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INDUSTRIAL SECTOR OF THE ECONOMY OF THE NORTHWEST OF RUSSIA: CONTINUED ADAPTATION TOWARD SANCTIONS PRESSURE



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Russian enterprises continue adapting to changing geopolitical conditions and increased sanctions pressure. The end of the acute phase of the crisis and the process of transformation of logistics and supply chains in the economy of the Northwest of Russia is evidenced by the dynamics of the manufacturing sector. Tracking its work based on expert surveys of representatives of enterprises allows adding another perspective to highlight the subjective problems of its functioning. Expert surveys provide an opportunity to compare official statistics with real assessments of the situation of participants in production activities. The paper presents the dynamics of the main processes taking place at enterprises in the Northwest of Russia, highlights key trends and trends, and determines the reactions of the management of organizations to important external and internal factors. The aim of the work is to establish the consequences of increased sanctions pressure on enterprises in the sector, and to identify the most

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effective measures, according to respondents, to adapt to the situation of economic uncertainty. The information base of the study was the work of Russian and foreign scientists, Rosstat statistics and data from questionnaires conducted in 2022–2025. The questionnaires include questions that make it possible to characterize the main areas of activity of enterprises, to show the presence or absence of transformations in production and distribution chains, to reflect the specifics of investment processes, personnel policy and relations with authorities. The survey participants are experts – managers of large, medium and small enterprises of the macro-region’s manufacturing sector, which makes it possible to formulate a number of recommendations for improving its working conditions. The results obtained can be taken into account when making changes to economic policy and appropriate government support measures. The study is of interest to specialists in the field of regional economics and regional authorities in developing programs to stimulate the manufacturing sector of the Northwestern Federal District.

Industrial sector, Northwest Russia, sanctions, adaptation, business executives, barriers, government regulation.

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Introduction

In 2024, the problematic situation related to the shortage of qualified personnel, which negatively affected the country’s industrial sector, was aggravated by an increase in the key interest rate. During the year, the Bank of Russia decided to increase the key rate three times, and as a result, its level increased by 5 percentage points to 21%. As a result, many companies noted difficulties in financing, investment cycle, and increased debt burden¹. The key rate became an amplifier and catalyst for other problems that hindered the work of the industry, including high prices for raw materials and components, a shortage of qualified personnel, sanctions pressure and restrictions on access to foreign technologies, infrastructure problems, as well as the volatility of the national currency and rising costs for manufacturers.

It is necessary to monitor its activities, define the main trends and barriers to successful operation for identifying the problems faced

by a manufacturing company. The relevance of the research is to highlight the factors affecting the functioning of the industrial sector and to identify the most effective measures to support and stimulate it. The work contributes to studying the regional economy: it complements the statistics of its industrial sector with subjective assessments, allows identifying trends in its development, as well as determining difficulties and obstacles in this process and, taking into account their specifics, developing appropriate recommendations for this economic sector in the context of the adaptation period.

The aim of our study is to reflect the effects of prolonged sanctions on the industrial sector of the Northwest Russia, to identify the most successful adaptation measures used by enterprises in the sector.

We solved the following tasks to achieve the aim:

– it is presented the dynamics of changes in subjective assessments of the work of the

¹ The key to the finish line: How the Russian industry suffers from high loan rates. Forbes. Available at: <https://www.forbes.ru/biznes/524672-kluc-na-finis-kak-rossijskaa-promyslennost-stradaet-ot-vysokih-kreditnyh-stavok>

industrial sector of the Northwest Russia by business executives;

- it is identified the most effective measures taken to maintain the stable functioning of enterprises;

- it is defined changes in production and distribution chains;

- it is analyzed the dynamics of interaction between enterprises of the macro region's industrial sector and representatives of federal and regional authorities.

The contribution of the research to solving the scientific problem is a combination of official statistics and expert surveys, which allows for a deeper understanding of the processes of adaptation of the regional industrial sector to external pressure.

Brief literary review

The activation of the industrial sector makes it possible to use the available internal resources of the region more efficiently, and the modernization of enterprises helps optimize the consumption of used raw materials and energy. For constituent entities of the country with a high share of industrial sectors in the economic structure, stable operation of the industrial sector is the basis for sustainable and confident development (Lukin, Uskova, 2018; Uskova et al., 2020; Treyer, 2025). The focus on the dominant sectors in the region's economy allows for maximum effect when stimulating them, which implies taking into account the specifics of the territorial structure of production (Lazhentsev, 2024; Kirillova, Orlova, 2024; Volkov, 2024). In conditions of economic uncertainty and geopolitical tension, the continued functioning of all sectors of the economy requires additional government support measures (Stepanova, 2024; Mironova, 2024). Manufacturing industries are under increased pressure due to the reduction in foreign trade volumes, as well as the strategic

goals of achieving technological sovereignty (Kozin, 2024; Akberdina, 2022; Abdikeev, 2022; Tavrikov, Yashalova, 2024). The country is experiencing difficulties in restructuring logistics and finding new consumers in the markets of friendly states in the context of ongoing sanctions in many sectors of the economy (Lavrentiev, 2024; Rozhko, Katsenko, 2024; Demchenko, Demchenko, 2025; Grigoryan, 2024). Adaptation processes and new trends, as well as an increase in the key rate, make it relevant to study the work of enterprises in the industrial sector and monitor trends and problems (Kuvalin et al., 2024).

Scientific papers track the influence of external and internal factors and digitalization trends (Hicham, Hamza, 2024; Jaradat et al., 2025) in the industrial sector. Continued sanctions and new requirements for the activities of the industrial sector have led to the publication of works on the possibilities of enhancing its development (Chernova, Balashova, 2024) and the analysis of production efficiency indicators (Ponomarev, Gorokhov, 2024). There are studies by foreign authors regarding changes in the economy or the industrial sector as a result of sanctions (Stępień et al., 2024), but they focus on digital transformation (Jeske et al., 2021) and the "green transition" (Allan et al., 2021). Monitoring of the work of enterprises in the industrial sector is aimed at recording and tracking important trends and identifying areas of support that will effectively offset the impact of negative factors.

Vologda Research Center of RAS has been conducting monitoring since 1993, including a survey of business executives in the industrial sector. Since 2022, a survey has been conducted in the Northwest Russia, in which questions are updated depending on the situation, which allows finding out the attitude of experts to the most significant events of the previous year (Shirokova, Lukin, 2024).

Research methodology

Expert targeted surveys conducted in April – May 2022–2025 are the methodological and informational basis of the study. The method of collecting information is a questionnaire. The survey is representative by size of enterprises and industries, all regions of the Northwestern Federal District are represented, and the method and sample size are consistent. Heads of large and medium-sized enterprises of the NWFD regions of the main industries acted as experts in monitoring the industrial sector of the Northwest Russia: ferrous metallurgy, electric power industry, timber industry, mechanical engineering and metalworking, food and light industry, fishing and fish farming. The questionnaire consisted of six blocks of questions that made it possible to assess the overall status of the enterprise, its production potential, the state of production and distribution chains, as well as the level of investment and innovation, product competitiveness, human resources and attitude to government actions. In the study, the responses from 2025 were compared with the results of the previous surveys and official statistics. In the 2022 survey, 100 business executives took part, 101 – in 2023, 99 – in 2024, and 105 – in 2025. We used standard and modern methods of statistical analysis adopted in economic and sociological research: descriptive, comparative, inferential, and predictive.

The presented technique fully complies with the basic principles of the Delphi method, but it has its own specifics, since it is its monitoring modification. Iterativity is achieved not through quick rounds with a single pool of experts, but through annual repetition of the survey using a comparable methodology followed by a comparative analysis of data over several years. Thus, we can confirm that classical Delphi has been adapted for the tasks of long-term tracking of subjective assessments of the business community, which makes the

methodology scientifically sound and relevant for studying the adaptation of enterprises to changing external conditions.

Results of the study

General trends in the industrial sector development

The Northwest Russia is an industrial macro region, the subjects of which develop mining (Komi Republic, Nenets Autonomous Area) and manufacturing (Saint Petersburg). In 2024, the share of shipped manufacturing products in Saint Petersburg amounted to 47.5% of the output of these industries in the NWFD, and the share of output in extractive industries in the Komi Republic and the Nenets Autonomous Area was 39.2% and 33.6%, respectively.

After the imposition of sanctions against Russia by unfriendly countries, the NWFD suffered severely due to the breakdown of cooperation with trading partners from the United States and Europe. The timber processing complex (TPC), which produces goods for countries that have ceased foreign trade cooperation with the Russian Federation, was most seriously affected. However, in 2024, the enterprises of the complex showed positive dynamics, which indicates the effectiveness of government support measures and the continuation of the adaptation period. The positive dynamics in the TPC indicates the overall effectiveness of government support measures to stabilize the industry at the macro level (*Fig. 1*).

Industrial production continues growing rapidly in the Northwest Russia (105.3%), the depth of decline for the extractive industries is decreasing (99.2% compared to 2023), growth was recorded in the sector of providing electricity, gas and steam (103.6%). The industrial sector continues adapting to the situation of simultaneous sanctions pressure and unstable geopolitical situation.

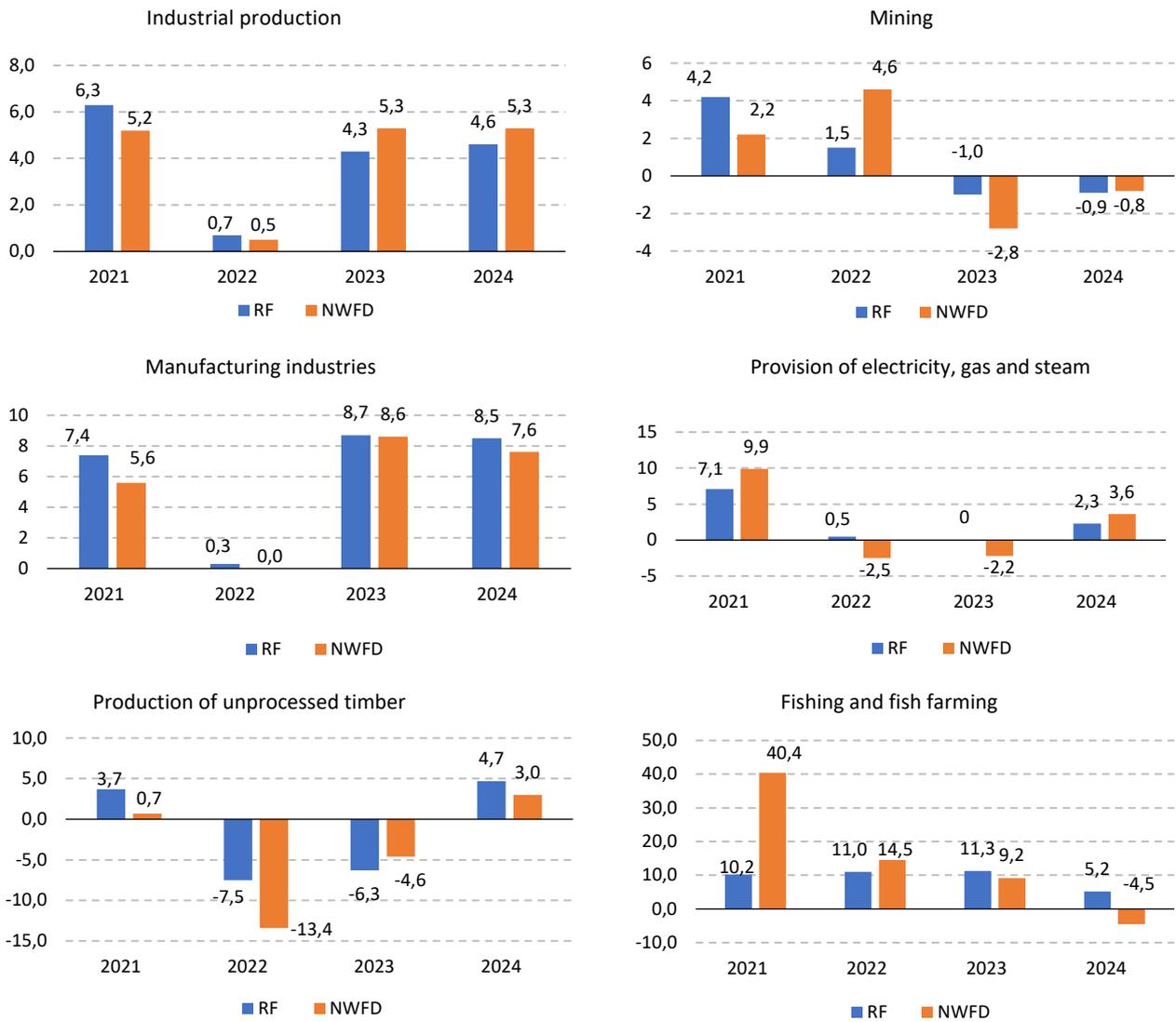


Figure 1. Dynamics of the industrial sector development of the RF and NWFD economy, % compared to the previous year

Source: Rosstat data.

Large, medium and small enterprises participate in surveys of business executives of the industrial sector of the Northwest Russia. The share of experts in enterprises employing over 1,000 people in a survey conducted in early 2022 was 30%, in 2023 – 41%, in 2024 – 54%, in 2025 – 53%. The share of respondents at the business executives with 250 to 1,000 employees was 40% in 2022, 22% in 2023, 25% in 2024, and 20% in 2025. Taking this into account, it is worth noting that the survey data make it possible to identify the main trends in the functioning of enterprises in the industrial sector, which have

a significant impact on the economy of the Northwest Russia subjects and can be taken into account when reviewing industrial policy and developing measures to support the economy.

Over the previous year, the share of business executives who gave an average assessment of their company's performance in modern conditions has increased significantly (67%; +26 p.p.). The share of high ratings over three years continues declining; in 2025, it amounted to 20% (-45 p.p. from 2022), and the share of low ratings over the previous year it decreased by half (-8 p.p., from 15 to 7%; Fig. 2).

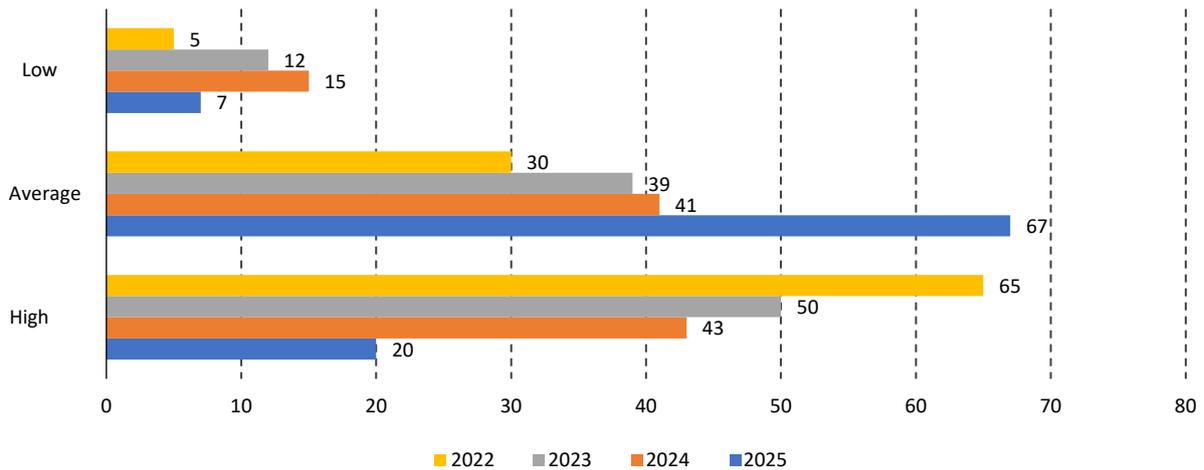


Figure 2. Distribution of responses to the question "How do you assess the work of your company in modern conditions?", % of respondents

Source: VoIRC RAS survey data.

Over the previous three years, the share of respondents who report an increase in natural output has increased (35, 37, and 47%, respectively), and throughout the NWFD surveys, the share of those who report an

increase in stocks of finished products has decreased (18; 17; 13%). Also, starting in 2022, the share of enterprises that continue increasing employee salaries is becoming smaller (86; 69; 68; 67%; *Tab. 1*).

Table 1. Assessment of changes in the main performance indicators of the enterprise, % of the number of respondents

Indicator	2022			2023			2024			2025		
	G	S	R	G	S	R	G	S	R	G	S	R
Natural output volume	63	25	12	35	44	22	37	26	37	47	27	20
Capital investment volume	47	37	16	18	50	32	37	35	28	27	47	27
Stocks of finished products	40	55	5	18	73	9	17	63	20	13	47	27
Prices for manufactured products	78	18	4	66	23	11	56	31	14	60	33	7
Prices for purchased products	87	13	0	92	4	4	97	3	0	73	27	0
Cost of production	77	20	3	89	8	3	93	7	0	80	20	0
Demand for products in the domestic market	51	42	7	20	66	14	28	54	18	20	60	20
Demand for products in foreign markets	50	30	20	13	44	43	12	52	36	13	47	7
Profit	56	24	20	40	22	38	19	23	58	33	27	40
Number of employees	35	55	10	18	59	23	30	43	26	20	47	33
Salaries of employees	86	11	3	69	27	4	68	29	3	67	27	0
Average level of production capacity utilization	49	44	7	16	57	27	31	44	25	27	47	27

Note: P – growth, S – the same level, R – reduction.
Source: VoIRC RAS survey data.

The transition to a new, more stable, albeit negative, development phase is evidenced by the predominance of the share of business executives who note the preservation of the previous (reduced) level of the main performance indicators of enterprises, rather than their further decline. In the 2025 survey, 40% of experts said the profit level was declining, but in the previous survey, it was 58% of respondents, which is a positive trend. The decrease in the share of enterprises raising salaries is an indicator of the transition from shock adaptation to a new, more severe economic reality. The business faced three main challenges: squeezed profits, catastrophically expensive loans, and uncertainty. In these conditions, companies are forced to reduce costs and maintain the current level of personnel costs to maintain financial stability.

The main reason for the changes in the main indicators in the work of enterprises in the industrial sector is the transition from the phase of active transformation to a new more complex reality. For example, the share of enterprises increasing the volume of natural products is growing, and the share of respondents increasing stocks of finished products is decreasing. The most striking negative trends were a serious drop in profits in organizations and a slowdown in wage growth, which indicates the need to save money and reduce costs. Evidence of stabilization in the economy is the softening of price pressure (drop in the share of responses about rising prices for consumed products), stagnation of investment activity (low share of enterprises increasing the volume of capital investments) and compression of demand (only 20% of managers noted an increase in demand in the domestic market).

Only 7% of respondents stated that the economic situation was improving in 2024, 13% of respondents already planned to improve it in 2025, and 40% of experts are already considering such a development in the longer term. At the same time, the share of responses

about the absence of a negative impact of sanctions pressure on the company increased significantly: the share of business executives who deny it exceeded 53% (+28 p.p.). In 2022, 71% of respondents noted the presence of such influence, in 2025 their share decreased to 40% (-30 p.p.). At the same time, the most acute problem related to the imposition of sanctions in 2025 was the increase in prices within the country, which was noted by 73% of business executives. This is followed by difficulties in obtaining imported raw materials (53%) and an increase in the cost of credit (53%).

More than a third of the respondents did not feel any effects from the imposition of sanctions on their company in 2024 (33%), 33% of experts considered them negative, and 27% indicated that some of them had a negative impact on their company, while others had a positive impact. Only 33% of respondents are confident that there will be no effects of sanctions until the end of 2025, while 27% are convinced that sanctions will continue having a negative impact; 20% of business executives found it difficult to answer this question, and another 20% spoke about the ambiguity of the impact of sanctions by the end of 2025.

Given the ongoing adaptation processes in the manufacturing sector, the question of how management strategies are transforming to best adjust to economic uncertainty is of significant interest. The decline from 60% to 47% in the share of enterprises that continue actively searching for new domestic suppliers suggests that a significant portion of manufacturers have largely reconfigured their most critical supply chains. However, this process remains relevant for almost half of the surveyed companies, indicating a transformation that is ongoing but entering its final phase.

The same trend is observed when choosing the answer to the search for suppliers abroad. From 2022, when 59% of managers carried out such searches, to 2026 (forecast) the decrease was 46 p.p.

due not only to the fact that new partners were found abroad, but also to the transfer of enterprises to the territory of the Russian Federation, the termination of interaction with former foreign trade partners. According to the survey of respondents, many of the activities planned for 2025 will be prolonged (reduction of the number of employees,

activation of advertising activities, reduction of investment costs, etc.). We should note a sharp increase in the share of managers who noted the need to reduce production volumes (+6 p.p., to 13%), sale and lease of premises in the future (+14 p.p., to 27%) to adapt their company to the existing economic conditions (Fig. 3).

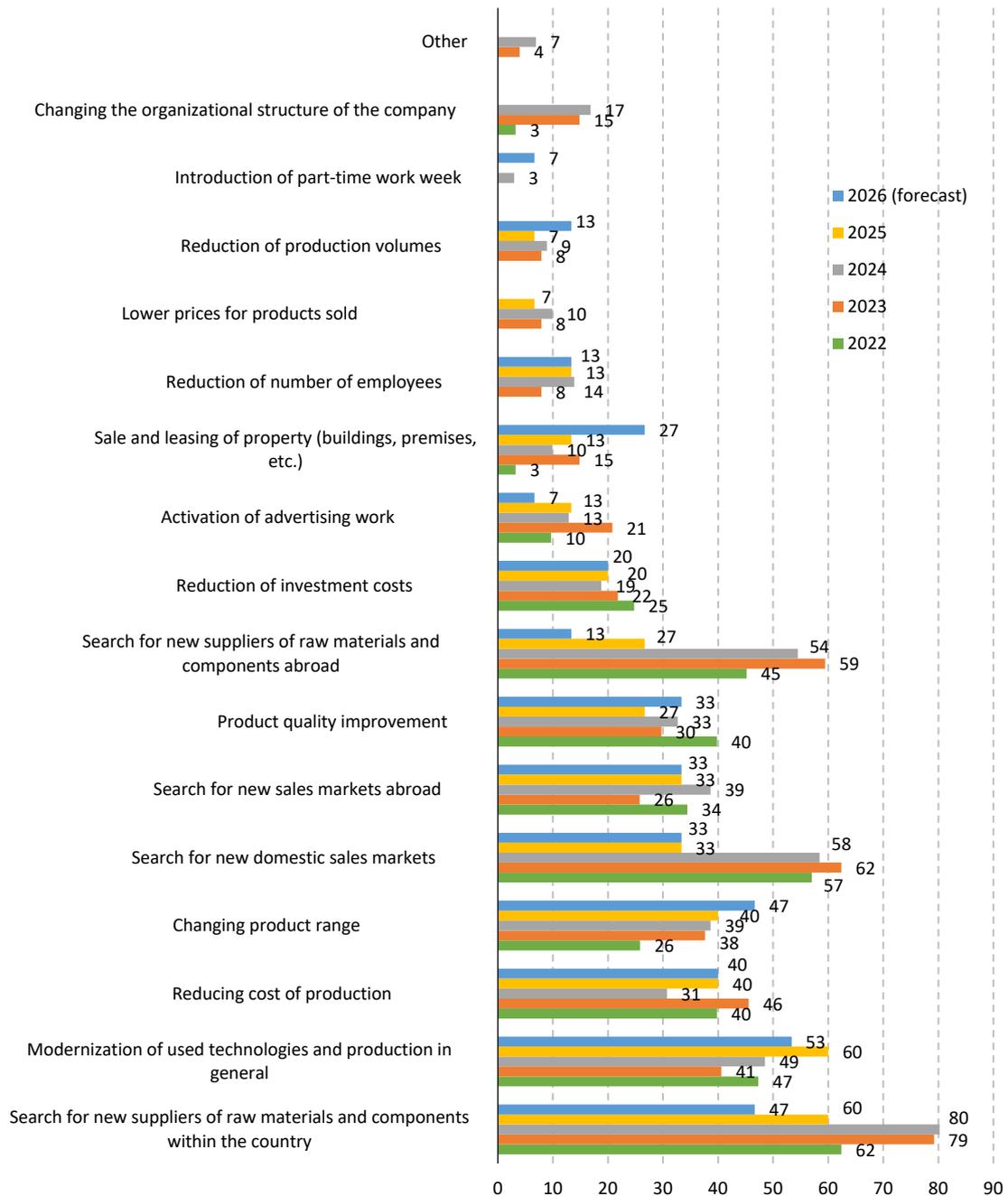


Figure 3. Distribution of responses to the question "What measures are used in your company to adapt to the existing economic conditions?", % of the respondents

Source: VoIRC RAS survey data.

According to the business executives in the industrial sector, the barriers that previously hindered the active growth of production have increased in 2025. In recent surveys, a high percentage of commercial loans was identified as an obstacle by a maximum of 35% of respondents (2024), but the increase in the Bank of Russia rate led to an increase in the proportion of respondents concerned about this to 47% and the persistence of this problem in 2026 (40%; *Tab. 2*).

At the same time, the growth showed a high level of taxation. This barrier was noted by 27% of respondents, its level has almost returned to the 2022 level, and more than a third of respondents are confident that it will increase in 2026 (33%). We would like to emphasize that the importance of many of these barriers for business executives of the industrial sector has decreased: lack and interruptions in the supply of raw materials (-11 p.p., up to 7%), deterioration and lack of equipment (-13 p.p., up to 13%), lack of skilled workers (-13 p.p., up to 27%) and high prices for raw materials, fuel, energy and materials (-15 p.p., up to 40%).

The share of managers noting the presence of idle capacities has not changed since last year (53%), while only 20% of them can increase output by 21 to 30% at their expense, none of the respondents noted the possibility of increasing output by more than 50%. This may indicate the problems of finding new sales markets, consumers, and the inflexibility of logistics chains.

For the first time in four years of surveys, 20% of business executives said that their company could go bankrupt, in the previous year their share was 10.1% (+9.9 p.p.). Only 20% consider the financial condition of their enterprises to be good, and the share of those confident in the continuation of this trend by 2026–2027 has not changed. The majority of respondents indicated its satisfactory condition in 2024 (47%), maintaining such an assessment in 2025 (40%) and for the period 2026–2027 (47%). The proportion of responses about the rather unsatisfactory condition of enterprises is significantly reduced in the future (27, 20 and 7%, respectively).

Table 2. Distribution of answers to the question “What is holding back the growth of production in your company?”, % of the number of respondents

Response option	2022	2023	2024	2025	2026 (forecast)
High percentage of commercial loans	20	15	35	47	40
Insufficient demand in the domestic market	16	53	38	40	33
High prices for raw materials, fuel, energy and materials	53	41	65	40	40
Uncertainty of economic situation	35	48	41	33	33
High level of taxation	29	40	20	27	33
Lack of skilled workers	26	27	40	27	27
Late payment for products sold	8	7	18	20	20
Competing imports	17	13	9	13	7
Lack of financial resources	19	25	18	13	20
Deterioration and lack of equipment	17	24	26	13	13
Shortage and interruptions in the supply of raw materials, fuel, energy and materials	14	7	18	7	7
Absence or imperfection of the regulatory framework	5	11	0	7	7
No restrictions	8	6	7	7	0
Other	11	12	6	7	7
Insufficient demand in the foreign market	18	19	16	0	0

Source: VolRC RAS survey data.

Transformation of value chains

Production and distribution chains continue changing in the industrial sector of the Northwest Russia. For instance, the share of respondents engaged in trade and economic cooperation with organizations in the region where the enterprise is based increased by almost 10 p.p. (93%). A significant decrease was noted among other business executives with a wider geography of trade relations. Thus, the share of those who cooperate with enterprises in other regions of the NWFD (except for the home region) decreased to 60% (-37 p.p.). The share of respondents who maintain relationships with other regions of Russia (except the Northwestern Federal District) fell by 25 p.p. last year to 60%; with other macro regions of Russia (except the Northwestern Federal District) – to 60% (-25 p.p.). The share of those cooperating with the EAEU countries decreased by 21 p.p. (up to 40%), with the countries of the former USSR (not members of the EAEU) – by 22 p.p. (up to 27%), with non-CIS countries – by 15 p.p. (up to 27%). The trend toward the transition of manufacturing sector enterprises to the

domestic market continues. Due to the problems of the infrastructure, which does not have time to transform under the sharply increased demand for transportation services, managers prefer to explore the regional markets closest to the location of their organizations.

Continued sanctions led not only to the termination of cooperation with foreign partners in the field of joint investment activities (0%), but also to the lack of interaction with them in attracting specialists (0%), selling technologies (0%) and other types of cooperation (0%, -17 p.p.; *Tab. 3*).

At the same time, we can note the results of the reorientation to the domestic market. If we take as a positive result the increase in the share of respondents interacting in one area or another with other enterprises in the Northwestern Federal District, then we can note some disappointment among respondents in joint investment activities (-58 p.p., up to 7%), purchase (-35 p.p., up to 7%) and sale of technologies (-30 p.p., up to 7%). However, only 7% indicated a lack of cooperation with regional partners within the Northwestern Federal District (-17 p.p.).

Table 3. Distribution of answers to the question “In what areas does your company cooperate with foreign and Russian organizations?”, % of the respondents

Direction	World				Russia				NWFD			
	2022	2023	2024	2025	2022	2023	2024	2025	2022	2023	2024	2025
Purchase of raw materials and semi-finished products	54	38	58	20	76	84	83	53	57	89	70	60
Sale of raw materials and semi-finished products	26	15	48	13	31	32	74	27	25	21	42	40
Sale of final products	50	46	56	40	74	84	78	60	72	93	75	80
Technology purchase	49	20	66	13	41	15	83	13	12	15	42	7
Technology sales	3	0	16	0	17	10	68	7	10	7	37	7
Joint investment activities	6	7	0	0	27	21	45	13	22	3	65	7
Attracting specialists	2	3	5	0	37	35	65	47	55	35	86	53
Other	3	17	17	0	6	20	67	7	2	19	17	13
Cooperation is not carried out	6	18	69	33	0	4	45	13	0	0	24	7

Source: VolRC RAS survey data.

A similar trend has been noted in cooperation with Russian enterprises: in all areas, the share of respondents has become significantly lower, and cooperation with foreign suppliers and consumers is maintained at a minimum.

More than half of the respondents do not plan to launch the production of import-substituting products in the future (53%). But the share of those who already produce such goods has grown to a maximum since 2022 (20%).

Cooperation with foreign countries is indicated by the fact that business executives continue noting the existence of certain barriers to cooperation with them. For instance, sanctions policy and rhetoric hinder 40% of respondents (-45 p.p.), remoteness of potential counterparties – 20% (-43 p.p.), economic inexpediency – 27% (-23 p.p.).

At the same time, the share of respondents who see no obstacles to the development of trade and economic relations with Russian (-54 p.p., 33%) and regional organizations of the NWFD

(-30 p.p., 40%) has increased significantly. A significant decrease was noted among the respondents who noted the low capacity of the Russian (-45 p.p., 20%) and regional (-52 p.p., 13%; *Tab. 4*) markets.

The reduction of many barriers that caused dissatisfaction among respondents a year ago can be attributed to effective government support measures and the actions of regional and federal authorities who tried to mitigate the forced transition to the domestic market for enterprises in the manufacturing sector. At the same time, surveys show that at the micro level, many enterprises are faced with the discrepancy between the proposed measures and individual needs.

More than half of the survey participants stated the need to reorient toward domestic suppliers and consumers in order to transform their own value chains (53%, -18 p.p.). The share of business executives going to look for new suppliers and consumers in the markets of neutral countries decreased by 31 p.p. (40%),

Table 4. Distribution of answers to the question “What, in your opinion, hinders the development of trade and economic relations between your company and foreign and Russian organizations?”, % of the respondents

Response option	World				Russia				NWFD			
	2022	2023	2024	2022	2023	2024	2022	2023	2024	2022	2024 г.	2025 г.
High competition in the market	20	7	39	0	44	19	38	13	26	18	18	13
Small market capacity	2	3	9	0	31	27	65	20	43	23	65	13
Remoteness of potential counterparties	20	8	63	20	15	9	43	20	11	8	13	20
Lack of information about ongoing tenders, contests, promising scientific and technical developments	5	15	61	0	24	14	71	0	13	11	42	0
Weak cooperation from public authorities	8	11	21	7	18	11	89	20	20	8	43	20
Economic inexpediency	22	18	50	27	8	10	44	0	11	6	18	0
Sanctions policy and rhetoric	76	65	85	40	6	8	15	7	0	8	0	7
Other	5	15	18	13	17	18	73	7	15	11	59	7
No obstacles	0	0	5	0	20	24	87	33	15	40	70	40

Source: VolRC RAS survey data.

which indicates a decreasing pace of adaptation processes in the sector. This conclusion is confirmed by the growing share of respondents who indicated that there were no violations in the supply chains (33%, +6 p.p.; Fig. 4).

The share of business executives using intermediary countries to restore contacts with former suppliers and consumers has more than doubled (-24 p.p., 20%). Half of the respondents do not expect further transformation of production and distribution chains (53%), which is 38 p.p. higher than the value of the previous survey.

The responses of the survey participants indicate the need for continued government support of the industrial sector to increase the competitiveness of products in foreign markets. For example, half indicated that this process would be facilitated by the development of strategies for the development of industries in the industrial sector (53%, +10 p.p.). Among the necessary measures, the implementation of a preferential low-interest policy leads (60%, -1

p.p.), in third place is direct financial assistance for the modernization of production (47%, -10 p.p.).

More than 80% of the respondents switched to new suppliers of equipment, spare parts, components and software after the increased sanctions pressure on the country. Only 40% of enterprises had not previously used sub-sanctioned equipment imports, 33% used sub-sanctioned spare parts, components and programs. Among those who used them, the majority preferred Russian or Chinese suppliers. Almost three quarters of business executives (73%) had not previously exported to “unfriendly” countries, while the rest had shifted to the domestic market (27%).

After stopping the import of necessary goods from abroad, 27% of business executives found that there were no alternative suppliers in Russia, and 13% did not find the required goods in friendly countries. A third of the respondents (33%) did not feel the effects of the reduction in import supplies.

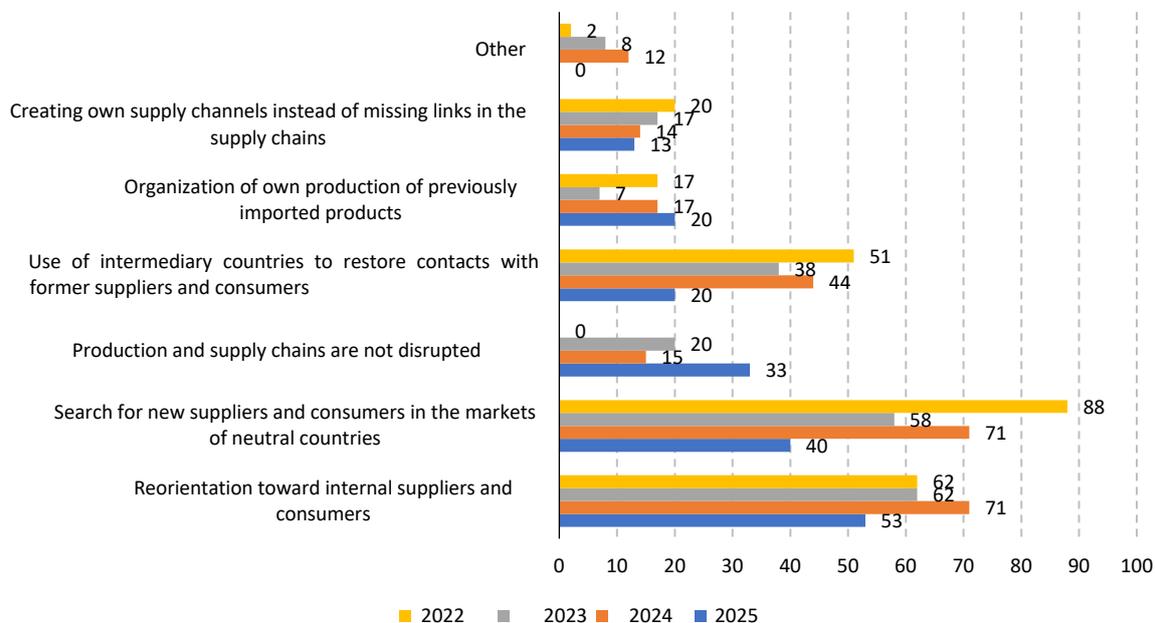


Figure 4. Distribution of responses to the question “What measures have been taken at your company to transform its production and distribution chains disrupted by sanctions?”*, % of respondents

* The question has been in the questionnaire since 2023.

Source: VoIRC RAS survey data.

Investment activity

It is necessary to increase financial resources to expand production and implement other investment projects. Over the previous year, the share of business executives who consider financing their enterprises to be optimal has increased (+13 p.p., to 40%), while the share of respondents who consider it sufficient for partial implementation of investment projects has decreased by 13 p.p. (0%, Fig. 5).

There are opposite trends in the dynamics of respondents' responses about financing that is sufficient only to maintain current production volumes and insufficient even for this purpose (27%). In the first case, the response rate has been decreasing for the third year in a row, while in the second case, it has been increasing over the past four years. We should say that the increase in the key interest rate has become a factor that has paralyzed investment activity. The policy of the Central Bank of Russia has caused the curtailment and postponement of investment programs, enterprises in the industrial sector are focusing on maintaining current activities and postponing development plans. This situation directly affects the long-term competitiveness and technological sovereignty of the region.

The fact that an increase in financial resources is required by the majority of respondents is clear from the answers about the need for modernization of production. Over the previous year, the share of business executives who noted the need for partial modernization increased by 23 p.p. (to 87%). However, only 40% of them have plans to upgrade the company's production facilities in 2025 (-42 p.p.). At the same time, there continues to be a tendency to preferentially use their own funds as a source of financing for investment activities: in 2024, 87% of managers invested in these processes, including their own capital, and only 33% indicated the use of credit funds. In 2025, 87% plan to use their own resources, 40% note the possibility of attracting credit funds. At the same time, almost half of the respondents were unsatisfied with the conditions for obtaining bank loans for long-term investment purposes (47%, -4 p.p.), and the share of dissatisfied with the conditions for obtaining a loan to finance working capital increased over the previous year to 53% (+7 p.p.).

A similar result was obtained in the monitoring of the Russian Union of Industrialists and Entrepreneurs in 2024: enterprises noted

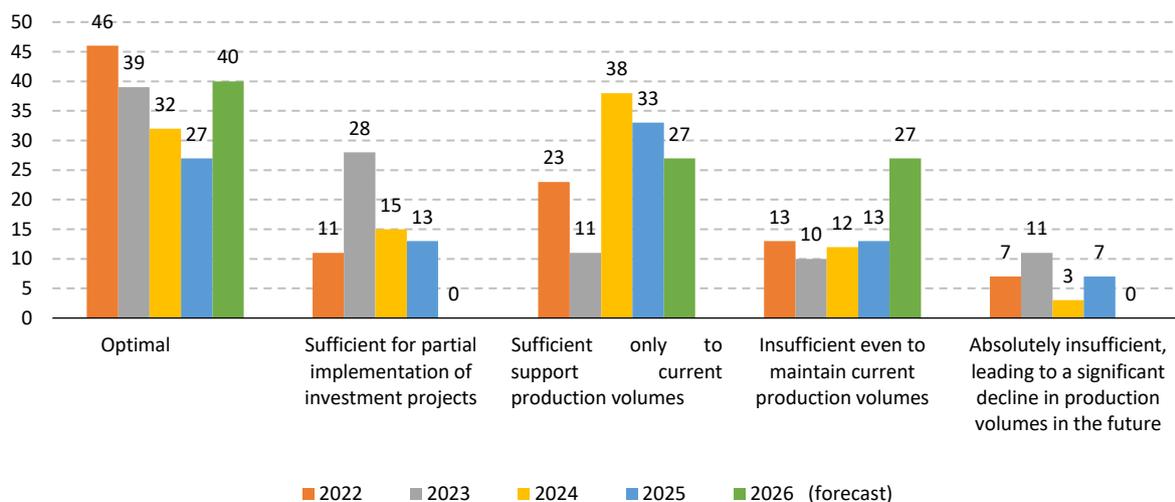


Figure 5. Distribution of answers to the question "How do you assess the level of funds allocated for the development of your company?" (sum of answers is 100%), % of respondents

Source: VolRC RAS survey data.

an aggravation of problems related to a lack of working capital and the unavailability of borrowed funds. According to 25% of the respondents, the unavailability of financing has led to significant restrictions on activities².

It is necessary to introduce innovations into the production process to produce competitive products. The respondents named the main reasons hindering investment activity in their enterprises. First of all, they note a lack of funds and a high percentage of bank loans (67%). As a result of the increase in the level of the key refinancing rate, both barriers turned out to be interrelated. Over the previous year, the increase in the share of respondents who identified these problems as the most acute was 24 and 19 p.p., respectively. Against the background

of the growth of these restrictions, several others have lost their importance, but 47% of business executives are still concerned about the high cost of equipment and construction and installation work (*Tab. 5*).

In the forecast for the coming year, respondents indicate the likelihood of an increase in the negative impact of the first two factors and a decrease in the importance of the remaining barriers against this background. An assessment by business leaders of the impact of the Bank of Russia's high key rate policy on the country's economy showed that most of them did not notice any impact (53%). At the same time, 40% noted its rather negative or unambiguously negative effect on the Russian economy (*Fig. 6*).

Table 5. Distribution of responses to the question "What, in your opinion, primarily held back investment activity at the enterprise?", % of respondents

Response option	2022	2023	2024	2025	2026 (forecast)
High interest on a bank loan	26	26	48	67	60
Lack of financial resources	55	37	43	67	67
High cost of equipment, construction and installation work	65	65	57	47	40
Restriction of access to imported equipment due to sanctions	16	35	54	27	27
Unforeseen changes in the ruble exchange rate and bank interest rates	16	45	49	27	13
High accounts payable/accounts receivable	22	8	11	13	7

Source: VolRC RAS survey data.

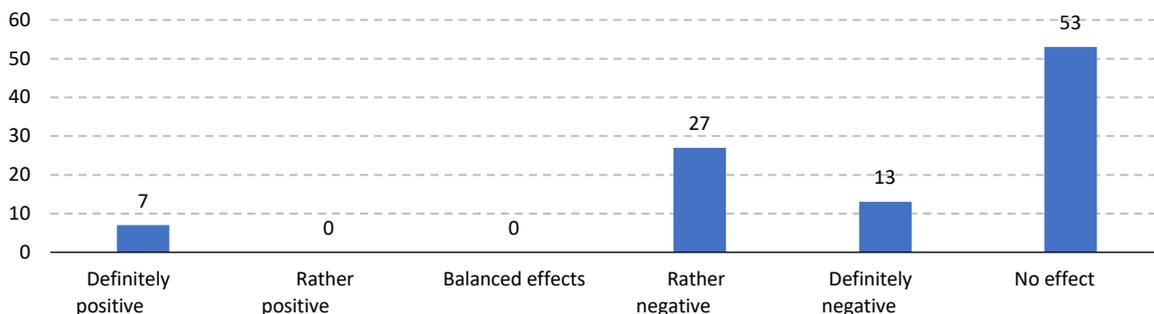


Figure 6. Distribution of responses to the question "How, in your opinion, does the high key rate policy currently implemented by the Bank of Russia affect the Russian economy?" (sum of responses is 100%), % of respondents

Source: VolRC RAS survey data.

² The state of the Russian economy and the activities of companies: The results of the monitoring of the Russian Union of Industrialists and Entrepreneurs in 2024. Available at: <https://rspp.ru/activity/analytics/sostoyanie-rossiyskoy-ekonomiki-i-deyatelnost-kompaniy-rezultaty-monitoringa-rspp-v-2024-godu>

Assessment of economic policy

The trend of approving the economic policies pursued by the federal authorities continues growing. In the 2025 survey, the share of business executives who consider the economic policy of the Russian authorities to be correct (73%) increased by 16 p.p. At the same time, the share of respondents who positively assess the activities of the regional government (47%) is still equal to the share of those who find it difficult to assess (47%).

At the same time, we can note an increase in the effectiveness of interaction between enterprises in the industrial sector of the NWFD economy and the executive branch at the federal (5.3 points; +0.1 points) and regional (6.4 points; +0.9 points) levels. The assessment of relations with executive authorities at the municipal level continues declining – over the previous four years it has decreased to 4.1 points (-1.4 points).

Last year, only 13% of respondents used state support measures at the federal level (-49 p.p.). A sharp drop was also observed among those who took advantage of support measures from the region (27%, -42 p.p.). At the same

time, only a third of business executives did not need support measures (33%), they failed get another 20% of the respondents. Among the most demanded measures of assistance, enterprises noted reimbursement of part of the costs (27%) and tax benefits (20%). The share of survey participants who received subsidies for business development has almost tripled over the year, from 38% to 13% (-25 p.p.).

The observed decline in business executives using government support measures indicates the termination of most programs aimed at leveling the acute phase of the economic crisis. Only 20% of the respondents indicated that there were no shortcomings that prevented active involvement in government support programs. The majority of respondents continue to express dissatisfaction with the discrepancy between the proposed support measures and the needs of the enterprise (40%, -18 p.p.). Another fifth of business executives indicated the appearance of other barriers (20%), in addition to the complexity of paperwork (13%), lack of information on available support measures (13%) and high time costs for documentation (7%, Fig. 7).

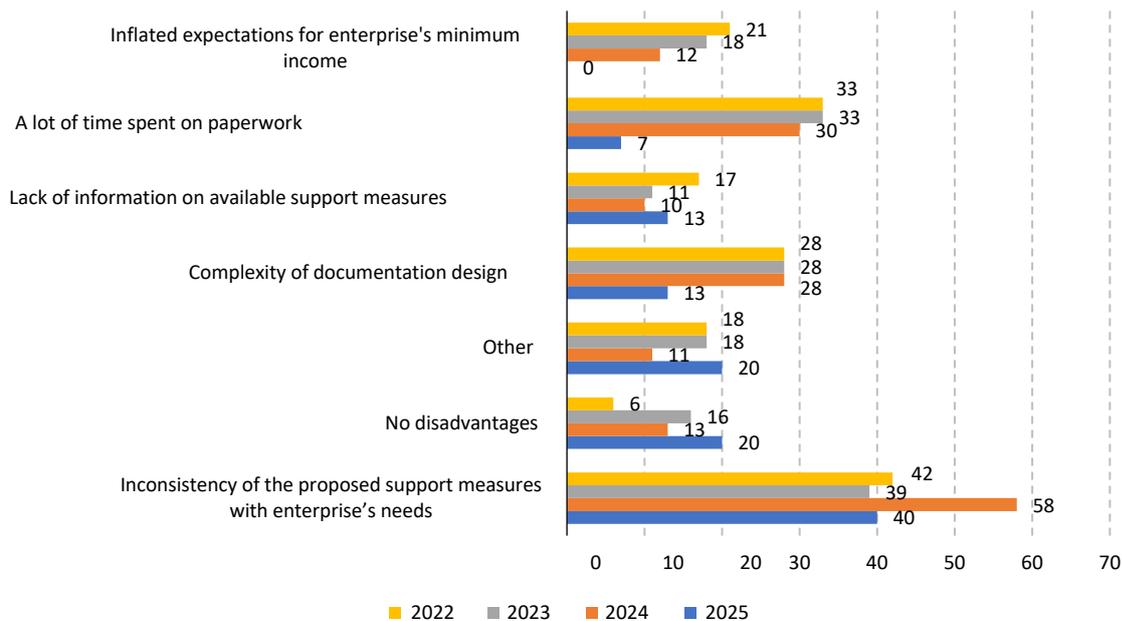


Figure 7. Distribution of responses to the question "What are the disadvantages of the existing government support that prevent you from using it actively?", % of respondents

Source: VoIRC RAS survey data.

Among the main measures for the development of the industrial sector, the survey participants most often chose the improvement of the financial and credit system (67%, +38 p.p.). They considered the need to simplify the taxation system to be the next most effective measures (40%) and the launch of large infrastructure and industrial projects at the expense of the state budget (40%; *Tab. 6*).

One third of respondents continue to worry about high prices for fuel, energy and transport services (33%), while the share of those dissatisfied with the high bureaucratic burden (20%, -36 p.p.) and poor conditions for investing in the industrial sector (13%, -47 p.p.) has significantly decreased.

Many will find a discrepancy between the opinion of the majority of respondents about the lack of impact of changes in the Central Bank's key rate on the country's economy (53%) and

the opinion of 67% of business executives about the need to improve financial and credit policy. The apparent contradiction between the data is explained by the fact that a high key rate has an ambiguous effect: it has no direct negative impact on the current activities of many enterprises that have switched to using their own funds (which explains 53% of neutral responses); However, expensive loans are a key barrier to the prospects of investment development and modernization, which reflects the request of 67% of respondents to improve the financial and credit system.

For the first time since 2022, the majority of business executives surveyed said that the role of the state in the economy is currently optimal (40%, +12 p.p.). Supporters of intensifying economic policy through the use of indirect economic regulation measures in the current survey took second place with 33% (-4 p.p.). Comparing the results obtained with the data

Table 6. Distribution of responses to the question "What measures do you think should be taken in the near future to develop the industrial sector?", % of respondents

Response option	2022	2023	2024	2025
Improve the financial and credit system in the interests of the industrial sector	30	37	29	67
Simplify the taxation system, reduce the total amount of taxes on producers	75	61	58	40
Launch large infrastructure and industrial projects at the expense of the state budget	30	26	22	40
Limit price increases for fuel, energy, and transportation services	36	58	43	33
Pursue an effective foreign trade policy in the interests of domestic producers	32	33	22	27
Reduce the level of bureaucratic burden	49	57	56	20
Create conditions for investing in the industrial sector, dramatically expand the scope of preferential loans	72	36	60	13
Provide financial support for the development of promising (for example, import-substituting) areas of the industrial sector and market infrastructure	36	32	35	13
Create conditions for the growth of effective demand	30	46	29	13
Strengthen fight against corruption	26	43	27	13
Create alternative payment systems for servicing import and export transactions	29	25	27	13
Reduce total amount of taxes on the population	17	29	10	7
Promote integration processes between enterprises	11	19	10	7
Source: VolRC RAS survey data.				

from a survey of business leaders conducted by the Institute of Economic Forecasting of the Russian Academy of Sciences (IEF RAS), it can be noted that, in the opinion of the majority of Russian business leaders, the most relevant response option is the need for indirect regulatory measures (44.3%), and only 21.4% of respondents noted the optimality of the current role of the state (Kovalin et al., 2024).

Conclusion

Let us summarize the changes in the industrial sector of the Northwest Russia over the previous year and highlight the trends and tendencies in its functioning over the previous four years.

The gradual withdrawal of enterprises from functioning in the conditions of crisis and economic uncertainty is indicated by a decrease in the share of respondents who give negative forecasts of decrease in their production performance; 40% of business executives have long-term plans to improve the indicators.

Sixty percent of the respondents continued to search for new suppliers of raw materials within the country, but the decrease in the share of those who will continue doing this in the future to 47% indicates a restructuring of logistics chains. It can also serve as an indicator of the completion of the active reorientation of most enterprises in the industrial sector to the domestic market.

An additional confirmation of the normalization of the economy is the weakening of a number of barriers that, according to business executives, hinder production growth. For instance, quarter fewer respondents are dissatisfied with high prices for raw materials, fuel and materials (-25 p.p.), 13 p.p. fewer respondents say about the shortage of skilled workers. However, working in conditions of a high key rate of the Bank of Russia led to an increase in the share of those expressing dissatisfaction with the high percentage of commercial loans (47%, +12 p.p.).

The transformation of production and distribution chains in the sector's enterprises is coming to an end. Trade and economic contacts in areas such as joint investment projects, technology sales and the recruitment of specialists with organizations from countries that have imposed sanctions have practically been discontinued (0% in 2025). At the same time, contacts remain, although they have decreased, in the field of trade in end products (40%), raw materials and semi-finished products (purchase – 20%, sale – 13%), technologies (purchase – 13%).

The decrease in the share of respondents who do not cooperate with foreign counterparties indicates a restructuring of logistics for cooperation with friendly countries (33%, -36 p.p.). The share of those who do not cooperate with Russian organizations fell to 13% (-32 p.p.) over the year, with enterprises from the Northwestern Federal District – to 7% (-17 p.p.).

The share of business executives dissatisfied with the small market capacity in Russia (20%, -45 p.p.) and the Northwestern Federal District (13%, -52 p.p.) decreased. In general, there was a significant decrease in dissatisfaction with the main barriers hindering the development of trade and economic relations with foreign and Russian organizations. The opinions of business executives have changed most dramatically about the lack of information regarding tenders and tenders in the Russian Federation (-71 p.p.) and the Northwestern Federal District (-42 p.p.), and about the weak assistance to the industrial sector from the authorities in Russia and the macro region (-69 and -23 p.p., respectively).

The stabilization of the economic situation in the country is indicated by a decrease in the share of business executives who carry out any measures to transform their production and distribution chains. Although there is a tendency of continued reorientation toward domestic suppliers and consumers (53%), and the search for new ones in

the markets of neutral countries (40%), already a third of business executives (33%) have stated that there are no disruptions in the supply chains.

The growth of up to 40% of the share of business executives who consider the amount of financing for their company to be optimal looks optimistic. On the other hand, for the third year now, the share of responses on the sufficiency of financing for the industrial sector of the NWFD economy has been falling, and there has been an increase in the share of respondents who said there were insufficient resources even to maintain current production volumes.

A request to assess the impact of a high key interest rate on the Russian economy gave the answer: 40% of respondents rated it as negative. The majority of business executives (53%) noted that such a level of the refinancing rate does not affect changes in the country's economy.

Seventy-three percent of respondents unequivocally support the actions of the government of the country, while only 47% of respondents support the regional authorities. Half of the business executives were unable to assess the policy of the regional authorities, which did not prevent the survey participants from expressing satisfaction with the effectiveness of cooperation with federal and regional executive authorities.

The sharp drop in the share of those who used state support measures at the federal and regional levels may have been due to a reduction in government programs to offset the acute phase of the crisis. One third of the respondents did not take advantage of support measures due to lack of need for such measures, another 20% did not have such an opportunity. At the same time, the main obstacles to their active application are the inconsistency of measures with the needs of the majority of enterprises in the industrial sector (40%).

Significant changes have taken place in the ranking of events that should stimulate the

development of the macro region's industrial sector in the near future. The most urgent, according to the business executives, is the improvement of the financial and credit system in accordance with the requirements of the industrial sector (67%, +38 p.p.).

Based on the survey results, it is possible to note the stabilization of the processes of transformation and adaptation of enterprises in the industrial sector of the Northwestern Federal District to sanctions and economic uncertainty. The reorientation of enterprises to the domestic market is almost complete, logistics chains have been rebuilt for the majority of respondents, and production and distribution chains do not require significant resources for further changes. The majority of experts demonstrate an optimistic view on the future work of their company, and a high key rate has no impact on the country's economy, according to half of the respondents.

Thus, we analyzed the results of the annual monitoring of the industrial sector conducted by Vologda Research Center of RAS. The survey of business executives makes it possible to supplement the official information with a subjective opinion about the real work of the sector. Participation in surveys of large corporations makes it possible to develop recommendations for the executive authorities of the constituent entities of the Northwest macro region to adjust support measures and industrial policy of the regions. The conducted research provides an opportunity to complement the study of regional and sectoral specifics of economic development, to list the barriers limiting regional growth, and to improve the necessary programs for the development of the sector. Taking into account the opinion of the business executives in the industrial sector of the macro region's economy will improve the efficiency of enterprises and have a positive impact on the region as a whole.

REFERENCES

- Abdikeev N.M. (2022). Import substitution in high-tech industries under external sanctions. *Management Sciences*, 12(3), 53–69. DOI: 10.26794/2304-022X
- Akberdina V.V. (2022). System resilience of industry to the sanctions pressure in industrial regions: Assessment and outlook. *Journal of New Economy*, 23(4), 26–45. DOI: 10.29141/2658-5081-2022-23-4-2
- Allan B., Lewis J.I., Oatley T. (2021). Green industrial policy and the global transformation of climate politics. *Global Environmental Politics*, 21(4), 1–19. DOI: https://doi.org/10.1162/glep_a_00640
- Chernova I.I., Balashova E.A. (2024). Analysis of the factors of investment activity activation and the development of the manufacturing sector in Russia based on offset contracts. *Sotsiosfera*, 4, 75–81 (in Russian).
- Demchenko T.S., Demchenko M.V. (2025). Assessment of the impact of economic sanctions on the activities of entrepreneurs. *Rossiiskii ekonomicheskii zhurnal*, 1, 58–71 (in Russian).
- Grigoryan S. (2024). The impact of economic sanctions on industrial development. *Scientific Bulletin*, 2(47), 83–97. DOI: <https://doi.org/10.24234/scientific.v2i47.165>
- Hicham B., Hamza D.T. (2024). Dimensions of artificial intelligence and data strategies in industrial enterprises and achieving sustainable leadership: A reading in the Saudi Industrial National Strategy 2016–2030. *Journal of North African Economies*, 20(34), 185–204.
- Jaradat Z., AL-Hawamleh A., Altarawneh M., Al-Tahat S., Akram Nazzal M. (2025). Effects of effective ERP system utilization on enterprise economic sustainability through product life cycle cost control. *Journal of Business and Socio-economic Development*. DOI: <https://doi.org/10.1108/JBSED-10-2024-0103>
- Jeske T., Würfels M., Lennings F. (2021). Development of digitalization in production industry–Impact on productivity, management and human work. *Procedia Computer Science*, 180, 371–380. DOI: <https://doi.org/10.1016/j.procs.2021.01.358>
- Kirillova S.A., Orlova D.S. (2024). Reducing the spatial differentiation of creative industries as a way to reduce interregional differences. *Problemy razvitiya territorii=Problems of Territory's Development*, 28(6), 22–38. DOI: 10.15838/ptd.2024.6.134.3 (in Russian).
- Kozin M.N. (2024). Assessment of the readiness of the industrial sector of the economy to fulfill urgent government orders in conditions of limited competition. *Nauchnye problemy material'no-tehnicheskogo obespecheniya Vooruzhennykh Sil Rossiiskoi Federatsii*, 3(33), 169–183 (in Russian).
- Kuvalin D.B., Zinchenko Yu.V., Ibragimov Sh.Sh., Zaitseva A.A. (2024). Russian enterprises in spring 2024: Significant increase in investment activity in the face of sanctions. *Problemy prognozirovaniya=Studies on Russian Economic Development*, 6, 201–216. DOI: 10.47711/0868-6351-207-201-216 (in Russian).
- Larch M. et al. (2022). Quantifying the impact of economic sanctions on international trade in the energy and mining sectors. *Economic Inquiry*, 60(3), 1038–1063. DOI: <https://doi.org/10.1111/ecin.13077>
- Lavrent'ev A.V. (2024). Adaptation of Russian enterprises to the conditions of sanctions pressure on the economy of the Russian Federation. *Ekonomika i upravlenie: problemy, resheniya*, 10, 10(151), 37–46 (in Russian).
- Lazhentsev V.N. (2024). Territorial development (theory and methodology of economic relations). *Problemy razvitiya territorii=Problems of Territory's Development*, 28(6), 10–21. DOI: 10.15838/ptd.2024.6.134.2 (in Russian).
- Lukin E.V., Uskova T.V. (2018). Problems of structural transformation of the regional economy. *Ekonomicheskie i sotsial'nye peremny: fakty, tendentsii, prognoz=Economic and Social Changes: Facts, Trends, Forecast*, 11(6), 26–40. DOI: 10.15838/esc.2018.6.60.2 (in Russian).

- Mironova O.A. (2024). The impact of Western sanctions on the economic activities of Russian companies. *Konkurentosposobnost' v global'nom mire: ekonomika, nauka, tekhnologii*, 7, 60–64 (in Russian).
- Ponomarev D.S., Gorokhov M.M. (2024). Development of systems for comparative analysis of key performance parameters of the manufacturing sector using Python. *Vestnik Donetskogo natsional'nogo universiteta. Seriya G: Tekhnicheskie nauki*, 3, 75–82 (in Russian).
- Rozhko O.N., Katsenko V.V. (2024). The impact of import sanctions on the manufacturing sector of the national economy. *Ekonomika, predprinimatel'stvo i pravo*, 14(3), 703–716 (in Russian).
- Shirokova E.Yu., Lukin E.V. (2024). The manufacturing sector of the economy of the North-West of Russia: Is it the continuation of transformation? *Problemy razvitiya territorii=Problems of Territory's Development*, 28(4), 100–200. DOI: 10.15838/ptd.2024.4.132.2 (in Russian).
- Stepanova T.D. (2024). Economic development trends after 2022: Industry, science, human potential. *Rossiiskii ekonomicheskii zhurnal*, 5, 32–45 (in Russian).
- Stępień B., Early B.R., Grauvogel J., Preble K.A., Truskolaski S. (2024). The impact of external pressure on companies' responses to sanctions – an international comparative study. *European Journal on Criminal Policy and Research*, 30(2), 1–26. DOI: <https://doi.org/10.1007/s10610-024-09576-y>
- Tavrikov D.M., Yashalova N.N. (2024). Sanctions pressure on the metalware industry: Problems and ways to overcome them. *Steel Transl.*, 54, 1176–1180. DOI: <https://doi.org/10.3103/S0967091225700056>
- Treier V.V. (2025). Industrial products as a central link in the digital transformation of the manufacturing sector of the economy. *Ekonomicheskie strategii*, 27, 1(199), 74–79 (in Russian).
- Uskova T.V., Lukin E.V., Leonidova E.G. et al. (2020). *Strukturnaya transformatsiya regional'noi ekonomiki* [Structural Transformation of the Regional Economy]. Vologda: Vologodskii nauchnyi tsentr Rossiiskoi akademii nauk.
- Volkov I.L. (2024). Comparative analysis of measures to support small and medium-sized businesses in the manufacturing sector in Russia and China. *Sovremennaya Aziya: politika, ekonomika, obshchestvo=Modern Asia: Politics, Economy, Society*, 2, 5–16 (in Russian).

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ЛИТЕРАТУРА

- Волков И.Л. (2024). Сравнительный анализ мер поддержки малого и среднего бизнеса в производственном секторе в России и Китае // Современная Азия: политика, экономика, общество. № 2. С. 5–16.
- Демченко Т.С., Демченко М.В. (2025). Оценка влияния экономических санкций на деятельность предпринимателей // Российский экономический журнал. № 1. С. 58–71.
- Кириллова С.А., Орлова Д.С. (2024). Снижение пространственной дифференциации креативных индустрий как направление сокращения межрегиональных различий // Проблемы развития территории. Т. 28. № 6. С. 22–38. DOI: 10.15838/ptd.2024.6.134.3

- Козин М.Н. (2024). Оценка готовности производственного сектора экономики к выполнению срочных государственных заказов в условиях ограниченной конкуренции // Научные проблемы материально-технического обеспечения Вооруженных Сил Российской Федерации. № 3 (33). С. 169–183.
- Кувалин Д.Б., Зинченко Ю.В., Ибрагимов Ш.Ш., Зайцева А.А. (2024). Российские предприятия весной 2024 года: значительное усиление инвестиционной активности в условиях санкций // Проблемы прогнозирования. № 6. С. 201–216. DOI: 10.47711/0868-6351-207-201-216
- Лаврентьев А.В. (2024). Адаптация российских предприятий к условиям санкционного давления на экономику Российской Федерации // Экономика и управление: проблемы, решения. Т. 10. № 10 (151). С. 37–46.
- Лаженцев В.Н. (2024). Территориальное развитие (теория и методология хозяйственных отношений) // Проблемы развития территории. Т. 28. № 6. С. 10–21. DOI: 10.15838/ptd.2024.6.134.2
- Лукин Е.В., Ускова Т.В. (2018). Проблемы структурной трансформации региональной экономики // Экономические и социальные перемены: факты, тенденции, прогноз. Т. 11. № 6. С. 26–40. DOI: 10.15838/esc.2018.6.60.2
- Миронова О.А. (2024). Влияние западных санкций на экономическую деятельность российских компаний // Конкурентоспособность в глобальном мире: экономика, наука, технологии. № 7. С. 60–64.
- Пономарев Д.С., Горохов М.М. (2024). Разработка систем сравнительного анализа ключевых параметров эффективности производственного сектора при помощи языка Python // Вестник Донецкого национального университета. Серия Г: Технические науки. № 3. С. 75–82.
- Рожко О.Н., Каценко В.В. (2024). Влияние санкционных импортных ограничений на производственный сектор национальной экономики // Экономика, предпринимательство и право. Т. 14. № 3. С. 703–716.
- Степанова Т.Д. (2024). Тенденции экономического развития после 2022 года: промышленность, наука, человеческий потенциал // Российский экономический журнал. № 5. С. 32–45.
- Трейер В.В. (2025). Продукция производственного назначения как центральное звено в цифровой трансформации производственного сектора экономики // Экономические стратегии. Т. 27. № 1 (199). С. 74–79.
- Ускова Т.В., Лукин Е.В., Леонидова Е.Г. [и др.] (2020). Структурная трансформация региональной экономики. Вологда: Вологодский научный центр Российской академии наук. 232 с.
- Чернова И.И., Балашова Е.А. (2024). Анализ факторов активизации инвестиционной деятельности и развития производственного сектора в России на основе офсетных контрактов // Социосфера. № 4. С. 75–81.
- Широкова Е.Ю., Лукин Е.В. (2024). Производственный сектор экономики Северо-Запада России: продолжение трансформации? // Проблемы развития территории. Т. 28. № 4. С. 10–29. DOI: 10.15838/ptd.2024.4.132.2
- Abdikeev N.M. (2022). Import substitution in high-tech industries under external sanctions. *Management sciences*, 12(3), 53–69. DOI: 10.26794/2304-022X
- Akberdina V.V. (2022). System resilience of industry to the sanctions pressure in industrial regions: Assessment and outlook. *Journal of New Economy*, 23(4), 26–45. DOI: 10.29141/2658-5081-2022-23-4-2
- Allan B., Lewis J.I., Oatley T. (2021). Green industrial policy and the global transformation of climate politics. *Global Environmental Politics*, 21(4), 1–19. DOI: https://doi.org/10.1162/glep_a_00640
- Grigoryan S. (2024). The impact of economic sanctions on industrial development. *Scientific Bulletin*, 2(47), 83–97. DOI: <https://doi.org/10.24234/scientific.v2i47.165>

- Hicham B., Hamza D.T. (2024). Dimensions of artificial intelligence and data strategies in industrial enterprises and achieving sustainable leadership: A reading in the Saudi Industrial National Strategy 2016-2030. *Journal of North African Economies*, 20(34), 185–204.
- Jaradat Z., AL-Hawamleh A., Altarawneh M., Al-Tahat S., Akram Nazzal M. (2025). Effects of effective ERP system utilization on enterprise economic sustainability through product life cycle cost control. *Journal of Business and Socio-economic Development*. DOI: <https://doi.org/10.1108/JBSED-10-2024-0103>
- Jeske T., Würfels M., Lennings F. (2021). Development of digitalization in production industry–Impact on productivity, management and human work. *Procedia Computer Science*, 180, 371–380. DOI: <https://doi.org/10.1016/j.procs.2021.01.358>
- Larch M. et al. (2022). Quantifying the impact of economic sanctions on international trade in the energy and mining sectors. *Economic Inquiry*, 60(3), 1038–1063. DOI: <https://doi.org/10.1111/ecin.13077>
- Stępień B., Early B.R., Grauvogel J., Preble K.A., Truskolaski S. (2024). The impact of external pressure on companies' responses to sanctions – an international comparative study. *European Journal on Criminal Policy and Research*, 30(2), 1–26. DOI: <https://doi.org/10.1007/s10610-024-09576-y>
- Tavrikov D.M., Yashalova N.N. (2024). Sanctions pressure on the metalware industry: Problems and ways to overcome them. *Steel Transl.*, 54, 1176–1180. DOI: <https://doi.org/10.3103/S0967091225700056>.

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