheres.

Strengthening, developing, and leveraging uniquely American research to advance the national goals:

- supporting and expanding the basic and applied research that is the hallmark of the U.S. innovation;
- helping emerging research institutions in effective competition for federal funding;
- supporting both industry and academia in identifying and addressing research safety issues;
- supporting the infrastructure and national potential capacity to provide free immediate and justifiable public access to the results of federally funded research while developing mechanisms to incentivise and encourage open, reproducible, and secure research practices that could be used by industry and innovators around the world.

Thus, a new aspect emerged in the 2025 national plans: a strong emphasis on regional and industrial innovation to ensure America competitiveness in science and technology.

It should be noted that the U.S. memorandum is issued a year and a half prior to its direct application. This period of time is necessary for the relevant committees and working groups of the U.S. Congress to coordinate detailed R&D plans throughout all federal agencies that have submitted applications for R&D funding.

SCIENCE AND TECHNOLOGY POLICY OF THE EU COUNTRIES

In the EU countries science and technology policy is waged, on the one hand, in accordance with the common European programs and, on the other hand, each EU member state determines its own priorities in the field of research and development financed from the national budget.

The common European priorities in the field of science are evidenced by the current plan Strategic Technologies for Europe Platform (STEP), focused on supporting key methodologies and strengthening European sovereignty.[1] In June 2023, the STEP budget until the year of 2027 was revised with the growth numbers in allocations aiming to create production capacity in the following areas:

- ***digital and innovative technologies*** (microelectronics, cloud computing, artificial intelligence, cybersecurity and 5G);
- ***clean and resource-efficient technologies*** (renewable energy sources, electricity and heat storage, renewable fuels of non-biological origin, sustainable alternative fuels);
- ***biotechnology*** (biomolecules, pharmaceuticals, medical technologies, etc.).

France

For a long period of time, the country has been among the leading scientific world powers. Thus, in 2017, it was in the top-list of world leaders ranked 5th in terms of investment in research and development (2.24 per cent of GDP), 10th in the total number of scientific publications and 4th in the number of patent applications (6.7% of the total worldwide) [2].

The French national science policy is formed within the framework of a centralized approach. Until 2020, budget allocations for science were made in accordance with the law on scientific research, adopted by the French National Assembly on an annual basis. The law stipulated some specific areas of research, made by the main scientific centers with the indication of the amount of funding for each of them for the

[1] URL: https://strategic-technologies.europa.eu/about _en#paragraph_207

coming year.

In 2020, members of the National Assembly began debating and elaborating the law for the ten-year period (2021–2030), which the French government presented as an opportunity for "unprecedented investment in science".[2]

The first ten-year Law No. 2020–1674 of 24.12.2020 "On Programming of Scientific Research for 2021–2030 and on various provisions in the field of scientific research and higher education" envisages additional funds from the national budget in the amount of 25 billion euros for the development of scientific research, allocated for 5 sections. The main section is "Strategic Research Directions and Budgetary Funding Programs".

It should be noted, that funding of the so-called strategic directions of science in France is structured within two budget programs: "Multidisciplinary Scientific and Technological Research" and 'Space Research'. It is determined by the French Senate on an annual basis for allocation for six state scientific and technical and four sectoral organizations.

France has 47 priority research programmes launched under the 2030 national plan to create and strengthen French leadership in scientific fields that play an important role in technological, economic, social, health or environmental transformation. The National Center for Scientific Research (CNRS) controls or takes part in most of them, along with those programmes which were impimented earlier.[3]

In France National Research Agency (ANR) maintains funding both the ongoing programs of the national acceleration strategy, with a total budget of € 2 billion for the period of 10 years, supporting scientific transformations already underway (related to 5G, cybersecurity, industrial decarbonization, quantum technologies, etc.) and priority research programs with a total budget of € 1 billion for the envisaged period of 10 years (in the field of genetics, Southwest Indian Ocean research, robotics, climate, etc.).

Germany

Since 2011, Germany has been running the Industry 4.0 program for industrial development. The essence of the program is to increase the competitiveness of the German industry by means of introduction of scientific achievements in the field of new materials and production technologies, as well as integration of digital solutions in the management of production processes, in particular, by connecting the Internet of Things to machine-tools, machines and warehouses.

It is worth noting that the Industry 4.0 program, which was designed as a targeted concept for industrial development in Germany, does not contain special priorities in the field of research and development. It predominantly finances research projects aimed at the development of production technologies, new materials, electronic services, etc. which focused on competitive product innovations.

A number of priority areas of research and development appear in the 2025 German High-Tech Strategy Plan, adopted in 2006, which is currently in its fourth phase, where research and development priorities have been given new goals within the framework of seven subject areas: health and care, sustainable development, climate protection and energy, mobility, city and countryside, security, as well as business and work.[4]

CURRENT SCIENTIFIC AND TECHNOLOGIC POLICY OF RUSSIA

Recently adopted legal acts in Russa, including The Strategy of Scientific and Technological Development of the Russian Federation approved by the Decree of the President of the

[2] URL: https://www.legifrance.gouv.fr/loda/id/JORFTEXT000042738027

[3] URL: https://www.cnrs.fr/en/our-challenges/national-research-programmes

[4] URL: https://bmbf-prod.bmbfcluster.de/upload_filestore/pub/Research_and_innovation_that_benefit_the_people.pdf

Russian Federation No. 145 dated 28.02.2024, the Decree of the Government of the Russian Federation No. 603 dated 15.04.2023 "On approval of priority directions of projects of technological sovereignty and projects of structural adaptation of the economy of the Russian Federation…", etc., give a clear evidence that the key resource of the national economic development should be scientific research and development, first of all, aimed to compensate the challenges of the Russian economy, develop technological facilities and ensure technological sovereignty.

For the first time the priority directions of science and technology development were approved by the Governmental Commission on Science and Technology Policy in 1996. The list included eight items[5]:

- fundamental research;
- information technologies and electronics;
- manufacturing technologies;
- new materials and chemical products;
- technologies of biological and living systems;
- transportation;
- fuel and energy;
- ecology and smart use of environmental management.

Subsequently, in 2002, 2006, 2011 and 2015 similar documents were adopted with changes of composition in the list of priority directions. At the same time, as a rule, lists of critical technologies were approved.

It is worth pointing out, that all priority directions stipulated in the documents of 2015 included approximately the same list of technologies and they were of advisory, rather than of mandatory nature [5].

Since 2015, the list as such was not revised. However, the Strategy for Scientific and Technological Development of the Russian Federation, approved by the Decree of the President of Russia No. 642 dated 01.12.2016, was expanded with a section "Priorities and Prospects of Scientific and Technological Development of the Russian Federation".[6] It was also noted that the priorities developed within the Strategy for the period of the next 10–15 years are focused on ensuring the provision of technologies capable to put into effect the industrial, environmental and social development of the country:

- transition to advanced digital, artificial intelligence-driven production technologies, robotic systems, new materials and design methods;
- transition to environmentally-friendly and resource-saving energy;
- transition to personalised medicine, high-tech healthcare and health-saving technologies;
- transition to a highly productive and environmentally-friendly agro- and aquatic economy;
- countering man-caused, biogenic, sociocultural threats, terrorism and ideological extremism;
- territorial connectivity of the Russian Federation sustained by means of creation of smart-driven transportation and telecommunication systems;
- ability to respond effectively when confronting dramatic challenges imposed for the Russian society.

The Resolution of the Government of the Russian Federation No. 1325-r dated 24.06.2017 approved the activities planned for the implementation of The Strategy for Scientific and Technological Development of the Russian Federation for the period of 2017–2019 (hereinafter — the Action Plan). The Ministry of Education and Science of the Russian Federation was appointed as its coordinator and federal executive authorities, state corporations, development institutions, foundations aimed to support scientific, scientific-technical and innovation activities, the Russian Academy of

[5] URL: https://docs.cntd.ru/document/9034171

[6] URL: http://www.kremlin.ru/acts/bank/41449/

Sciences as well as executive authorities of the constituent entities of the Russian Federation were in charge of its implementation.

In accordance with the abovementioned Action Plan, the State Programme "Scientific and Technological Development of the Russian Federation"[7] was developed. The priorities of the Sate Program were determined, among other things, as the main directions of the global scientific, technological and innovation spheres and also the need to respond to major challenges associated with them.

In the late-December 2020, the Government approved the "Programme of Fundamental Scientific Research in the Russian Federation for a Long-Term Period (2021–2030)".[8] The Russian Academy of Sciences was appointed as its coordinator.

In general, it should be noted, that all the adopted programmes did not have instruments for the implementation of critical technologies.

The priorities outlined in the Decree of the President of the Russian Federation № 145 dated as of 28.02.2024 "On the Strategy of Scientific and Technological Development of the Russian Federation", fundamentally correspond to those outlined in the Strategy of 2016, however, they bear an expanded and more emphasized interpretation. However, the most important thing is that for the first time it was adopted that in practice the Government of the Russian Federation should "envisage budgetary allocations for the implementation of this Decree when drafting the federal budget for the next fiscal year and for the planned period[9]".

Assessing the abovementioned approaches towards development of priorities in the field of science, practiced by the Russian Federation and other economically developed countries, it should be noted, that they are focused to build advanced technologies in the field of health care, ecology, agriculture, material production, i.e. in general, to ensure national technological sovereignty.

COMPARISON OF SCIENTIFIC RESEARCH FUNDING

According to Statista, in 2022, global research and development spending amounted to more than $ 2.47 trillion (in purchasing power parity terms). At the same time, the growth rate of global R&D expenditures has remained positive since 1996. A slight decrease in the indicator was noted only in 2019, which occurred due to the COVID-19 pandemic. [6].

Most scientific research works indicate that R&D is an important driver of economic growth. The main argument for such a conclusion being the recognition that R&D spending has a positive impact on innovation and overall productivity [7, 8]. Whereas, the improvement of technology through innovation activities is undeniably considered to be a driving force for improving living standards in the long run. Accordingly, many scholars believe that investment in science contributes to a more efficient economy [9]. To illustrate this conclusion, here is the ranking of countries by the indicator "Domestic expenditure on research and development as a percentage of gross domestic product" (*Fig. 1*). Thus, according to the top-list results of 2022, Israel has the leading indicator of 5.56%, followed by the Republic of Korea (4.93%) and the USA (3.46%). Russia ranks 40th (0.94%).

To be fair, it should be noted that this indicator gives only a rough idea of the level of expenditures on R&D and in no way indicates the effectiveness of scientific research.

Thus, according to distinguished international online journal Scimago Journal & Country Rank, in 2022 Russia ranked 12th among the global leaders of publications in international peer-reviewed scientific journals, which indicates a fairly high level of efficiency of

[7] URL: http://static.government.ru/media/files/AAVpU 2sDAvMQkIHV20ZJZc3MDqcTxt8x.pdf

[8] URL: https://docs.cntd.ru/document/573319222

[9] URL: https://www.garant.ru/products/ipo/prime/doc/408518353/

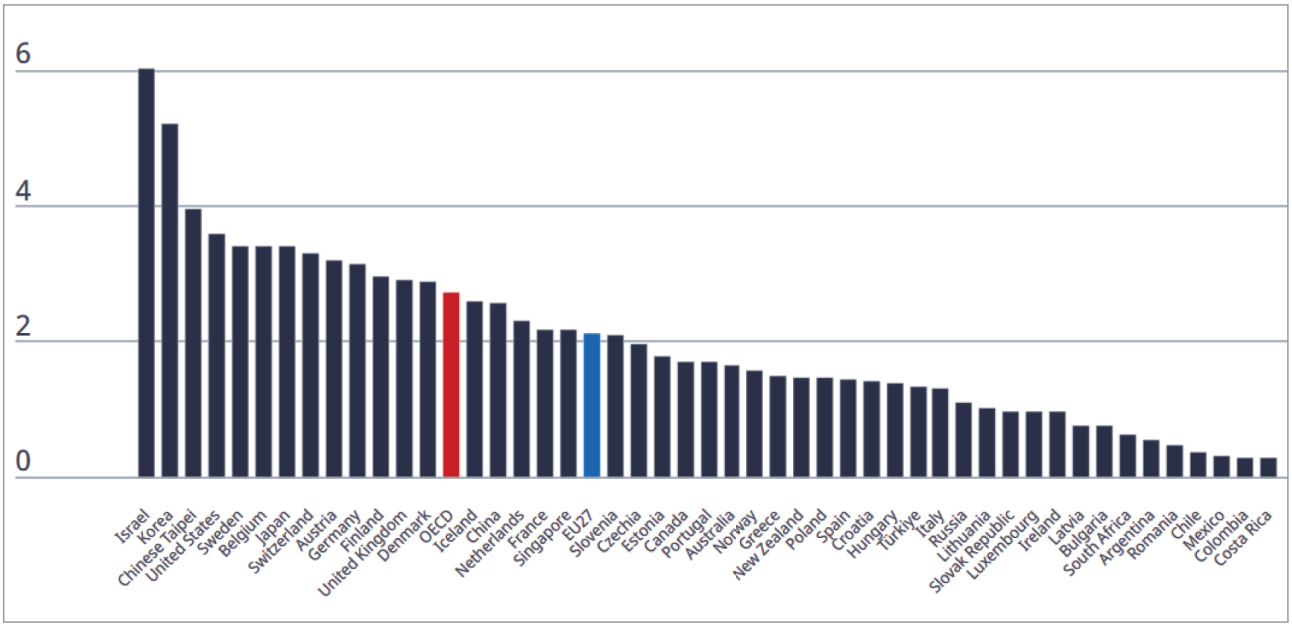

Fig. 1. **Domestic research and development costs share in GDP by 2022**

Source: https://www.oecd.org/en/data/datasets/main-science-and-technology-indicators.htm

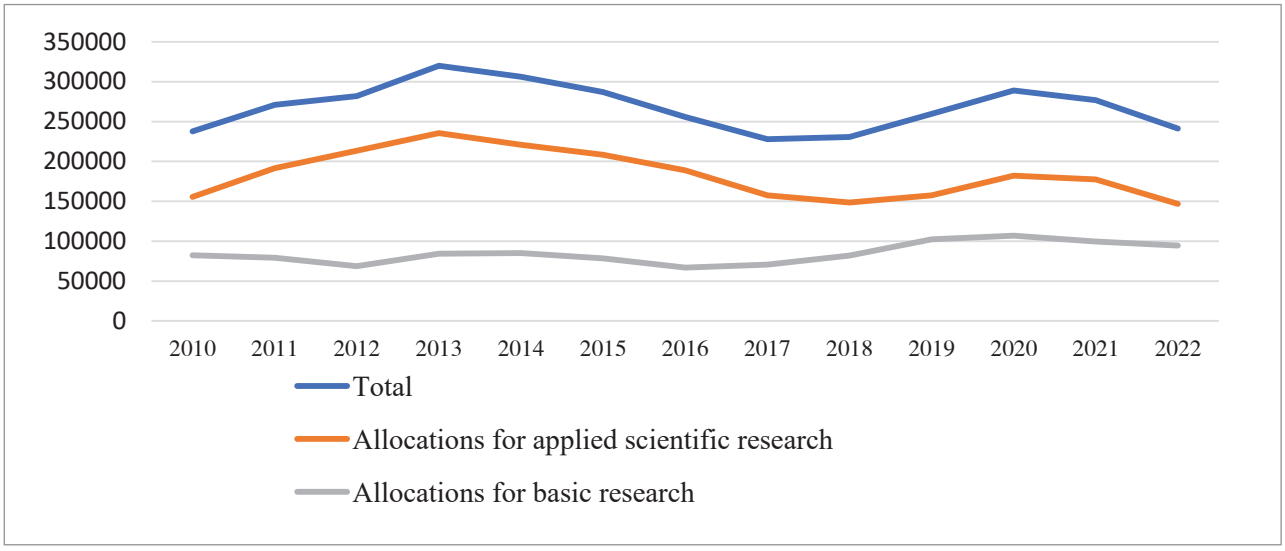

Fig. 2. **Civil science funding from the federal budget of Russia in constant prices in 2010 (in million Rubles)**

Source: compiled by the authors on: https://issek.hse.ru/mirror/pubs/share/907029023.pdf

Russian science,[10] which, unfortunately, has nothing to do with innovation activity and economic effect.

This conclusion is somewhat explained in the work of Chang-Sheng Liao and Xinyang Li [10], who used the so-called method of threshold estimation to study the impact of R&D efficiency on economic growth in different regions of China. The scientists stated, that there is a non-linear relationship between R&D efficiency and economic growth, mainly due to dynamic and static

[10] URL: //www.scimagojr.com/countryrank.php.

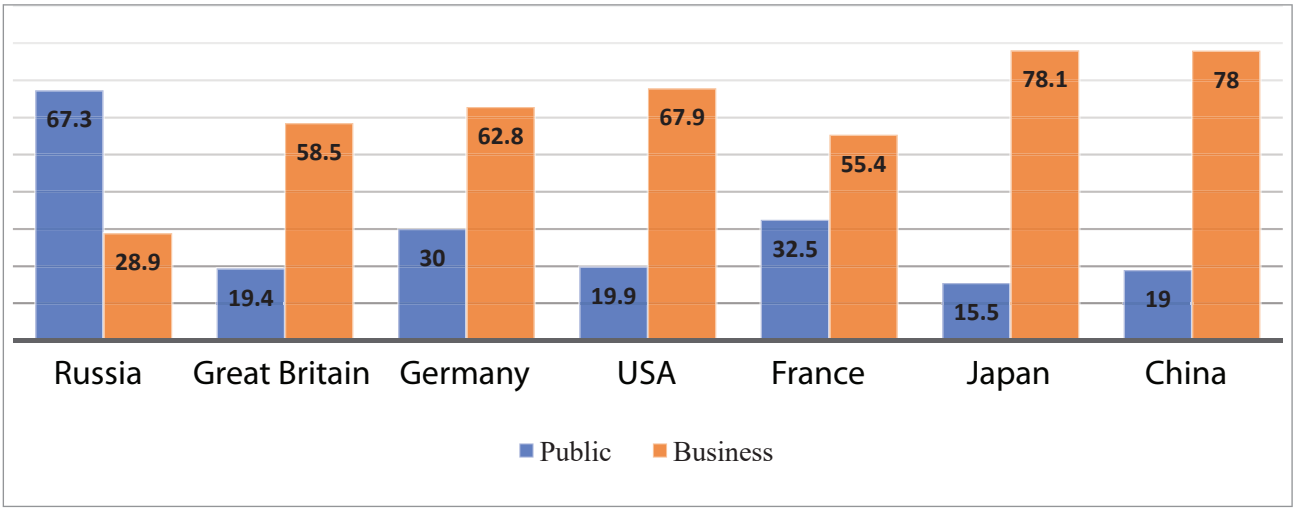

Fig. 3. **Leading countries of the world R&D domestic costs in 2022, %**

Source: compiled by the authors on: https://issek.hse.ru/mirror/pubs/share/907029023.pdf

threshold effects determined by the level of financial development of individual regions, which limits the ability to invest in the use of R&D results, i.e. in innovation. The authors make a conclusion that research results as such do not have a significant impact on economic growth in such regions. This conclusion can probably be applied to Russia as well, where enterprises and entities, especially among small and medium-sized businesses, have a limited possibility to invest in innovation and technology.

Thus, expenditures for research and developments are not always directly proportional to economic growth. This effect can be generally explained by the distribution of financial resources between fundamental and applied scientific research (*Fig. 2*).

Analyzing expenditures on research and development, it should be noted that in each country there are a few sources of funding for science, the main of which are funds from the State budget and the business sector. Notably, their shares vary greatly (*Fig. 3*).

It should be noted, that in the West the expenditure on science from the State (public funds) is less than that of the business sector, while in Russia the situation is reverse. The reasons are manifold: among the main of them are the structural peculiarities of the business sector and the historical particularities of its development.

CONCLUSION

The comparative analysis of competitiveness and allocation of funding in the field of science and technology allows us to justify the current priorities in this area. At the same time, it is necessary to create the instruments of technology implementation, taking into account the fact, that funding predominantly from the state budget is under criticism with the following arguments: public funding does not correspond to the market principles of economic development and does not generate a mature innovation environment. At the same time, it should be noted, that in modern conditions, when the Russian Federation is deprived of the opportunity to import the latest production technologies, the existing structure of national economy with predominance of state funding of science can contribute to a positive economic effect, provided that the allocations are targeted to the development of the most demanded technologies and ensuring technological sovereignty. In this case, the most urgent condition is effective management of relevant programs and projects.

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The Role of The Greenhouse Gas Emissions Trading System in the Carbon Regulation of the European Union

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ABSTRACT

The relevance of the study is due to the need to study the features of low-carbon development of the world economy, to understand the mechanisms and tools of decarbonization, including the formation of a comprehensive policy providing for a wide range of measures to transition to a green economy with minimizing negative consequences. **The subject** of the study is the EU quota trading system as an economic instrument for regulating greenhouse gas emissions. **The purpose** of the work is to analyze the stages of development of the European quota trading system, identify the existing advantages and disadvantages of this system. **As a result** of the conducted research, the existing problems of the European quota trading system are identified; measures to improve the functioning of this system are described; the boundary carbon correction mechanism (as part of the development of the system) is investigated, including its impact on exporters to the EU.

Keywords: carbon regulation; carbon pricing; European Union; emission trading system; green economy; carbon charges; greenhouse gases; climate change; boundary carbon correction mechanism

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INTRODUCTION

At the Conferences of the UN Framework Convention on Climate Change, held in Dubai in 2023, the majority of representatives of the world's leading economies confirmed that they aim to reach carbon neutrality by the middle of this century (2050–2070). Nevertheless, geopolitical and economic crises pose risks to this and they could lead to the introduction of more stringent measures. The choice of instruments of climate policy becomes an even more complex and important task in the context of constraints and negative dynamics of most macroeconomic indicators, such as slowing GDP growth, high inflation, volatile prices for fuel and energy commodities, etc.

ECONOMIC INSTRUMENTS FOR CARBON REGULATION

Carbon regulation is a system of measures aimed at reducing emissions of greenhouse gases, primarily carbon dioxide (CO_2) into the atmosphere of the Earth. Carbon regulation may include various instruments (*Table 1*). Its main goal is to reduce the negative impact on the climate and prevent the potential effects of global warming.

The employment of carbon regulation mechanisms usually involves the use of a variety of instruments. In this case, the most effective and universal are economic measures, especially those that establish a price on carbon, in view of the costs of struggling the consequences of greenhouse gas emissions during the formation of the cost of products.[1]

There are two main approaches to carbon pricing [1]:

1. *Direct* carbon tax *approach* establishing a fixed rate per ton of carbon emissions. It can be set up at a level sufficient to stimulate emission reductions up to a desired level.

2. *Market-based approach* involves an emissions trading system which sets limits on the total amount of emissions that can be produced by a particular sector of the economy. These limits are distributed among market participants who are allowed to trade emission allowances to optimise their emission abatement costs.

ENERGY TRANSITION IN THE EU COUNTRIES

According to Eurostat, the EU's energy mix is predominantly made up of oil and oil products, with a 37% share. This is followed by natural gas with 21% and renewable energy with 18%.

[1] URL: https://www.economy.gov.ru/material/file/c13068c695b51eb60ba8cb2006dd81c1/13777562.pdf?ysclid=le30toz4me704691704

Table 1

Regulation instruments of greenhouse gas (GHG) emissions

Administrative and technical instruments (direct limitation of harmful anthropogenic impact on an ecosystem)	Economic instruments (creating economic incentives)
Technical regulation Resource consumption norms (energy efficiency standards for buildings, fuel consumption norms, etc.). The best available technologies. Quantitative limitation of emission (fixing emission "ceilings" for enterprises and industries)	Regarding emissions: Carbon taxes. Emission trading systems. Subsidies for emission reduction (including subsidies for RES and other clean energy sources). Regarding production or consumption of carbon-containing products: Tax on carbon-containing products. Subsidies for non-carbon-compound products

Source: URL: https://www.economy.gov.ru/material/file/c13068c695b51eb60ba8cb2006dd81c1/137–77562.pdf

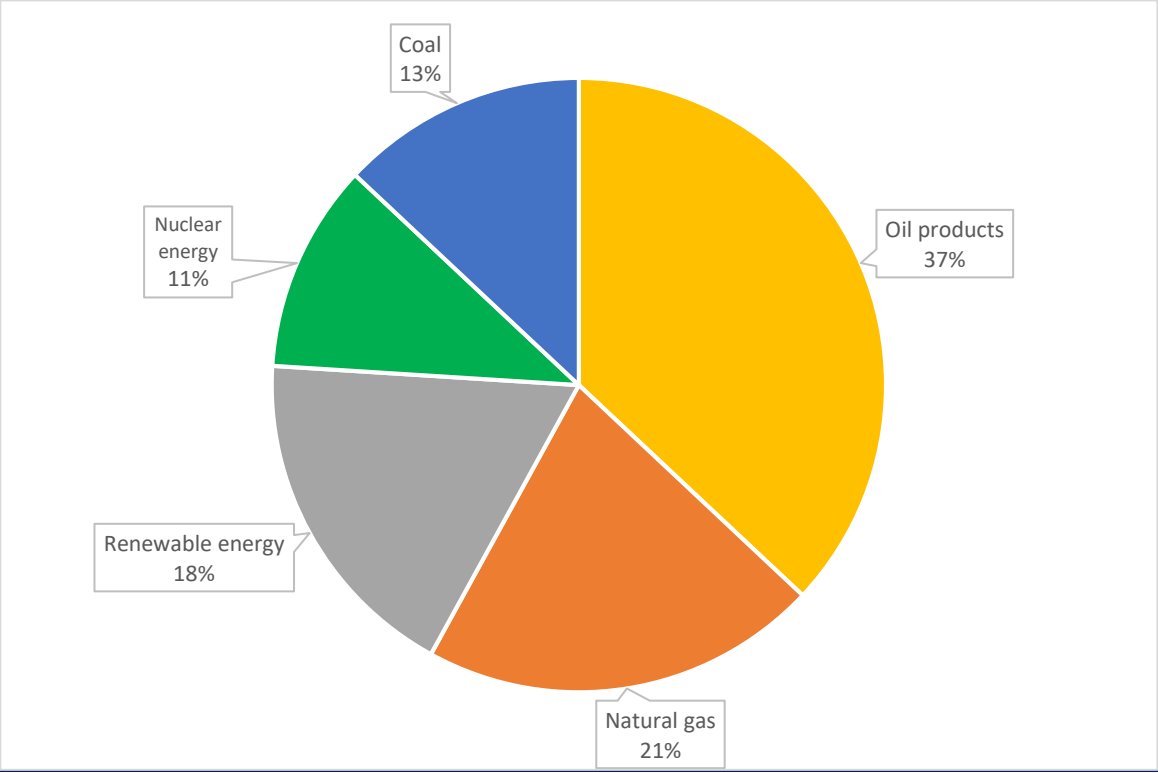

Fig. 1. **Share of energy products in total energy available in the EU, 2022**
Source: URL: https://ec.europa.eu/eurostat/web/interactive-publications/energy-2024

Coal and nuclear power account for 13% and 11% respectively. *Figure 1* shows the structure of the EU energy mix, according to which fossil fuels account for almost ¾ of the total. However, due to the EU targets, this ratio may change significantly by 2050.[2]

However, the shares of different sources in the energy mix are not equal among the member countries. In 2022, the share of oil and oil products was 87% in Cyprus, 86% in Malta and 61% in Luxembourg. Natural gas played a key role in the energy mix of such countries as Italy (37%), Hungary (31%), Ireland and the Netherlands (30% each). The leaders in renewables were Sweden (50 per cent) and Latvia (42%). In France and Sweden, nuclear power plants were a significant part of the energy mix, 35 and 26 per cent respectively. Solid fossil fuels were most widely used in Estonia (58%) and Poland (41%)[3].

Lack of efficiency in the use of natural resources contributes to deteriorated climate situation. The EU is consistently running a policy aimed at making Europe a climate-neutral continent by 2050, when greenhouse gas emissions in the EU countries will be compensated by their absorption [2].

In 2019, "The European Green Deal" Programme was approved as part of the EU's development strategy for the years 2019–2024. It aims to change the way goods and services are produced and consumed, which accounts for 75% of greenhouse gas emissions [3].

The main objectives of the programme include improving resource efficiency, transitioning to a circular economy, restoring biological diversity and reducing emissions. Such initiative is expected to have an impact not only on the economy of the European Union, but also on its partners due to possible changes in energy markets and reduced purchases of high-carbon products[4].

[2] URL: https://ec.europa.eu/eurostat/web/interactive-publications/energy-2024

[3] [3] Ibid.

[4] URL: https://eec.eaeunion.org/upload/medialibrary/b34/Doklad-

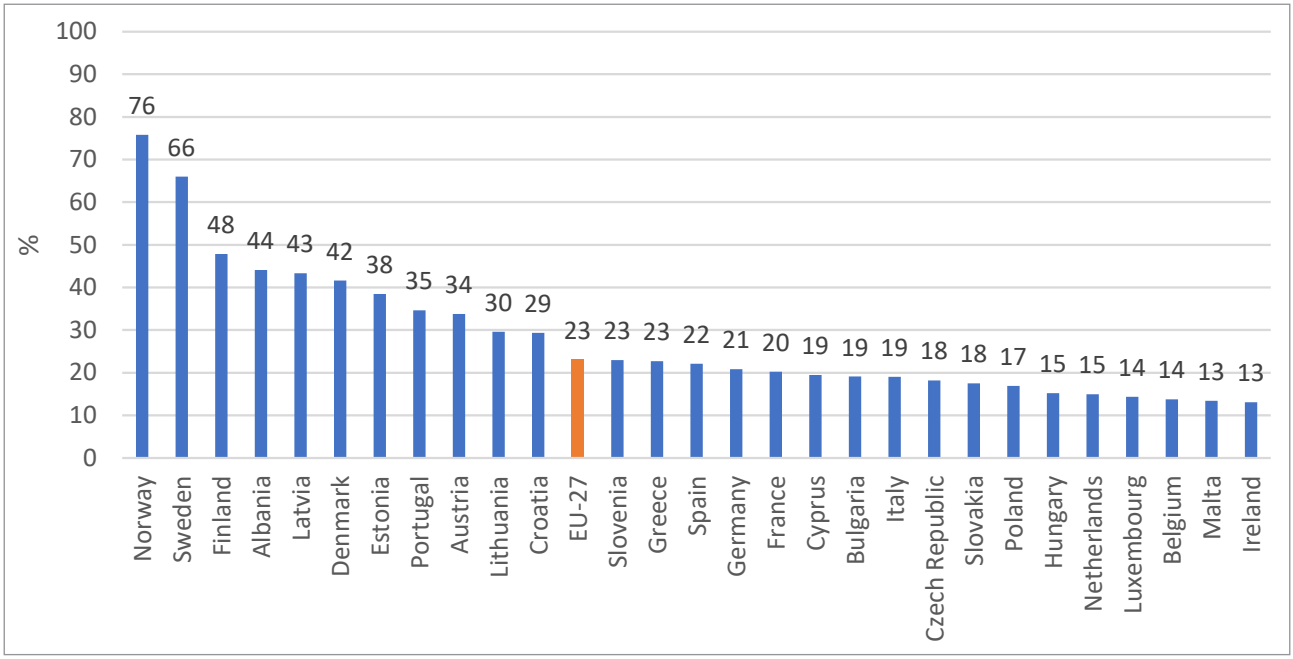

Fig. 2. **Overall share of energy from renewable resources in the EU, 2022**

Source: URL: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20231222–2

According to the prognosis of the European Commission, fossil fuels will continue to cover about half of the EU's energy needs by the year 2030. At the same time, fossil fuels are characterised by different degrees of intensity of emissions into the atmosphere [3].

Thus, the use of coal, one of the most high-carbon elements of the EU energy system, is expected to decrease significantly by 2030. By 2050, it is planned to almost completely avoid the use oil from the energy mix, and natural gas will provide only 10% of the EU's energy needs [4].

The active use of renewable energy in electricity, industry, construction and transport could boost the EU's independence in energy, kick-start the transition to green energy and, later on, reduce energy prices. The European Commission proposes to increase the renewable energy target by 2030: from 40 to 45 per cent within the framework of the Fit for 55 package. According to the latest Eurostat data, the share of RES in 2022 consumption at the EU level has already reached 23% (*Fig. 2*).

Such fundamental changes in the EU energy system will inevitably lead to geopolitical and economic consequences, including for oil and gas exporting countries, as well as for global energy markets and European energy security, etc. [5].

At the same time, despite the start of process of energy transition, there exist a number of difficulties:

- endemic problems of energy supply, which are related to the increasing share of RES in generation;
- the probability of another energy crisis, characterised by a sharp increase in the cost of fuel and energy commodities, which brings into question perspectives of success and forethought of the European decarbonisation strategy and it gives a new direction to discussions on the role and place of fossil fuels in the EU energy mix;
- the increasing share of coal in electricity generation due to the energy crisis, which has a negative impact on emissions.

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All these problems require an integrated approach and joint efforts of all EU member states. They become drivers for regular reformatting of energy policy.

GREENHOUSE GAS EMISSIONS TRADING SYSTEM IN THE EUROPEAN UNION

Currently, decarbonisation issues are under particular attention, among other things, due to deterioration of climate situation. As a consequence of extensive economic growth, increased greenhouse gas emissions pose serious threats to national security: more frequent droughts, water shortages, shrinking forest territories, reduced air quality, etc.). How to reduce greenhouse gas emissions and achieve carbon neutrality? This can be done through carbon pricing. Currently, there are 73 carbon pricing initiatives in the world, including cap-and-trade systems and carbon taxes and costs (11 Ht CO_2-eq.)[5].

One of the most well-developed and important initiatives is the European Emissions Trading System (hereinafter EU ETS) [6]. This system started to operate in 2005 and continues to be the main instrument of the EU policy towards carbon neutrality. The EU ETS is the largest one of its kind. It regulates about 40 per cent of emissions from more than 10,000 industrial sources[6].

The basis aspect of the EU ETS is the traditional approach to addressing environmental protection issues, providing economic incentives for businesses to reduce emissions [7]. Initially, the effectiveness of this system was limited, however, after some changes in the third phase of its implementation, the pressure on enterprises with high emission levels has increased significantly, as was evidenced by the increase in the cost of allowances (*Table 2*) [8].

Initially, the European Commission determines the annual total indicator for emissions from all sources and each type of greenhouse gas. Based on this data, the maximum permitted emissions are set for each emitter in the current year. This becomes its annual quota. Then these allowances are determined as individual emission permits to be sold to the relevant regulated entities.

Within the framework of this mechanism, emitting enterprises must first of all purchase the required number of emission allowances from the central authority. If an enterprise exceeds its quota, it can buy additional permits from those that have reduced their emissions. If its emissions are below the quota, it can sell the remaining permits to other enterprises, or to the central authority. This mechanism stimulates enterprises to reduce emissions in order to reduce the cost of buying additional permits [9].

Thus, the European Commission has made it clear, that the number of allowances granted for each emission source must not exceed the CO_2 emission level set by its pre-determined production plan. Establishing the upper limit of CO_2 emissions allows to create the necessary deficit of allowances for stimulating trade and maintaining an adequate (high) cost of permits [10].

Emission prices in emissions trading systems, including the EU ETS, depend on the balance of supply and demand. They are also determined by the free exchange of allowances. A cap-and-trade mechanism ensures leveling up automatically of distribution for emissions and their gradual reduction. It involves the free and voluntary re-allocation of emission allowances from sources, which do not need them to those which need them, because of the higher carbon trace of their products. It should be noted, that the EU ETS has the potential to be a very effective means of managing CO_2 emissions into the atmosphere. However, over the long term, no country has been able to successfully implement a climate strategy and achieve significant results (*Fig. 3 — in kilotonnes CO_2 eq*).

To achieve cost-effective emission reductions, the EU ETS has been reinforced. Specifically,

[5] URL: https://carbonpricingdashboard.worldbank.org/

[6] URL: https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/what-eu-ets_en

Table 2

EU ETS Developmental Stages

Characteristics of the stages	Phase 1 (2005–2007)	Stage 2 (2008–2012)	Stage 3 (2013–2020)	Stage 4 (2021–2030)
Objective of the stage	Pilot project	Reduction of emissions by 8% compared to the level of 1990	Reduction of emissions by 21% compared to the level of 1990	Reduction of emissions by 62% compared to the level of 2005
Territories	EU	EU & Norway	EU with Norway, Iceland, Liechtenstein	EU + Norway, Iceland, Liechtenstein. UK withdrawn from EU ETS
Types of greenhouse gases	Carbon dioxide CO^2	Carbon dioxide CO^2 Nitrous oxide N_2O with voluntary agreement of participating countries	Carbon dioxide CO^2. Nitrous oxide N_2O. Perfluorocarbons (PFC) from production of aluminium	Carbon dioxide CO^2. Nitrous oxide N_2O. Perfluorocarbons (PFC) from production of aluminium
Application sectors	Energy. Energy-intensive sectors	Energy. Energy- intensive sectors incl. aviation within the EEA	Energy. Energy intensive industries. Aviation in the EEA and aluminium, oil, chemicals.	Energy. Energy intensive industries. Aviation in the EEA, aluminium, oil, chemicals + maritime transport
Types of quotas	Free allocation of almost all quotas. Penalty for non-compliance € 40/ tonne CO^2	Free quota allocation reduced by 90 per cent. Auctions introduced in some member states. Penalty for non-compliance up to € 100/tonne of CO^2	Auctions. Free quota allocation allowed for green policy companies. Introduction of Market Stability Reserve and Reserve for new entrants. Penalty for non-compliance up to € 100/tonne of CO^2	Retention of free quotas for green companies. Gradual reduction of remaining free quotas. Penalty for non-compliance up to € 100/tonne of CO^2
Specialties	Over-supply of allowances, low emission prices	Supply and demand imbalance	Introduction of market correction mechanisms for imbalances of supply and demand	Expanded coverage of industries — introduction of a separate emissions trading system for construction and transport

Source: URL: https://www.ecb.europa.eu/pub/economic-bulletin/focus/2021/html/ecb.ebbox202106_05~ef8ce0bc70.en.html

free allowances are significantly reduced on an annual basis and its territory is expanded with itineraries of maritime transportation (*Fig. 4*). Overall, restrictions have been expanded to reduce emissions by 62% by 2030 compared to 2005 level.

Simultaneously, the operational parameters of a special Market Stability Reserve (MSR) were adjusted to organise a balanced EU carbon market. This mechanism allows for automatic changes in the number of permits auctioned under predetermined conditions.

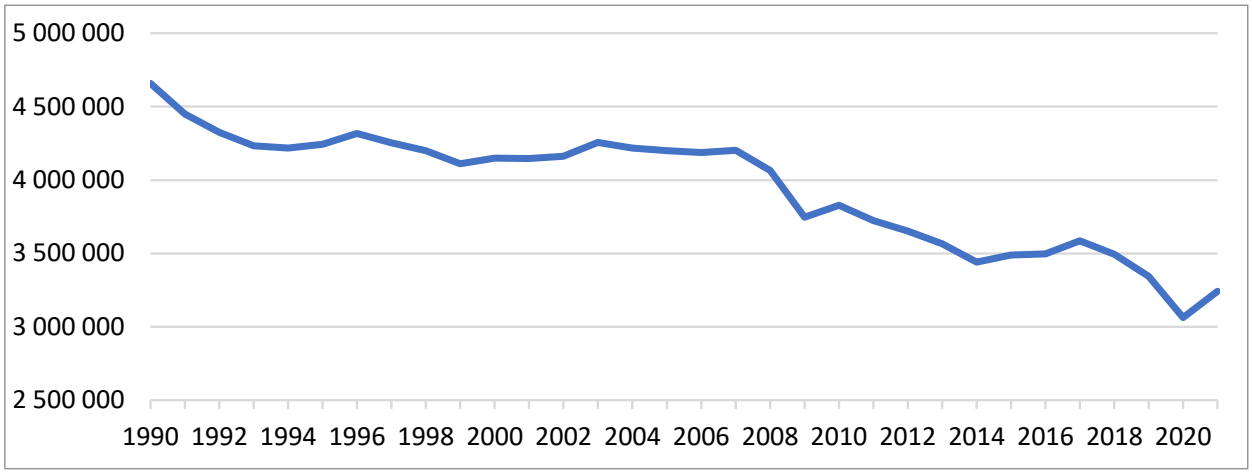

Fig. 3. **GHG emissions in the EU in 1990–2020, ktonnes CO_2 eq.**

Source: URL: https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer.

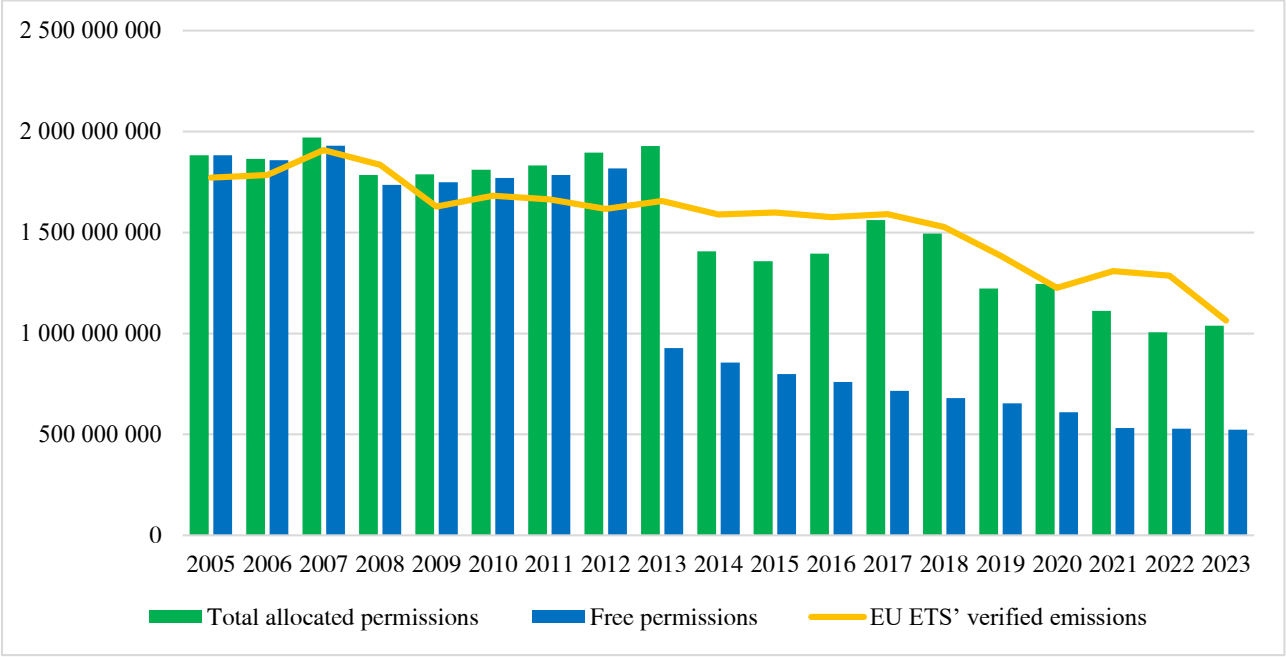

Fig. 4. **EU ETS reduction in 2005–2023, in ktonnes CO_2 eq.**

Source: URL: https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1

For example, if the total volume of unsold permits in the carbon market exceeds a certain limit, they are automatically transferred in the MSR. Conversely, if the total volume of unused permits is insufficient, they can be removed from the Reserve and positioned for the market.

To improve the EU ETS system the following measures should be taken, including:

- More effective reporting transparency. Requirements for reporting procedure of enterprises, as well as monitoring and control system for emissions should be more effective. This will help to inspire a better confidence

about the system and reduce the chances for manipulation.

• More efficient market monitoring. To prevent manipulation and ensure market stability a set of special measures should be introduced. For example, to limit the amount of allowances that can be sold for, or bought by a single market participant.

• The cost of quotas should be economically justified — high enough, but not exceedingly high that turns out unprofitable for enterprises [3].

INTRODUCTION OF THE EU BORDER ADJUSTMENT CARBON MECHANISM

To avoid the transfer of high-carbon emission industries outside the EU territory to other countries with no (or low) carbon charges and to keep European businesses competitive qualities, the EU has developed the Carbon Border Adjustment Mechanism (CBAM).

The point is, that some enterprises move their high-carbon production outside the EU borders to gain an advantage over other European companies which comply with the climate agenda in good faith. In order to prevent such cases, a step-by-step monitoring system of emissions is introduced, followed by payments to the EU budget for greenhouse gases contaminating the atmosphere [11].

However, it should be noted, that a few decades ago, many large companies made a wide-scale re-location of their production facilities to other countries from the EU territory. The leaders of Russia, India, Brazil, South Africa, as well as BASIC and BRICS groups have repeatedly drawn attention of international community to the fact, that this phenomenon contradicts the norms of international law, including the articles of the WTO charter and the Paris Agreement.[7] Besides, it should be emphasized, this

[7] URL: https://greenfiscalpolicy.org/brics-summit-is-likely-to-strongly-oppose-carbon-tax-proposed-by-eu/

Table 3

Top 10 CBAM exposure countries

No.	Country	Product exports to the EU (% of total product exports)	Gross relative index of CBAM impact	Most vulnerable products
1	Zimbabwe	87	0.087	Iron and steel
2	Ukraine	37	0.053	Cement
3	Georgia	35	0.046	Fertilisers
4	Mozambique	74	0.045	Aluminium
5	India	19	0.031	Iron and steel
6	Belarus	50	0.030	Cement
7	Egypt	38	0.022	Fertilisers
8	Russia	31	0.020	Energy resources
9	Kazakhstan	14	0.016	Aluminium
10	Venezuela	45	0.015	Iron and steel

Source: URL: https://www.worldbank.org/en/data/interactive/2023/06/15/relative-cbam-exposure-index#1

makes a large-scale menace to economies of export industries for a number of developing countries.

Until the mechanism is fully and effectively operational, business in the EU has to purchase permits for rising prices, which affects the final cost of European products and services. Therefore, the European authorities intend to launch the Carbon Border Adjustment Mechanism aiming to increase competitive capabilities of producers of goods and services within the European Union (*Table 3*). Such measures force EU partners to introduce their own carbon trading systems in order to shift the payment of carbon emissions to their territory [10]. Currently, 24 national and subnational markets operate with CO_2 emission allowances trade. Nearly 20 such marketplaces are still in development. In 2021, border carbon adjustment mechanisms started to operate in China, the UK and New Zealand.

The CBAM Regulation associated with higher carbon emissions and assessed by the EU as high risk carbon-leakage products. These include aluminium, cement, fertilisers, iron and steel. Importing goods into the EU territories will require authorisation from a competent authority of the entered into force in May 2023. The carbon levy is expected to come into force on the January 1, 2026 and will initially deal with import of certain products EU member state. The cost per tonne of emissions is influenced by the weekly average final price of a tonne of emissions auctioned under the EU ETS (as of 10 June 2024, the CO_2 price is € 70.9/t). It is important to emphasise that the amount of the levy for an imported good will depend on the actual amount of emissions at the production site where it was produced. The emission level is calculated either by importers or manufacturers. In any case, the declared emissions must be verified by an independent person accredited by the European Commission [12].

At the same time, goods are exempt from the levy if the country builds up its national cap-and-trade mechanism and agrees with the EU on compatibility with the EU ETS.

If carbon levies are charged, the country has a possibility to reduce the amount of CBAM levies. In this case, the importer may ensure the reduction by providing the proper information: the type of product according to the EU commodity classification; the type of carbon price; the country where the carbon fee was paid; whether there is a rebate or any form of compensation available in the country where the fee was paid; the amount of direct or indirect emissions covered, etc.). Switzerland, Norway, Iceland and Liechtenstein are exempt from this system.

CONCLUSIONS

To summarise, it can be said that currently, economic incentives for the benefit of global climate prevail in carbon regulation. The implementation of some of the above mentioned initiatives should contribute to improving the global climate situation, increasing the efficiency of the system of emissions trading within the framework of the majority of countries and regions, including the EU member states [9].

Overall, the EU ETS has demonstrated its potential to create tangible incentives for businesses to reduce greenhouse gas emissions. Reforms and adaptations took place over three consecutive phases, which culminated in the introduction of a mechanism to stimulate reduction of carbon dioxide in various industrial sectors.

The third phase (2013–2020) introduced meaningful changes which significantly increased the pressure on emitting industries. This shift is indicated by a notable increase in allowance prices, which showcases more growing economic signals used to substantially reduce emissions.

Fulfilment of such key conditions as development of reliable means of verification procedure to ensure accurate reporting of greenhouse gas

emissions at industrial enterprises, establishment of economically justified prices for allowances, creation of clear and transparent conditions for trading in allowances, etc., will ensure improved efficiency of the system adopted by the European Union. It is also worth mentioning once again the Carbon Border Adjustment Mechanism (CBAM), which makes a contribution to the regulation of emissions. Although, some countries consider some CBAM regulations fail to meet basic principles of the WTO: most-favoured-nation treatment, EU tariff commitments, principles of uniform administration of measures, etc. It will be possible to draw final conclusions only after the full implementation of the CBAM.

To sum up, the EU ETS is the cornerstone of the EU's decarbonisation policy. It demonstrates both the potential and the challenges of market-based approaches to carbon regulation. If it is successful to encourage reductions of emissions while balancing economic performance, it may influence global efforts to combat climate change. The system is constantly upgraded with supplementary measures (such as the CBAM) which reflects the dynamic nature of the EU's decarbonisation policy in view of changing economic and climate realities.

As the world faces the need to reduce carbon emissions, the European cap-and-trade system gives a practical example of decarbonisation of the economy. The ability of countries to effectively combine economic goals with reductions of greenhouse gas emission will be of paramount importance for shaping the global response to climate change.

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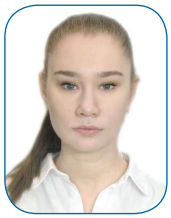

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ORIGINAL PAPER

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Recovery of International Tourism in Russia and China after the COVID-19 Pandemic

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ABSTRACT

This article focuses on the development of international tourism in Russia and China during and after the pandemic. The study aims to identify trends and specific features of the post-pandemic recovery process of international tourism in the context of Russian-Chinese bilateral cooperation. Expanding tourist exchanges with China, one of Russia's key tourism partners that implemented strict pandemic restrictions, is directly aligned with Russia's economic interests in developing bilateral cooperation. The authors examine the impact of the pandemic on China's tourism industry, considering the phased introduction of COVID-19 restrictions from 2020 to 2023. The article also addresses its effect on inbound tourism in Russia, highlights the unique features of the global tourism industry's revival, and outlines the factors, directions, and geography of resumed tourist flows between Russia and China within the current stage of their interaction. Special attention is given to measures taken in cities and regions of the Russian Far East to enhance the country's tourism appeal.

Keywords: global tourism; international tourism in Russia; international tourism in China; post-pandemic period; post-pandemic economic recovery; Russian-Chinese cooperation; Russian-Chinese tourism

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INTRODUCTION

Tourism is one of the largest and fast-developing sectors of the global economy. Starting from the 20th century, countries and individual cities — cultural, historical, educational and entertainment centres — grew actively to raise their economic potential, boosted by developing industry, transportation, communication technologies, social sphere, etc., which led to a multiple increase of tourist traffic. Nowadays, tourism generates notable export earnings, which enhances the development of such tourism-related industries directly or indirectly, as business and leisure infrastructure, finance, hospitality and restaurant business, transport, education, etc. It also supports national economy and social progress as a whole.

The significance of the tourism industry for modern countries is determined by the depth of the decline in the foreign travel as a result of the COVID-19 pandemic, when the industry was among the most affected sectors by closed of borders, restricted movement and contacts, tough preventive measures to restrict the spread of the disease, which as a whole significantly reduced the number of tourists and led to serious financial problems.

Currently, Russia and China, two major players of the global tourism market, rehabilitate their economies within the framework of these sectors of tourism. Due to both historical factors and the current geopolitical situation, this period of time is characterised by intensified bilateral economic co-operation and, particularly, a growing mutual interest in the heritage of both cultures. Therefore, the scientific and practical task of the research is to determine the potential for the development of economic relations in the sector of tourism between both nations.

IMPACT OF THE PANDEMIC ON CHINESE TOURISM INDUSTRY: HISTORICAL AND ECONOMIC PERSPECTIVE

Before the start of the pandemic, China was experiencing a strong growth in the number of foreign visitors arriving in the country for various purposes, totally 31.9 million: 17.4 million (54.6 per cent) were classic tourists eager to enjoy sightseeing and relaxing; 1.4 million visitors of relatives and friends; 7.1 million visitors aimed for work. Over the period 2014–2019, the annual increase of foreign visitors was 5.5 million (21 per cent), including the growing number of classic tourists — 8.5 million (95 per cent) and those who planned to work — 3.9 million (2.2 times more). In 2019, foreign exchange earnings from the international tourism amounted totally 131.25 trillion USD, which exceeded 25.9 trillion USD (24.6 per cent) compared to 2014. Russian visitors made up an impressive part of tourist traffic: 2.3 million (13.2 per cent), which grew by more than 35 per cent between 2014 and 2019.

After the first outbreak of COVID-19 in the late-2019, China introduced restriction measures, which stages *Table 1* presents below.

Unlike a few other countries which put an emphasis on vaccination, China has parlayed more on barrier methods to curb the spread of coronavirus infection: such as closing its borders, imposing lockdowns and contact restrictions, and regular medical screening of population. In 2021, China adopted special conditions for visas and entry into its territory, including the introduction of the 'Exit/Entry Health Declaration Form', which lasted until November 2023: the country was one of the last in the world to lift the ban of administrative restrictions.[1]

However, even during the quarantine period, the leadership of the People's Republic of China realised the necessity to optimise its long-term strategy and improve measures to develop the tourism sector, which, according to experts' assessment, previously involved directly and indirectly up to 80 million people — 10 per cent of the employed population [1].

[1] URL: https://www.unwto.org/tourism-data/international-tourism-and-covid-19

Table 1

2020–2023 in China: Stages of Covid-19 restriction measures

Years	Main activities	Degree of restrictions
2020	Restrictions on movement and interpersonal contacts. Schools and enterprises temporary closed. Launch of 'zero tolerance' policy towards COVID-19 by means of local lockdowns, medical tests of population and quarantine	Severe measures
2021	Launch of vaccination campaign. Elimination of local outbreaks of the virus. Continuation of 'zero tolerance' policy in the form of local lockdowns, medical tests of population and quarantine. Closed borders for tourists	Extremely severe measures
2022	Combating a whole variety of viruses. Tightening restrictions in response to individual outbreaks of the virus. Imposing lockdowns in Shanghai and other major cities, leading to disruptions of businesses and supply chains. Further 'zero tolerance' policy with a slightly easier level of measures by the end of the year. Removal of quarantine in December 2022	Severe measures
2023	Further control of other virus modifications. Still easier 'zero tolerance' policy measures, meanwhile maintaining precautions such as wearing masks and social distancing. Borders for tourists opened in January 2023.	Moderate measures
2024	Withdrawal from a 'zero tolerance' policy, meanwhile maintaining non-rigorous precautions	Flexible measures

Source: compiled by the authors on: URL: https://www.who.int/emergencies/diseases/novel-coronavirus-2019; https://www.unwto.org/tourism-data/international-tourism-and-covid-19

A highlight event was the Winter Olympics held in Beijing in February 2022. The organisers of the event strictly enforced bacteriological safety under the motto "Success of countermeasures means success of the Games". However, the very fact that the Olympics were held, encouraged speculation about soon-to-be open entry to the country. Thus, despite the fact that the Games was followed by a new major outbreak of the disease, which led to a large-scale lockdown in Shanghai, China opened borders in May 2022 to representatives of diplomatic missions, business visitors, family members seeking reunion, visitors for humanitarian purposes and to those who arrived on the basis of Chinese citizenship. In autumn 2022, the Chinese government adopted the decision to expand this list: in particular, for students with residence permits and holders of international APEC Business Travel Cards. Meanwhile, access still remained closed to many cities, with business and tourist sectors, as well as shopping centres not operating. Only after a long break, which lasted almost three years, the Government announces the lift of the ban for foreign tourists to visit China.

IMPACT OF THE PANDEMIC ON THE RUSSIAN TOURISM INDUSTRY

In the pre-pandemic years, Russia was also actively developing inbound tourism. In 2019, 24.4 million people visited our country, including 1.9 million (7.8 per cent) from China. The gross value added of the tourism industry totaled 2.8 trillion Rubles (in current prices) which accounts for 2.8 per cent of GDP. Most Chinese tourists visited Russia in group tours under a visa-free agreement. However, this was temporarily suspended in 2020 due to the pandemic.

The scale and degree of COVID-19 restrictions in Russia were not as severe as in China due to the fact that vaccination, reasonable safety barrier restrictions, such as wearing masks, keeping

distance between people, as well as prevention and general health promotion measures, etc. were adopted as the main programme to combat the coronavirus. However, global lockdowns and travel restrictions in Russia, as well as in other countries, significantly reduced the revenues of the national tourism industry and related spheres. According to estimates of Russian experts, in the first half of 2020 alone, Russian tourism industry lost nearly 1.5 trillion Rubles, including 500 billion Rubles[2] from the closure of state borders for foreign tourists.

As a result of the reduction in the inbound tourist traffic, the consequences hit not only domestic tour operators and travel agencies that lost foreign clients bringing foreign currency revenue, but also Russian hospitality business, excursions and museums, catering, transport and cruise sector, as well as the field of personnel training for the industry [2]. The largest Russian air carrier Aeroflot in 2020–2021 suffered record losses in its history, the main factor of which was the plummet in demand for air travel due to pandemic restrictions.[3]

However, as a result of the continued ability to travel throughout the vast territories of Russia, domestic tourism grew most active at this period of time. In 2021, due to the gradual easing of restrictions, external tourism started to acquire a normalising tendency: Russia resumed round-trip air flights with Turkey, Tanzania, the UK and Switzerland.

PECULIARITIES OF THE RECOVERY OF THE GLOBAL TOURISM INDUSTRY

According to the data of World Tourism Organisation (UNWTO), international tourist travels recovered 89 per cent of the 2019 level in 2023 and 97 per cent in the first quarter of 2024. Revenues from exports of international tourism and related passenger transport services reached 1.7 trillion USD in 2023, which is 96 per cent of pre-pandemic levels. The UN Tourism forecast for 2024 indicated the possibility of full recovery and even a growth in international tourism worldwide, driven by increasing demand for tourism services and the corresponding expansion of air traffic, especially from such densely populated country, as China and other Asian states, which make a category of active travelers in the global tourism market.[4]

UNWTO has a positive outlook of prospects for China in terms of regaining its position as one of the leaders in the world's tourism in terms of both expenditures from outbound tourism and revenues from inbound tourism. However, meanwhile China has indeed become a record-holder in outbound tourism in 2023, spending 196.5 billion USD (the largest amount among all countries), the inertia of previous restrictions has prevented China, as well as its closest Asian neighbours, from achieving the same results in inbound tourism. At the end of the first quarter of 2024, North-East Asian countries had restored only 75 per cent of their pre-pandemic level of international inbound tourism, although this amount is by 181 per cent higher than the corresponding figure for the same period in 2023 (*Table 2*).

As a consequence of the pandemic, and the human and economic losses it caused, the global characteristics and standards of travel services have changed. Nowadays, an average traveler prioritises an all-round safety, including hygiene and all health-related aspects. Travelers demand a high quality service and prefer to trust well-known travel brands. Statistics indicate a decrease in spontaneous trips and an increase in pre-planned trips and travel purchases. The range of niche areas of tourism has expanded: sightseeing, entertainment, health and medical, ecological, industrial, rural, automobile, adventure, cultural trips etc., so that everyone can fo-

[2] URL: https://www.rbc.ru/society/04/08/2020/5f291c059a794724ea66f930

[3] URL: https://ir.aeroflot.ru/ru/company-overview/traffic-and-financial-highlights/

[4] URL: https://www.unwto.org/news/china-recovers-its-position-as-top-spender-in-2023-as-asia-and-the-pacific-reopens-to-tourism

Table 2

2023–2024: The tourism industry recovery level in different macro regions (compared to 2019 in terms of the number of inbound tourists in %)

Macro region / Time period	2023				2024	
	January	April	July	October	January	March
North-East Asia	–72	–54	–39	–30	–31	–25
South-East Asia	–39	–31	–24	–27	–12	–11
North America	–12	–16	–14	–11	–4	–7
Europe	–5	–5	–1	–2	–1	3
Middle East	29	21	29	34	37	30
World	–19	–15	–7	–6	–5	–3

Source: compiled by the authors on: URL: https://www.unwto.org/news/china-recovers-its-position-as-top-spender-in-2023-as-asia-and-the-pacific-reopens-to-tourism

cus on getting exactly the impressions they were initially aimed for, which reduces the possibility to be disappointed after the trip or a chance of various unforeseen consequences. The combined requirements for safety and positive impressions fully correspond to the nature of cooperation that is in the current stage of development between Russia and China. This is confirmed by the given scientific research work [2, 3].

RUSSIA-CHINA: RESTORATION OF TOURIST TRAFFIC

Currently, a number of factors determine the relevance of the development of bilateral co-operation in the tourism sphere between Russia and China. Firstly, both countries have a long-time history of economic co-operation, as well as a rich cultural and historical heritage which arouses vivid interest among of each of the nation, and which also contributes to growing interaction and mutual understanding, to preserving friendliness in political relations. Secondly, both countries have a significant, untapped potential for the development of inbound tourism, which contributes to strengthening economic, financial, industrial and investment ties. The main principles for formation of international tourism in both Russian-Chinese and Chinese-Russian directions are based on expanding the range of tourist services, improving the quality of services, including by means of the introduction of modern technologies in business processes, enlarging the 'comfort zone' of holidaymakers at all stages of their leisure time in the host country [4].

A number of regulatory documents are in force within the framework of cooperation in tourism, including: the Agreement between the Governments of the Russian Federation and the People's Republic of China on visa-free group tourist travel of February 29, 2000,[5] as well as the Memorandum of Understanding between the Federal Agency for Tourism (of the Russian Federation) and Union Pay International (of the People's Republic of China) dated December 17, 2015.[6] Joint tourism forums, advertising campaigns, and conferences on new routes are held

[5] URL: https://www.consultant.ru/document/cons_doc_LAW_125123/

[6] URL: http://government.ru/news/21123/

Table 3

Directions for developing tourism cooperation between Russia and China according to the UNWTO quality criteria for tourist attractions

Criterion	Areas for development
1. Availability of natural resources	Recreational, ecological, rural and other types of tourism related to the careful use of natural resources
2. Promotion and preservation of cultural resources	Various tours and excursions, educational, leisure, entertainment and spectacular tourism
3. Economic sustainability	Improving the quality of the all-round services related to tourist services
4. Social sustainability	Ensuring the comfort of traveling/communication and social safety for foreign tourists in the host country
5. Environmental sustainability	Providing the ability of recreational resources to recover
6. Tourism development and sustainable value chain integration	Establishment of joint ventures and implementation of joint activities to provide a wide range of tourism services
7. Tourism governance and setting priorities	Designing strategic programmes and initiatives, setting up norms for tourism in both countries
8. Infrastructures and potential for connectivity	Building tourism, transport and financial infrastructures for domestic and international activities
9. Health, safety and security	Provision of medical and sanitary control, biological safety measures for tourism activities

Source: compiled by the authors on: URL: https://www.unwto.org/news/china-recovers-its-position-as-top-spender-in-2023-as-asia-and-the-pacific-reopens-to-tourism

on a regular basis. Chinese representatives are traditionally present among the most numerous delegations at the annual St-Petersburg International Economic Forum and the Eastern Economic Forum in Vladivostok. Russia acts as an important link of co-operation within the framework of China's "One Belt, One Road" initiative, complementing it with Russian initiative framework "Greater Eurasian Partnership".

Table 3 presents the list of directions for developing cooperation between Russia and China in the sphere of tourism in accordance with the UNWTO quality criteria of tourist sites.

Since China opened its borders in January 2023, the average monthly number of Russian tourists has grown by 197 per cent.[7] In January-March 2024, about 60 per cent of them chose the Hainan resort for their holidays, 30 per cent visited Beijing and Shanghai [5]. The most popular destinations for Russians are traditionally Beijing, the capital of the China, a modern metropolis with a rich history and culture, Shanghai, the most densely populated city of the country and its financial centre, as well as Guangzhou, the third largest city and an important trade centre. Then follow Hong Kong, a specific place and administrative region of China and Hainan, a sub-tropical island well-known for its resorts and beach recreation sites. Our compatriots are also interested to visit such ancient cities as Xi'an, Lijiang, Pingyao, Guilin and natural sightseeing locations, including: Huangshan and Emeishan mountains, Yangtze River, Tibetan plateau, Beidaihe beach resort, as well as Yabuli and Qingcheng Shan ski resorts.

Among Far East residents the most popular places to visit are the north-eastern cities of Harbin and Dalian, as well as the border cities

[7] URL: https://rosstat.gov.ru/statistics/turizm

of Suifēnhé, Hēihé, and Hongchun, which were created and keep developing due to trade, economic and tourist co-operation with the Far-East region of Russia. Nowadays, there are direct and regular weekly flights from Vladivostok to Harbin (nine flights a week), Beijing (eight flights), Dalian (four flights), Shanghai (two flights). According to Chinese scholars, the importance of cross-border tourism is becoming still more and more considerable, and its status in external economic, social and cultural exchange is constantly increasing for both countries [6].

It should be taken into account that after the pandemic, other previously traditionally popular destinations were re-opened for Russian tourists: Thailand, the Arab Emirates, and Central Asian countries, which historically managed to create a favourable tourist environment long before China. However, China is actively expanding and updating its routes, developing domestic tourism in parallel with external tourism, the level of which, judging by the volume of air traffic and the number of trips, exceeds the pre-pandemic level in 2024.[8] A newly founded trend in the tourism industry has become new integrated itineraries that include more than one, but two or even more countries to visit.

Before and after the pandemic, Chinese citizens were not the predominant leaders in the overall countries' list of foreigners visiting Russia, but they were and still remain the backbone of classic inbound tourism, mainly seeking for sightseeing, shopping, recreation, entertainment, as well as oriented for educational purposes. Despite the fact, that according to experts, the recovery of tourist traffic from China develops slower than expected, and this process will end only in 2025,[9] we can already point out the active export of Russian tourist services to China, because Russia reveals a more noticeable interest there after the wrap up of the pandemic (*Table 4*).

If earlier the most popular destinations were Moscow, St. Petersburg, the cities of the Golden Ring, Sochi and Kazan, nowadays, according to the 2023 statistics, nearly 70 per cent of Chinese tourists visit the Far East, in particular Vladivostok, Khabarovsk and Blagoveshchensk [7]. In addition, they are more involved in ecological tourism, traveling to Lake Baikal, northern Arctic routes, volcanoes of Kamchatka etc. Wealthy travelers take adventure icebreakers-driven trips to visit the National Park "Russian Arctic".

It should be noted, tourism is of a prominent significance for the economy of the Far Eastern regions of the Russian Federation, and, first of all,

[8] URL: https://rst.ru/novosti/novosti-turizma/rst-chislo-vyezzhayushhih-za-rubezh-kitajskih-turistov-poka-daleko-ot-dopandemijnyh-pokazatelej.html

[9] Ibid.

Table 4

2019–2024: Dynamics of the number of foreign tourists in Russia, based on the number of tourist trips (in thousands of people)

Descriptor / Year	2019	2020	2021	2022	2023	2024 (1st quarter)	2024 (forecast)
Total number of tourist trips of foreign citizens to Russia	24419	6359	7080	8243	8210	1765	8470
including from China	1883	82	18	30	477	181	880
The share of Chinese tourists (in per cent)	7.7	1.3	0.3	0.4	5.8	10.3	10.4

Source: compiled by the authors on: URL: https://rosstat.gov.ru/statistics/turizm

for Primorsky and Khabarovsk Territories, Amur Region, as well as for north-eastern provinces of China, including Heilongjiang, Jilin and Inner Mongolia. Russia builds relevant infrastructures and actively supports the industry, both within the framework of the national project "Tourism and Hospitality" and also as a part of a unified subsidy for the regions and preferential lending programmes. The allocated subsidies are channeled to accommodation funds and non-hotel accommodation sites, to develop transportation links between the region and neighbouring countries and ensure adequate solutions for security issues. To finance construction of 20 large hotels and a high-class international-level resort in Kamchatka 76 billion Rubles were allocated for the Far Eastern Federal Region, which is 9.6 per cent of the all-Russian volume of preferential loan portfolio in the hospitality sector [7].

It is also planned to invest 188.5 billion Rubles in the development of tourism in the major cities of the Far East by 2030,[10] which is 4.4 per cent of the total national volume of investments. Amusement Park and a Park-Hotel are among the largest investment projects (with 32 and 36 billion Rubles correspondingly) of integrated tourist facilities in the south of Primorsky Krai [8, p. 20]. Besides, the operational game zone "Primorye" is also a world class integrated entertainment health resort and the most significant tourist project in the region at the moment very popular among foreign tourists, the majority of which are traditionally Chinese citizens.[11] All these giant projects in the south-east of Russia may represent one of the most large-scale tourist zones in the country, providing a variety of popular entertainment, leisure and sociocultural facilities.

Definitely, both countries plan to expand the territory of presence for Chinese tourists in Russia from Kamchatka to Kaliningrad [9], however, international inbound tourism in Primorye is regarded as one of the drivers for regional economic growth. Regular contacts between the Primorsky Krai government and the leadership of the neighbouring Chinese provinces include business discussions of a whole range of issues regarding the development of cross-border cooperation in tourism and culture.

As a result of such region's activity, 129.500 Chinese citizens in 2023 and 49.100 more in the first quarter of 2024 visited Primorsky Krai both on individual visas and as part of visa-free groups. In February 2024, for the first time ever since the pandemic, Chinese tourist traffic in Primorye exceeded Russian outbound tourist traffic. As Governor O.N. Kozhemyako pointed out, cruise tourism in the Pacific regions of Russia, as well as to Kamchatka and the Kuril Islands, would become a popular destination in the near future. In 2024, the number of Chinese travelers in Primorsky Krai may almost double, and the region is ready towelcome them[12].

CONCLUSIONS

International inbound tourism is an important sector of Russian and Chinese national economies, the development of which was interrupted by the COVID-19 pandemic and revived relatively only in the recent time. As a result of severe restrictive measures taken by many countries to prevent the spread of the coronavirus, the recovery process of the global tourism industry will take some more time.

Russia and China are acting not just only in accordance with their economic interests, but also jointly in line with the general trend of strengthening comprehensive cooperation and in the spirit of good-neighbour friendly relations. In the long term, we envisage a growing bilateral tourist traffic, as well as the development of routes, types and forms of tourist services, improving their quality, safety, spectacular appeal and technological feasibility.

[10] URL: https://xn-25-flcdf3dabp.xn — p1ai/

[11] URL: https://primorsky.ru; https://invest.primorsky.ru/ru/projects/

[12] URL: https://tass.ru/obschestvo/20902495

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Development of Russia's Metallurgical Industry under Sanctions Restrictions: Iran's Experience

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ABSTRACT

The relevance of this research topic lies in the crucial role of the metallurgical industry for the Russian economy as a whole. This industry is heavily relied upon by key sectors such as industry, the fuel and energy complex, and construction, which together account for more than half of GDP. **The purpose** of this article is to analyse the development of the Iranian metallurgical industry, which has been under the long-term impact of sanctions restrictions, in the context of its applicability to the Russian industry. **Methods**: The study was conducted by analysing official data from the World Steel Association, the Federal Customs Service, and other relevant sources. We used theoretical analysis and systematized information on the impact of sanctions on economic indicators. **Scientific novelty**: Based on the analysis of the long-term Iranian experience in countering sanctions restrictions and the efforts made by Russian metallurgical companies to operate their enterprises in similar conditions, the author suggests directions for the development of this sector of the economy. **The results of the study**: The article analyses the experience of Iran's long-term development under the conditions of sanctions restrictions. We have identified and analysed the tools for levelling these restrictions. The author also analyses the measures of support for the metallurgical industry in Russia provided by the Government of the Russian Federation and the Ministry of Industry and Trade. These measures allow this sector of the economy to develop steadily in an unstable geopolitical situation. A comparative analysis of the counteraction to sanctions restrictions applied earlier for many years in the metallurgical industry of Iran and currently applied in Russia is presented. **Practical significance**: The results and conclusions of this article can be useful for both the scientific community and the heads of enterprises in the metallurgical industry in Russia in formulating medium- and long-term development plans.
Keywords: Russian metallurgy; sanctions; metallurgical industry; industry; sanctions against Iran; metallurgical industry of Iran

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INTRODUCTION

In February 2022, Russia experienced a record number of sanctions imposed on its economy, which resulted in large-scale consequences, including:

- notable decline in imports and exports of goods: imports declined by 11.7 per cent, however, exports the domestic situation managed to straighten up during 2022 (total volume in 2022, according to the Federal Customs Service, increased by 19.9 per cent)[1];
- serious restrictions in the banking sector (foreign assets blocked, restriction of transfers, subsequent disconnection from SWIFT);
- high inflation rates (*Fig. 1*).

It is currently impossible to make an accurate assessment of sanctions' impact due to limited access or lack of statistical data in certain areas.

Sanctions also affected the Russian metallurgical sector, which led to significant difficulties in the functioning of this segment of the economy: restriction of traditional sales markets, ban on payments, etc., and their ways to overcome seemed quite controversial.

Metallurgy is of strategic importance for the Russian economy: its main sectors (industry, construction, fuel and energy complex) altogether account for 58 per cent of GDP [1, p. 355]. This circumstance has determined the metallurgical industry as the research objective of this article.

Russia is not the only country affected by sanctions: this type of economic pressure has a long history. Therefore, in order to understand how to counteract the imposed restrictions, it is advisable to analyse the existing experience.

Iran takes of one the top positions in the sanctions list (*Fig. 2*). Iranian strong metallurgical industry has a long history of development, which makes it an interesting object of study.

The impact of sanctions restrictions on Iran and conditions of its development were studied in the research works of both foreign [2, 3] and Russian scientists [4–9]. However, the authors did not fully cover the development of the Iranian metallurgical industry in the context of sanctions within the period of 2000 to 2023.

Thus, within the framework of this article, the Iranian experience is compared analytically with the situation in Russia with the aim to develop counter-sanctions mechanisms of activity for functioning of the Russian economy and, in particular, the metallurgical industry in the context of restrictions. It should be noted at this point that it is not a universal experience: it was formed in very special geopolitical conditions

[1] URL: https://statexim.ru/news/update2022part/?ysclid=lxvqid8t40886531252

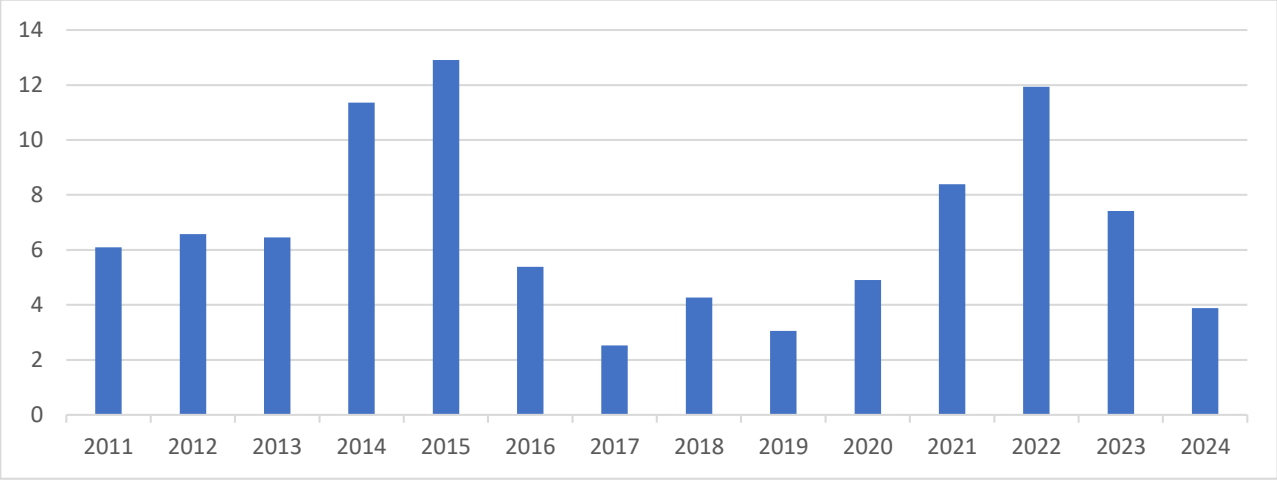


Fig. 1. **Inflation rate in Russia (2011–2024, in per cent)**

Source: compiled by the author.

for a long time, however, some mechanisms of adaptation activity regarding sanctions restrictions, which turned out to be effective, can be applied by other countries [4, p. 92].

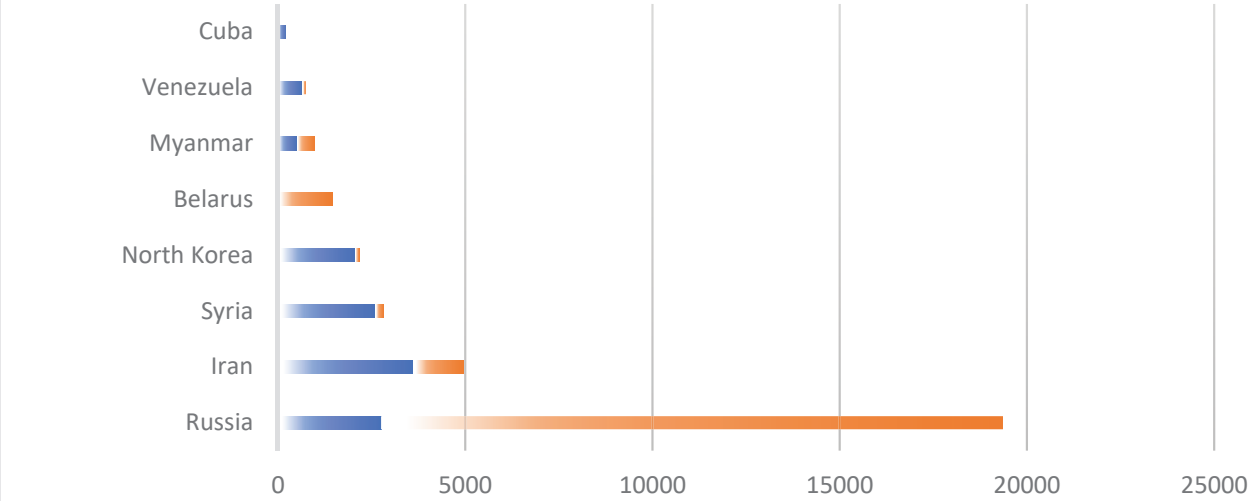
THE STATE OF THE METALLURGICAL INDUSTRY IN IRAN BY LATE 20TH – EARLY 21ST CENTURY AND ITS DEVELOPMENT IN THE CONTEXT OF SANCTIONS

Iran has been under various kinds of sanctions restrictions for over 40 years. Taking into account rather an extensive production of the Iranian metallurgical industry (according to the World Steel Association, in 2023 the country took the 10th position in the world in terms of steel production),[2] the experience of its development is relevant for Russia.

[2] URL: https:// worldsteel.org/data/world-steel-in-figures-2024/

It is worth pointing out now that despite some similarities, the sanctions restrictions imposed on Iran and Russia have a few key differences, namely:

- Timing. Sanctions against Iran were imposed gradually, which gave the economy more time to get adjusted and test different instruments. From 1995 to 2006, Iran experienced stable economic growth because the sanctions were sectoral in nature, they did not affect oil producing and oil processing sectors of the economy, and they limited only the import of goods, which it moderated by changes territories in importing countries [5, p. 30]. Meanwhile, sanctions restrictions in Russia had a large-scale, compressed timeframe nature, which forced Russia to use other mechanisms [5, p. 37].
- Level of oil prices. Likewise Iran, Russia has a significant share of revenues from energy exports. Thus, during the period of sanc-



	Russia	Iran	Syria	North Korea	Belarus	Myanmar	Venezuela	Cuba
prior to 22.02.2022	2754	3616	2608	2077		510	651	208
after 22.02.2022	16607	1337	203	94	1454	478	96	

Fig. 2. **The most sanctioned countries by the date of 06.19.2024, pcs.**

Source: compiled by the author and based on URL: https://tgstat.ru/

tions against Iran (since 2010, according to UN Security Council Resolution No. 1929, the most extensive sanctions have been imposed, affecting almost all sectors of its economy), the decline in oil exports was partially compensated by high oil prices (*Fig. 3*). As for Russia, the situation on the world market was not so optimistic (since the beginning of sanctions restrictions in 2014) [5, p. 26, 37].

Thus in 1979, after the Islamic Revolution, many Iranian metallurgical companies came under the State control, when almost all mines, pits and operating metallurgical plants became owned by the State. However, since 1990, Iran has embarked on a course of economic liberalisation, and by 1995, more than 1000 mining companies were owned by private entrepreneurs or companies [6, p. 5].

By analysing the metallurgical industry of Iran, it is worth noting that the late 20th — early 21st century, it took the priority position in the five-year plans of the national socio-economic development. Thus, the national programme, developed in the early 2000s to increase the output of base metal, envisaged the growth of steel production to 18–20 million tonnes by 2014 [6, p. 6]. The envisaged goal was not achieved, but the volume of smelting has multiplied compared to the year of 2000 (*Fig. 4*), which in 2010, Iran to held [6, p. 9].

The target was not reached, but the smelting volumes increased several times compared to 2000 (*Fig. 4*), so that Iran became the second largest steel producer and succumbed the primacy only to Turkey in the top-list in the Near and Middle East in 2010 [6, p. 9].

According to the research of N.M. Mamedova, the reasons for such an increase in production were as follows:

- Implementation of large-scale projects for the construction of metallurgical plants of various profiles with involvement of foreign capital. The main investors are Germany, Spain, China, India and Japan. Examples include the first steelworks in Mobarek (the Mobarek Iron and Steel Works, commissioned in 1991, which was one of the most modern plants in the world at the time) and Miyan. This is also confirmed by the fact, that the volume of investment in metallurgy, as a share of total investment, did not fall below 20 per cent in the 2000s and it reached a record level of 33 and 42 per cent in 2005 and 2006 respectively.
- The Tehran Metal Exchange became operational in 2003, contributing to the growth of metal exports.
- The existence of a sufficient raw material base for the development of the metallurgical industry, as well as the potential for further

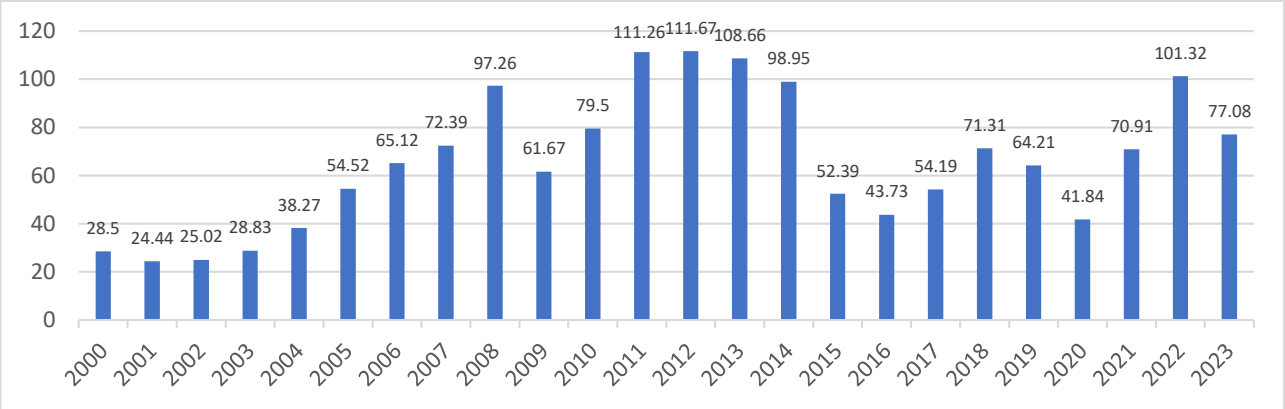


Fig. 3. **Brent crude oil price fluctuations in 2000–2023, in USD/barrel**

Source: compiled by the author and based on: URL: global-finances.ru.

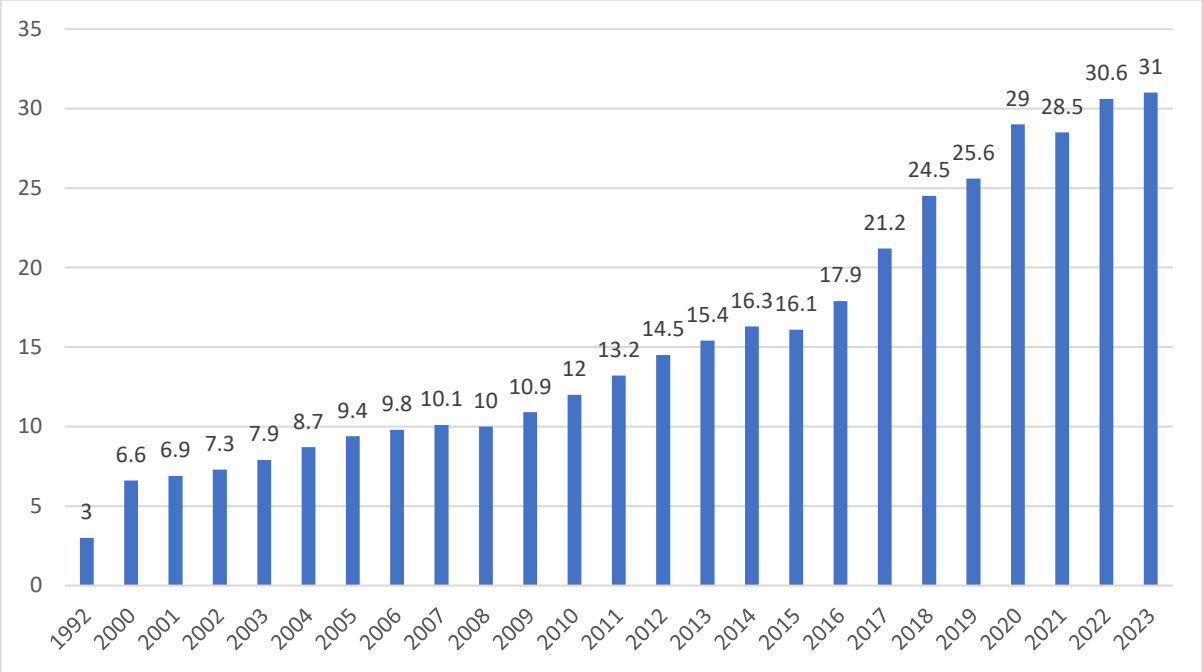


Fig. 4. **Steel production in Iran in 1992–1023, million tonnes**

Source: compiled by the author.

expansion in the process of geological prospecting.

- High level of domestic consumption, which ensures stable demand regardless of external market conditions.

It is also worth noting, that at the beginning of the 20th century there were no direct sanctions-related restrictions on Iran's metallurgical industry. This made it possible to attract impressive investments of foreign capital for large-scale projects to modernise production and build new enterprises.

High rates of development of Iran's metallurgical industry was facilitated by the presence of significant gas reserves and their low price, which was additionally subsidised for industrial enterprises [6, p. 6]. Iran ranks first in the world in terms of exploration of gas reserves, 90% of which goes for domestic consumption [4, p. 86].

Another driver of development, including the metallurgical industry, has become the 'resistance economy', the course for which was proclaimed by Supreme Leader Ayatollah Ali Khamenei in 2010. The strategy was based on the following ten principles: reducing dependence on imports, increasing the economy's resistance to sanctions restrictions, 'scientific jihad' (a course for the development of scientific achievements, transition to an innovative economy), etc. [4, p. 90].

In 2013, the new government formed a vector of industrial development to reduce dependence on oil sales. By 2016, this export-oriented vector allowed to change the balance of exports towards the non-oil segment for the first time in 60 years [7, p. 34].

The priority sector was still in the steel industry, which was proved by the launch of national steel modernisation programme in 2015, aiming to increase smelting capacity up to 55 million tonnes by 2025 [7, p. 35].

According to the World Steel Association, the aforementioned factors enabled Iran to ascend to the 10th position in the global steel ranking list by 2018 (in 2008, Iran was ranked 19th), with steel production reaching 24.5 million tonnes (a 245 per cent increase).[3]

[3] URL: https://worldsteel.org/data/world-steel-in-figures/

On May 8, 2018, the US unilaterally withdrew from the Iran nuclear agreement, leading to the unfreezing of previously imposed restrictions dated August 7, 2018, including those partly affected companies in the metallurgical sector of Iranian economy.[4] This decision seriously affected the economy of Iran: oil export revenues dropped by $ 10 billion in annual terms, inevitably resulting in a negative impact on the rate of economic growth [8, c. 95].

On 8 May 2019, the United States imposed direct sanctions on the metals sector of Iran's economy, which constituted the largest source of non-oil export revenues. The restrictions imposed affected both legal entities and individuals operating in the metallurgy sector. These restrictions included the prohibition of the transfer and supply of significant goods and services to Iran, as well as the purchase of iron, aluminium, steel and steel products from Iran.[5]

The new US sanctions on 10 January 2020 targeted companies that violated the 2019 decree, as well as Iran's leading steel, copper and aluminium companies (Esfahan Mobarakeh Steel Company, Iran Aluminum Company, National Iranian Copper Industries, etc.).[6] While these restrictions did not result in a substantial impact on the production and export of Iranian steel, they did lead to alterations in market dynamics and sales channels, as it was evidenced by the data on the dynamics of non-oil revenues.

In 2019–2020, the Iran's GDP (excluding oil revenues) indicated the growth of 0.9 per cent compared to decline of 2.1 per cent registered in 2018–2019, which signified a robust adaptability of the non-oil sector of the economy [8, p. 95].

Metallurgical sector demonstrated a similar trend (*Fig. 4*): the volume of steel production, although not demonstrating the rapid growth observed in previous time, continued to show positive dynamics. According to experts, this indicates that recent sanctions restrictions do not have a significant impact on the Iranian metallurgical sector, but rather result in a reallocation of sales.[7]

It is noteworthy, that Iran has historically developed reaction mechanisms against sanctions restrictions, which, not completely eliminate their negative effects, however, they manage to mitigate their impact on the economy as a whole.

Still, experts diverge in their assessments of the impact of sanctions on the Iranian economy. While some experts point out detrimental consequences of sanctions on Iran's economy, others find out, that sanctions can serve as a catalyst for socio-economic development, a galvaniser of progress for structural reforms and for the growth of new sectors in the Iranian economy [9, p. 5].

RUSSIAN IRON AND STEEL MARKET: SANCTIONS' IMPACT AND STATE SUPPORT MEASURES

The steel market in Russia predominantly includes private, vertically integrated companies. For example, the share of the six largest steel holdings (Severstal, NLMK, MMK, Evraz, Metalloinvest Management Company and TMK) accounts for more than 90% of steel production, while entities of the public sector accounts for only 0.2% [1, p. 355].

As mentioned above, the sanctions imposed in February 2022 had a significant impact on the Russian economy, especially on the spheres of exports and imports. Thus, exports in ferrous metallurgy decreased by 15.24 per cent,[8] and according to the results of 2022, due to export restrictions, the total losses of Russian exporters of metal products, amounted to nearly 3.3 billion euros.[9]

[4] URL: https://tass.ru/info/5754936?ysclid=lxvh8mqp9y343231695

[5] URL: https://tass.ru/mezhdunarodnaya-panorama/6415056?ysclid=lxvhejwj6o287218468

[6] URL: https://www.kommersant.ru/doc/4219033

[7] URL: https://www.kommersant.ru/doc/4219033?ysclid=lwp62w0dld665818663

[8] URL: 24.07.2024 https://statexim.ru/news/update2022part/?ysclid=lxvqid8t40886531252

[9] URL: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1761

This circumstance could not but affect the economy of some regions, as more than 79% of Russian metallurgical enterprises operate in the towns [1, p. 362].

In view of a high level of uncertainty about the further dynamics of consumption of domestic steel, in April 2022, the World Steel Association predicted 20–35 per cent decline of consumption. However, according to Rosstat estimates, it was slightly over 5 per cent [1, p. 362].

The volume of steel production decreased by about the same amount: slightly more than 7.1 per cent[10] (up to 71.5 million tonnes), which was in line with the global trend of 4.2 per cent.

There were several reasons for such statistics:

- prompt emergency measures of state support (various programmes, subsidies);
- growing domestic demand (mainly in construction sector and automotive industry) and again, partly due to state support measures (mortgages with discount rates, construction of social and commercial housing, etc.).
- export routs reoriented towards the Asian market.

Within the framework of Federal Law No. 488-FZ dated December 31, 2014 "On Industrial Policy in the Russian Federation", a whole range of programmes and subprogrammes was carried out. The framework of the fourth subprogramme "Production development of traditional and new materials" included metallurgy as a key resource for manufacturing industries in Russia, and the Government allocated 4 billion Rubles as financing support for the years of 2020–2023.[11]

The Ministry of Industry and Trade also supported Russian metallurgy sector by restricting the import of metal products, stimulating exports, protecting Russian exporters in foreign markets and reducing dependence on imported raw materials [1, p. 358].

It is estimated, that Russian steel industry will need about eight years to adapt to restrictive sanctions. According to the strategy developed, it is necessary to increase domestic consumption (including by means of possible foundation of a reserve for ferrous metallurgy) and boost exports to emerging markets in Asia, Africa and Latin America.[12] These measures are similar to the mechanisms used in Iran to counteract sanctions restrictions (*see the Table*).

It is worth noting that increasing domestic consumption is more attractive than increasing exports, which is currently unprofitable, while the domestic market shows profitability of over 30 per cent [10, p. 119].

The Government support is not limited to direct financing on the metallurgical sector of the economy. The steel industry was always backed up significantly by support measures of related sectors of the economy, which take a significant share in the cost of production (subsidising the pricing of electricity, natural gas and railway transport).

According to the World Steel Association, energy carriers (coal, electricity, or natural gas) constitute from 20 to 40 per cent of the cost of steel production [1, p. 366].

The state support of metallurgy is also provided by means of regulation of electricity and natural gas prices according to the Federal Law No. 35-FZ dated March 26, 2003 "On Electricity". Thus, retail electricity prices for the mining and manufacturing industry are approximately 25 per cent lower than for agriculture and other segments of the economy.

The construction sector indicates a fast-growing domestic consumption of metal products due to the following aspects:

- implementation of preferential mortgage lending programmes in the primary real estate market[13];

[10] URL: https://worldsteel.org/steel-topics/statistics/world-steel-in-figures-2023

[11] URL: https://ach.gov.ru/upload/iblock/007/00722c93cbd60321d51ac5f23dc156a0.pdf

[12] URL: https://www.rbc.ru/business/08.03.2022/62e912a79a794744d2ec40fc

[13] URL: https://www.cbr.ru/Content/Document/File/140482/Consultation_Paper_12102022.pdf

• financing by the Russian Government large-scale metal-intensive infrastructure projects in Russia and abroad. For example, in 2015–2021, the Russian-Kyrgyz Development Fund (RKDF) supported more than 2.270 projects in metal-intensive industries by subsidizing nearly $ 500 million[14] allocated by the Russian Federation. In 2021, the Russian Government also allocated over 200 billion Rubles to support six projects in the Arctic zone, most of which deal with infrastructure development to stimulate demand for metal products.[15]

The Russian government also supports car manufacturers through preferential car loans, tax deferrals and State guarantees [11, 12].[16]

However, all the measures mentioned above seem to be more likely aimed to protect the metallurgical industry from recession, than to create conditions for further progressive development.

Stock market turbulence and unstable output dynamics lead to the freezing of investment projects and the search for new other areas of activity.

Thus, Public Joint-Stock Company 'Severstal' reduced the amount of financing for investment activities in 2021 by 14.42 per cent ($ 193 million), as a result of recessionary expectations in the global market of steel and raw materials, as well as costs of foreign materials for renewal and reconstruction of fixed production assets [13, p. 23].

Implementation of companies' investment policy is hindered by a limited access to foreign capital markets, which was practically banned due to sanctions. Besides, this situation triggered a more rigid policy of spending the entities' own funds.

In addition to the foregoing, the task of attracting borrowed funds is complicated by the growth of the key rate (*Fig. 5*), which may affect the cost of loans for industrial enterprises.

Thus, various subsidy programmes and support measures, restrictions on imports of steel products from abroad and assistance in import substitution of unavailable raw materials made it possible to mitigate to minimum the impact of sanctions restrictions and safeguard Russian steel industry from recession.

However, turbulence in the stock markets along with unstable output dynamics prevent the all-round implementation of investment

[14] URL: https://www.rkdf.org/godovye-otchety/

[15] URL: https://www.cbr.ru/Content/Document/File/140482/Consultation_Paper_12102022.pdf

[16] URL: http://government.ru/support_measures/measure/109/

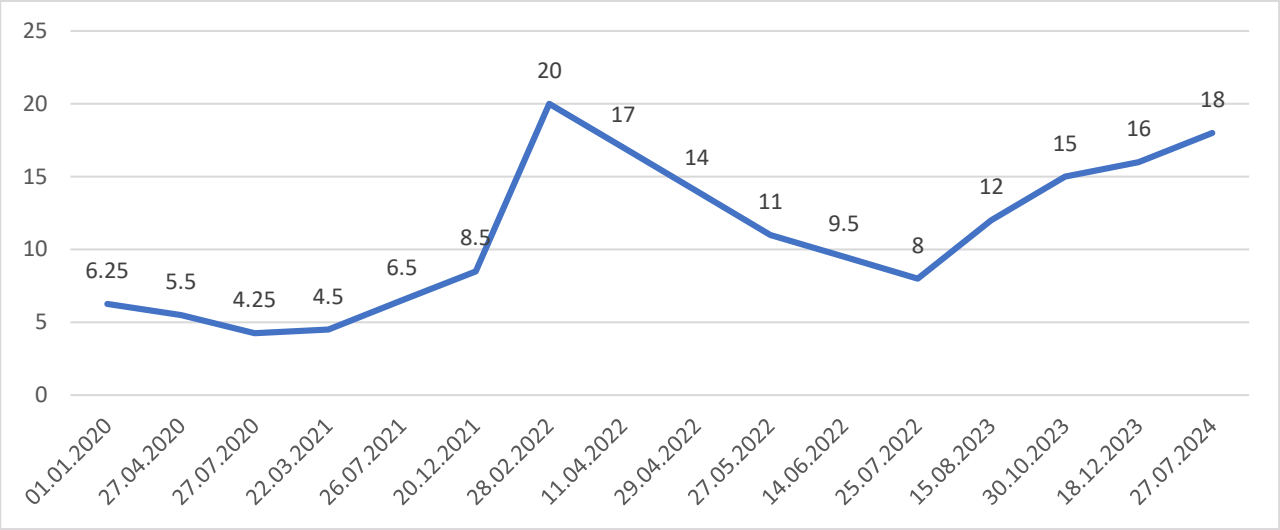


Fig. 5. **Russian Central Bank key rates in 2020–2024, in per cent per annum**

Source: compiled by the author.

programmes to modernise and upgrade the main production assets of metallurgical enterprises. The situation is complicated by growing costs of imported components and equipment, almost complete inaccessibility of foreign capital markets and tightening monetary and credit policy in Russia.

COMPARISON OF THE IMPACT OF SANCTIONS RESTRICTIONS ON THE METALLURGICAL INDUSTRIES IN IRAN AND RUSSIA (PROSPECTS FOR THE DEVELOPMENT OF RUSSIAN METALLURGY IN THE CONTEXT OF IRAN'S EXPERIENCE)

After liberalisation of the industry in Iran in 1990, the majority of steel enterprises became a part of private ownership. This is similar to the situation in Russia: as a result of privatisation in 1992–1996, a significant part of such enterprises also came under private ownership.

At the same time, the state of the main production assets differs. In view of the fact, that the main metallurgical plants in Iran were built later, than in Russia (its main facilities were built during the Soviet era), the need for investment resources for their renewal is much lower in Iran. In the 2010s, Russian large-scale modernisation of metallurgy was carried out and it partially mitigates the current situation [14, p. 134], however, the progress of modernization was significantly delayed by sanctions restrictions, as well as foreign means of production and foreign capital subsequently were not accessible.

Export dependences on the Iranian and Russian metallurgy markets are also different: domestic consumption initially prevailed in Iran and only a small proportion of exported production reached foreign markets. This circumstance subsequently mitigated the impact of sanctions on the export of Iranian steel products. As to Russia, up to 40 per cent of steel and steel products were exported (the share of export sales was up to 50% of the total volume [15, p. 180]). Thus, the restrictions imposed in 2022 led to significant complications, which were not possible to overcome completely so far.

Both countries consider this segment of the economy as strategic for development of related industries and the economy as a whole, as evidenced by implementation of state support programs through various methods and mechanisms, including subsidies by means of low tariffs for energy carriers.

According to the author's point of view, in the context of the analyses of Iranian experience and the efforts of Russian metallurgical companies aimed to operate sustainably their enterprises under the sanctions restrictions, there are the following ways to develop this sector of economy:

- Reorientation to the Asian, Latin American and African markets, which is the most obvious in the context of restrictions aimed to curb operations in the European, American and other pro-sanctions markets.
- However, this involves so many obstacles, and the most crucial one is the level of prices for its products. They are significantly affected by the insufficiently high level of technological development of production, which in its turn is limited, among other things, by the shutdown of access to foreign technologies. The other obstacles involve high transportation and logistics costs, as well as problems with international accounting activities, which in their turn are constantly aggravated by new follow-up restrictions and still tightening control over the previously adopted limitations.
- Possible expansion of the B 2C market (business-to-consumer — the business model, when a company sells goods to the end consumer or a private person), which will strengthen its position in the domestic market (especially in the regions where companies operate), increase of the added value by eliminating the markup of intermediaries, and pursue a more flexible pricing policy in relation to

Table

Comparative analysis of counteraction against sanctions and restrictions imposed on metallurgical sectors of Iranian and Russian economies

Type of sanctions	Means of circumventing restrictions in Iran	Means of circumventing restrictions in Russia
Prohibition on transfer of significant goods and services to metallurgical enterprises, as well as on the purchase of the results of their activities	1. Changing export import policy (replacing Western partner countries in the export structure with Eastern and Asian partnership) [5, p. 30]	1. Change of export-import policy (replacement of Western partner countries in the export structure with Eastern and Asian partnership)
	2. Active state support for domestic production and consumption	2. Active state support for domestic production and consumption
	3. Supply of sanctioned goods through the third countries	3. Supply of sanctioned goods through the third countries
	4. Import substitution (with rather ambiguous results) [5, p. 34].	4. Import substitution (with active participation of the Ministry of Industry and Trade of the Russian Federation)
	5. "Economy of resistance"	5. This strategy was not used

Source: compiled by the author.

end consumers. All this will ultimately lead to an increase in domestic sales.

- A solution to the problem of capital availability may become attraction of investment from Asia: this is not only a market for trading, but also an important financial center, where participants are searching for investment in large production enterprises.
- To ensure a stable production output dynamics, that help implementing long-term programmes for production re-equipment, it is also a promising way to cooperate more closely with the State in terms of implementing multi-year large-scale infrastructure projects. This direction in conjunction with the Government programs to support the industry will create a basis for long-range production planning, for balancing the influence of favourable situation for Russian and foreign trade market conditions.

Sanctions against both Russia and Iran have lead not merely to negative consequences. They also served as a stimulus to kick-start qualitative changes and to implement decisive measures, which previously would have never been based on such serious ground.

This all is not only merely related to traditional areas of cost reduction, improvement of technological processes, etc. For example, Russian metallurgical industry is actively developing within the framework of the digital transformation of the economy, which was announced one of the main priorities at the St. Petersburg Economic Forum 2022. The conducted research shows that the largest metallurgical enterprises not only master the latest upgradings in this area, but also strive to create digital ecosystems to solve complex problems of production development [14, p. 141].

Thus, despite the similarity of sanctions pressure measures imposed on Russia and Iran, the degree of their impact is not the same, due to the differences in the export component in the revenue of metallurgical enterprises, different

duration of sanctions, restrictions regime and other economic and geopolitical peculiarities. At the same time, many Iranian mechanisms to counteract sanctions restrictions are applicable to Russian metallurgical enterprises (see *Table*).

CONCLUSIONS

The paper analyses the impact of sanctions restrictions on the Iranian steel industry. Taking into account a long period of restrictions and a rather domestically oriented sales structure of economy, it can be summarized that the Iranian metallurgical industry has managed to adapt itself, so that the degree of impact of those sanctions has become not significant.

At the same time, it is worth pointing out that, according to various experts, the impact of the restrictions is quite ambiguous. Some of the experts believe that just the sanctions that caused structural changes, which in its turn, had a positive impact on the economy and made it more adaptable to the new restrictions.

Despite its similarities with the Iranian experience, Russian metallurgical industry turned out to have more ramifications from the impact of sanctions. This was due to the significant export orientation of the product sales market. Besides, sanctions were imposed with a flurry of additional restrictions and due to this fact they affected several segments of the economy at the same time (particularly, sanctions were aimed to hit the financial sector and imports of key raw materials).

However, thanks to the implementation of Government programmes to support both metallurgy and related industries that influence prices, as well as thanks to other support instruments, the industry has not fallen into recession. On the contrary, it is in the process of developing mechanisms to recapture its previous growth rates.

In the author's opinion, the main areas of development that can lead to the growth of this segment of the economy include the following venues:

- reorientation towards the markets in Asia, Latin America and Africa;
- expansion of the B 2C market;
- attracting investments from Asia;
- closer cooperation with the State to implement large-scale, multi-year infrastructure projects.

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