DOI: 10.15838/esc.2023.6.90.4
UDC 332.12, LBC 65.9(2Rus)-98

Promising Economic Specializations within a Macroregion (the Case of the Northwestern Federal District)

Nikita M.
RUMYANTSEV
Vologda Research Center, Russian Academy of Sciences
Vologda, Russian Federation
e-mail: rumyanik.95@gmail.com
ORCID: 0000-0001-5660-8443; ResearcherID: AAC-2818-2019

Abstract. The intensification of structural transformation of the economy in Russia and its regions in the context of geopolitical instability requires searching for the most promising types of economic activity that could become drivers of development in the new economic conditions. This premise is especially relevant for the Northwest of Russia due to the fact that the economy in this macroregion has been subjected to the strongest negative impact of foreign trade restrictions. Thus, the aim of our study is to determine sectoral priorities of regional development in the form of promising economic specializations within a single macroregion. To achieve the goal, we address the following tasks: to develop a methodology for searching for promising economic specializations at the macroregional level; identify existing sectoral specializations in the Northwest of Russia; outline the profile of promising economic specializations in the Northwestern Federal District, taking into account possible interregional interactions. Based on our own methodological approach, which is the novelty of the study, we identify promising value chains in the timber industry, machine-building industries and the chemical industry. According to the results of the study, we compile profiles of promising economic specializations for regions in the Northwest of Russia; this is also an original scientific result. Based on the analysis of global economic development trends, we identify potential market niches for the industries under consideration. In addition, we propose measures to promote the development of promising economic specializations in the macroregion. The findings of the study can be useful to a wide range of researchers in the field of sectoral and regional economics,

For citation: Rumyantsev N.M. (2023). Promising economic specializations within a macroregion (the case of the Northwestern Federal District). *Economic and Social Changes: Facts, Trends, Forecast*, 16(6), 74–90. DOI: 10.15838/esc.2023.6.90.4

as well as federal and regional authorities in the development and adjustment of various strategic and sectoral documents.

Key words: structural transformation, promising economic specializations, interregional cooperation, economic growth, value chains.

Acknowledgment

The research was funded by Russian Science Foundation grant 23-28-01862, https://rscf.ru/project/23-28-01862/.

Introduction

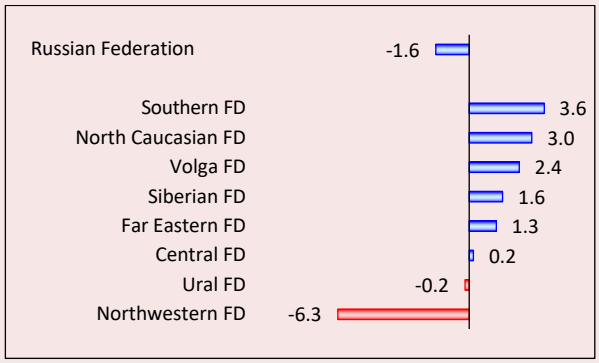
The Northwest of Russia is one of the macroregions most affected by the sanctions. Foreign trade restrictions have had a negative impact on the key industries of the constituent entities within the Northwestern Federal District (NWFD) – metallurgy, chemical industries, woodworking, and mechanical engineering. In conditions of high import dependence on the supply of investment products and a decrease in financial performance, investment processes in the macroregion have slowed down.

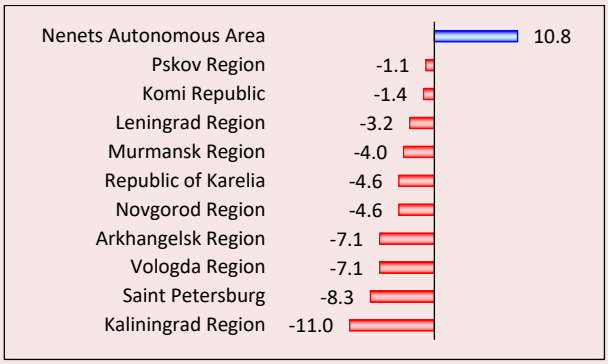
This thesis is confirmed by statistical data: for example, in the Northwest of Russia in 2022, the physical volume of output in the context of basic types of economic activity decreased by 6.3%, while the nationwide decrease was 1.6% *(Figure)*.

The most dramatic decline was observed in Saint Petersburg and the Kaliningrad Region; the Vologda and Arkhangelsk regions also suffered significantly. The indicator increased only in the Nenets Autonomous Area due to the high share of the mining industry, which was less affected by the sanctions.

At the same time, data from surveys of managers of enterprises in the manufacturing sector indicate the intensification of transformational processes. Business leaders predict a deterioration in economic conditions (90% of respondents). At the same time, the assessments of heads of manufacturing sector organizations regarding the impact of sanctions in the Northwestern Federal District are more negative than in the Russian Federation (71% of

Dynamics of output of goods and services in the context of basic types of economic activity in 2022, broken down by federal district, and by region of the Northwestern Federal District, % compared to the previous year





Source: Rosstat.

respondents in the Northwestern Federal District versus 59% in the Russian Federation reported a negative impact of foreign trade restrictions on the activities of enterprises). More than 82% of respondents expected transformation of their own supply chains in 2022; 62% named the search for supply and sales channels in the domestic market as the direction of restructuring, 20% were looking for import substitution opportunities, and 17% were ready to replace imported products on their own. It is also noted that the government should intensify economic policy by expanding the range of tools used and applying mainly indirect measures of economic regulation (this was noted by 66% of respondents) (Uskova et al., 2022).

All of the above brings to the fore the need for structural policy, in particular, the definition of its sectoral priorities in the form of promising economic specializations, which is the aim of the study. To achieve the goal, it is necessary to address the following tasks:

– develop a methodology for searching for promising economic specializations at the macroregional level;

– identify existing industry specializations at the macroregional level;

– determine the profile of promising economic specializations in regions of the Northwest of Russia, taking into account possible interregional interactions.

Scientific novelty of the research lies in the development of our own approach to the definition of promising specializations at the macroregional level, as well as the formation of profiles of promising industry specialization of regions in the Northwest under new economic conditions.

Review of scientific literature on the research topic

Scientific discourse on the influence of the structure of the regional socio-economic system on the trajectories of its development has been going on for a long time (Caragliu et al., 2016; Content, Frenken, 2016; Feldman, Audretsch, 1999).

Two types of external effects are discussed in scientific papers. The effect of specialization usually manifests itself when a certain number of industries with similar competencies and products are concentrated in a given area, which allows forming narrowly focused labor and knowledge markets, as well as generating innovations and technological solutions among a limited number of companies in isolated economic activities (Glaeser et al., 1992). The effects of specialization include higher labor productivity and increased innovation activity in companies that make up the specialization industries (Grashof et al., 2019).

The opposite effect, the diversification effect, or the Jacobs effect, is a consequence of the diversity of the economic structure of a territory. When there is a variety of developed industries, due to the accumulation of competencies, fundamentally new productions arise on the basis of restructured existing enterprises. This is due to cross-industry cooperation or a combination of old technologies in new products (Jacobs, 1969). One of the research papers contains conclusions that the recombination of existing competencies can form radically new products, technologies and skills (Essletzbichler, 2015).

At present there is no unambiguous consensus among researchers on the advantage of one or another effect – specialization or diversification – for the intensification and acceleration of economic growth of territories (Henderson et al., 1995; Duranton, Puga, 2000; Greunz, 2004).

Diversification involves a variety of economic sectors and activities in the territory, which reduces risks and increases the resilience of the economy to external influences. At the same time, the main focus is on the development of new industries and creation of conditions for attracting investment in various economic sectors. Diversification can be especially effective for regions that depend on one or more industries that may be vulnerable to changes in global markets.

On the other hand, the specialization strategy involves focusing on certain industries and activities that are competitive and bring high profits. Such an economic model is most effective for regions with unique resources or competitive advantages in certain industries.

Our position within the framework of the correlation of these concepts is as follows: at the federal level, it is necessary to adhere to diversification in order to ensure our own economic security (by localizing value chains in the country) and eliminate export and import dependence, which in turn requires specialization of individual territories with effective use of their competitive advantages. This requires intensification of interregional cooperation and coordination of the efforts of federal and regional authorities in the field of economic and, in particular, structural policy.

The formation of a new economic structure necessitates defining sectoral vectors of its development, as noted earlier. The concepts of searching for promising economic specializations are of considerable research interest in this direction. This concept appeared in Russian management practice in 2019, when the Spatial Development Strategy of the Russian Federation through to 20251 (hereinafter referred to as the Strategy) was adopted. It defines the category of promising economic specializations, forms their list for all 85 RF regions, and also states the need to develop a methodological approach to the search for promising types of economic activities based on "smart" specialization.

However, this strategic planning document has been subjected to some criticism in the works of researchers. Thus, it is noted that the concept of promising specializations in Strategy has a fairly general definition and does not take into account the imbalance in the spatial development of Russian regions that has formed over decades (Ivanov, Bukhvald, 2019). Researchers at the Higher School of Economics point out that the list of specializations, first, is very wide and does not have specifics, and second, contains a significant number of duplicate specializations ("... in the Strategy, 30% of the most common specializations are indicated for 71% of RF constituent entities (for example, "crop and livestock production, provision of appropriate services in these areas" – for 80 regions, and "production of other finished products" – for 84 regions). According to HSE estimates, one third of the most common specializations are objectively found in only 29% of territories"), and third, it includes nontradable industries whose products cannot be exported to other regions (Kutsenko et al., 2019).

We should note that the task set out in the action plan for the implementation of the Strategy to develop a methodological approach for identifying promising types of economic activity based on the concept of "smart" specialization has not been fulfilled. However, other approaches to the search for promising specializations are also used in economics. In addition to the "smart" specialization already mentioned, the most commonly used concepts include economic complexity and technological proximity.

Appropriate approaches are being developed by individual research groups. Thus, the formation of profiles of a promising specialization on the basis of "smart" specialization was carried out by scientists of the Russian Foreign Trade Academy of the Ministry of Economic Development of the Russian Federation (Kotov et al., 2019), and on the basis of the improved approach of the European Cluster Observatory – by researchers of the Higher School of Economics (Kutsenko et al., 2019).

In the foreign literature, the study of promising specializations within the framework of the concept of economic complexity is represented by works

[1] Spatial Development Strategy of the Russian Federation for the period through to 2025 (approved by RF Government Resolution 207-r, dated February 13, 2019).

on its analysis at the regional level. Thus, using the example of some Australian states, goods and services with a comparative advantage and capable of forming appropriate production capacities were identified (Reynolds et al., 2018). B. Tullio and C. Giancarlo identified a space in Europe within which regional technological proximity is characterized. In this work, seven clusters were analyzed, differing in competitive advantages, production characteristics and functional affiliation, and it was found that the more intense the dynamics of structural changes within the region, the higher the production capabilities due to the recombination of competencies of similar industries (Tullio, Giancarlo, 2018).

A Russian team of researchers representing RANEPA studied the issues of export diversification in Russian regions (Lyubimov et al., 2017). Major research results include the assessment of the levels of complexity of the export basket for 80 RF regions, the analysis of the potential for complication of exports of goods and services. According to the assessment results, the regions were divided into groups with low and high levels of foreign trade development.

In another study, these scientists examined the structure of export activity in the regions of the Russian Federation, and assessed the possibility of its diversification. According to the authors' calculations, an atlas of the economic complexity of exports of Russian regions was compiled (Lyubimov et al., 2018). The work confirmed the conclusions of previous studies: for example, it was proved that the western and central regions of Russia have a wider export basket and have more opportunities for its diversification, while the northern and eastern regions have the opposite. Another significant conclusion is that in order to expand the export basket, it is necessary to form interregional cooperative ties, as well as actively integrate into transnational value chains.

It is worth mentioning the research on economic complexity within regional systems. Russian science contains an example of a study of the complexity of the Kaliningrad Region's economy: methods and algorithms for searching and analyzing the source data system, an approach to assessing complexity are developed, recommendations for using the results of analysis in the system of regional management and managerial decision-making in the interests of industrial development in the Kaliningrad Region are formulated and substantiated (Roos et al., 2020).

The theory of economic diversity is one of the most well-known and significant concepts in the search for trajectories of the optimal path of economic development and structural transformations. Its key indicator can be called the indicator of technological proximity, which is also used to highlight related industries. Taking into account the disadvantages of the traditional approaches used, Hidalgo and co-authors (Hidalgo et al., 2007) developed a method for calculating the indicator of technological proximity based on comparative advantages. This indicator allows us to quantify the possibilities for developing new types of economic activities based on their technological prospects, taking into account the existing innovative and technological portfolio of territories. The work (Rastvortseva, Amanalieva, 2020), uses an example of high-tech economic activities within the EU countries and demonstrates the application of the indicator of technological proximity in order to analyze innovative systems and innovative industries' prospects.

The analysis of existing scientific papers allowed us to conclude that it is possible to combine methodological approaches to the search for promising specializations. However, it is worth noting that the concept of "smart" specialization is best suited for determining industry priorities due to its industry rather than product orientation, as

well as a more pronounced search for competitive advantages. In addition, it is possible to use some elements of other concepts when assessing the prospects of a particular type of economic activity.

Materials and methods

As the main methodological tools, we used the method of searching for promising specializations based on the criteria selection of types of economic activity. This technique was tested on materials from the Vologda Region for 235 types of economic activity (Rumyantsev et al., 2022). As part of the significant components of the assessment, within the framework of the proposed methodological approach, the effectiveness of industry specialization; market potential; innovation activity; patent security were analyzed.

As a final indicator, which is used to assess the prospects of economic activities in the region, a cumulative integral assessment is used, calculated on the basis of the sum of points assigned to each of the calculated indicators, according to the directions indicated above:

$$PC_i^{reg} = \left(EIS_i^{reg} + MP_i^{reg} + IA_i^{reg}\right) + PP_i^{reg},$$

where PC_i^{reg} – cumulative integral assessment of the prospects of the i-th type of economic activity in the region;

EIS_i^{reg} – sum of points according to the block of criteria "Efficiency of industry specialization", calculated for the i-th type of economic activity in the region;

MP_i^{reg} – sum of points according to the block of criteria "Market potential", calculated for the i-th type of economic activity in the region;

IA_i^{reg} – sum of points according to the block of criteria "Innovative activity", calculated for the i-th type of economic activity in the region;

PP_i^{reg} – sum of points according to the block of criteria "Patent provision", calculated for the i-th type of economic activity of the region.

The initial approbation and the study of relevant scientific papers required improvement of the existing methodological approach as follows:

– promising economic specializations are identified only for tradable industries, the competitive advantages of which allow using both the volume of the domestic market and export opportunities[2];

– it is more correct to calculate the significance of the type of economic activity (TEA) on a regional and national scale according to the number of employees so as to eliminate distortions caused by recording the volume of shipped products (used in calculations earlier) at the place of registration of the company rather than its physical location;

– due to the incompleteness of statistical information, a number of innovative activity indicators were excluded from the calculation; in order to compensate for the weight of innovative activity in the integrated assessment, the points for the remaining criteria were increased.

After making these changes, the list of indicators used to calculate the integral indicator of the prospectivity of a type of economic activity is as follows *(Tab. 1)*.

After the corresponding indicators have been calculated, they are assigned a point score in accordance with the intervals shown in *Table 2*.

Within the framework of the study, we formed the passports of promising economic specializations for Northwestern Federal District regions and revealed potential points of interaction for the types of economic activities we identified for the production of deep processing goods, including on the basis of interregional cooperation. The final stage of the study was to define microspecializations of regions, which required an analysis of expert opinions and relevant industry literature and allowed us to identify narrow market niches for vigorous economic development in the macroregion.

[2] The work uses a list of tradable industries presented in (Ketels, Protsiv, 2014).

Table 1. Methodology for calculating prospectivity indicators for the types of economic activity in the region

Indicator	Calculation
Effectiveness of industry specialization	
Labor productivity of TEA in the region	$K_1 = \left(\frac{V_{it}^{\text{reg}}}{L_{it}^{\text{reg}}} : \frac{\sum_{i=n} V_{it}^{\text{reg}}}{\sum_{i=n} L_{it}^{\text{reg}}}\right) * \left(\frac{L_{it}^{\text{reg}}}{L_{nt}^{\text{reg}}} : \frac{L_t^{\text{reg}}}{L_{nt}^{\text{reg}}}\right)$
Labor productivity of TEA in the macroregion	$K_2 = \left(\frac{V_{it}^{\text{reg}}}{L_{it}^{\text{reg}}} : \frac{V_{it}^{\text{mreg}}}{L_{it}^{\text{mreg}}}\right)$
Labor productivity of TEA in the country	$K_3 = \left(\frac{V_{it}^{\text{reg}}}{L_{it}^{\text{reg}}} : \frac{V_{it}^{\text{RF}}}{L_{it}^{\text{RF}}}\right)$
Nationwide efficiency of labor productivity in the industry	$K_4 = K_1 * \left(\frac{V_t^{\text{reg}}}{L_t^{\text{reg}}} : \frac{V_t^{\text{RF}}}{L_t^{\text{RF}}}\right)$
Market potential	
Significance of TEA on a national scale	$K_5 = \frac{L_{it}^{\text{reg}}}{L_{it}^{\text{RF}}} * 100\%$
Significance of TEA on a regional scale	$K_6 = \frac{L_{it}^{\text{reg}}}{L_t^{\text{reg}}} * 100\%$
Growth rate of TEA in the region	$K_7 = \sqrt[3]{\frac{L_{i(t-2)}^{\text{reg}}}{L_{i(t-3)}^{\text{reg}}} * \frac{L_{i(t-1)}^{\text{reg}}}{L_{i(t-2)}^{\text{reg}}} * \frac{L_{it}^{\text{reg}}}{L_{i(t-1)}^{\text{reg}}}} * 100\%$
Potential for economic complexity due to the development of TEA	$K_8 = D_i$ $K_9 = U_i$
Import substitution potential	$K_{10} = \frac{I_{it}^{\text{reg}}}{V_{it}^{\text{reg}}} * 100\%$
Innovative activity	
Share of shipped goods, works, and services of an innovative nature in the region's TEA in the volume of the country's TEA (in prices of year *t*)	$K_{11} = \left(\frac{N_{i(t-2)}^{\text{reg}}}{N_{i(t-2)}^{\text{RF}}} + \frac{N_{i(t-1)}^{\text{reg}}}{N_{i(t-1)}^{\text{RF}}} + \frac{N_{it}^{\text{reg}}}{N_{it}^{\text{RF}}}\right)/3$
Share of costs for innovative activities of the region's TEA in the volume of innovative costs of the country's TEA (in prices of year *t*)	$K_{12} = \left(\frac{CTI_{i(t-2)}^{\text{reg}}}{CTI_{i(t-2)}^{\text{RF}}} + \frac{CTI_{i(t-1)}^{\text{reg}}}{CTI_{i(t-1)}^{\text{RF}}} + \frac{CTI_{it}^{\text{reg}}}{CTI_{it}^{\text{RF}}}\right)/3$
Ratio of the shares of innovative goods, works and services in the region and in the country (in prices of year *t*)	$K_{13} = \left(\frac{\varepsilon_{i(t-2)}^{\text{reg}}}{\varepsilon_{i(t-2)}^{\text{RF}}} + \frac{\varepsilon_{i(t-1)}^{\text{reg}}}{\varepsilon_{i(t-1)}^{\text{RF}}} + \frac{\varepsilon_{it}^{\text{reg}}}{\varepsilon_{it}^{\text{RF}}}\right)/3$
Patent provision	
Patent provision	$K_{14} = \frac{Pat_i}{\sum_{k=1}^{6} Pat_i}$

Legend:
V_{it}^{reg} – volume of shipped goods of own production, own works completed and own services provided under the *i*-th type of economic activity in the region for year *t*; L_{it}^{reg} – average number of employees in the *i*-th type of economic activity in the region for year *t*; L_t^{reg} – average number of employees in the region for year *t*; L_{nt}^{reg} – average number of employees in the *n*-th industry in the region for year *t*; V_{it}^{mreg} – volume of shipped goods of own production, own works completed and own services provided under the *i*-th type of economic activity in the macroregion for year *t*; L_{it}^{mreg} – average number of employees in the i-th type of economic activity in the macroregion for year t; V_{it}^{RF} – volume of shipped goods of own production, own works completed and own services provided under the *i*-th type of economic activity in the RF for year *t*; L_{it}^{RF} – average number of employees in the i-th type of economic activity in the RF for year *t*; V_t^{reg} – volume of shipped goods of own production, own works completed and own services provided in the region for year *t*; V_t^{RF} – volume of shipped goods of own production, own works completed and own services provided in the RF for year *t*; L_t^{RF} – average number of employees in the RF for year *t*; D_i – length of the production chain; U_i – length of the supply chain*; I_{it}^{reg} – volume of imports of goods, works, and services under the *i*-th type of economic activity; N_{it}^{reg} – volume of shipped goods of own production, innovative works completed and innovative services provided under the *i*-th type of economic activity in the region for year *t*; N_{it}^{RF} – volume of shipped goods of own production, innovative works completed and innovative services provided under the *i*-th type of economic activity in the country for year *t*; CTI_{it}^{reg} – share of costs for innovation activities of TEA in the region under the *i*-th type of economic activity in the region for year *t*; CTI_{it}^{RF} – share of costs for innovation activities of TEA in the region under the *i*-th type of economic activity in the country for year *t*; $\varepsilon_{it}^{\text{reg}}$ – share of innovative goods, works, services under the *i*-th type of economic activity in the region for year *t*; $\varepsilon_{it}^{\text{RF}}$ – share of innovative goods in the total volume of goods, works, services under the *i*-th type of economic activity in the country for year *t*; Pat_i – number of patents under the *i*-th type of economic activity in the country.
* For more detail, see: (Lukin, 2022).
Source: own compilation with the use of (Rumyantsev et al., 2022).

Table 2. Point scores of indicators for determining promising specializations

Criterion	Procedure for assigning points	Criterion	Procedure for assigning points
K1	K1 ≥ 1.2 – 1 point 1.2 > K1 ≥ 0.8 – 0.5 points K1 < 0.8 – 0 points	K8	K8 ≥ 2.5 – 2 points 2.5 > K8 ≥ 2 – 1 point 2 > K8 ≥ 1.5 – 0.5 points K8 < 1.5 – 0 points
K2	K2 ≥ 1.2 – 1 point 1.2 > K2 ≥ 0.8 – 0.5 points K2 < 0.8 – 0 points	K9	K9 ≥ 2.5 – 2 points 2.5 > K9 ≥ 2 – 1 point 2 > K9 ≥ 1.5 – 0.5 points K9<1.5 – 0 points
K3	K3 ≥ 1.2 – 1 point 1.2 > K3 ≥ 0.8 – 0.5 points K3 < 0.8 – 0 points	K10	K10 < 0.5 – 2 points 0.5 < K10 < 1 – 1 point K10 ≥ 1 – 0 points
K4	K4 ≥ 2 – 2 points 2 > K ≥ 1.2 – 1 point 1.2 ≤ K4 ≥ 0.8 – 0.5 points K4 < 0.8 – 0 points	K11	K11 ≥ 5 – 1 point K11 < 5 – 0 points
K5	K5 ≥ 5 – 1 point 5 > K5 ≥ 1 – 0.5 points K5 < 1 – 0 points	K12	K12 ≥ 1 – 1 point 1 > K12 > 0 – 0.5 points K 12 ≤0 – 0 points
K6	K6 ≥ 10 – 1 point 10 > K6 ≥ 5 – 0.5 points K6 < 5 – 0 points	K13	K13 ≥ 1 – 1 point K13 < 0 – 0 points
K7	K7 ≥ 120 – 1 point 120 > K7 ≥ 110 – 0.5 points K7 < 110 – 0 points	K14	K1 4≥ 0.1 – K16*10 points K14 < 0.1 – 0 points
Source: own compilation based on (Rumyantsev et al., 2022) and expert assessments.			

Research results

The preliminary stage of the search for promising economic specializations in the regions of the Northwest of Russia was to define existing market specializations in the territories under consideration. For this purpose, localization coefficients were calculated for all sectors of the economy, as well as their share in the economy of each region. The conditions for the allocation of current specializations were the importance of TEA for the economy (at least 2% of the total volume of shipped products) and the pronounced specialization of the region in the production of a specific type of goods or services (specialization coefficient greater than 2)[3]. The calculation results are presented in *Table 3*.

Table 3. Market specializations of the economies in regions of the Northwest of Russia in 2021

Republic of Karelia
Mining and processing of iron ores Production of pulp, wood pulp, paper and cardboard Sawing and planing of wood Logging operations
Komi Republic
Production of oil and petroleum (associated) gas; provision of services in the field of oil and natural gas production Production of pulp, wood pulp, paper and cardboard Mining and processing of coal and anthracite Production of basic precious metals and other non-ferrous metals Manufacture of wood products, cork, straw and weaving materials

[3] A similar approach is used in (Kutsenko et al., 2019).

End of Table 3

Arkhangelsk Region
Production of pulp, wood pulp, paper and cardboard Sawing and planing of wood Railway transport activities: freight transportation Logging operations
Nenets Autonomous Area
Production of oil and petroleum (associated) gas; provision of services in the field of oil and natural gas production
Vologda Region
Production of cast iron, steel and ferroalloys Production of basic chemicals Production of other steel products by primary processing Production of dairy products Manufacture of wood products, cork, straw and weaving materials
Kaliningrad Region
Production of motor vehicles Production of ready-made animal feed Production of vegetable and animal oils and fats Processing and preservation of meat and meat food products; fish, crustaceans and shellfish
Leningrad Region
Production of petroleum products Manufacture of paper and cardboard products Animal husbandry Manufacture of tobacco products
Murmansk Region
Production of basic precious metals and other non-ferrous metals Mining and processing of iron ores Fishing Mining of minerals not included in other groupings
Novgorod Region
Production of basic chemicals Manufacture of wood products, cork, straw and weaving materials Animal husbandry Sawing and planing of wood Construction of roads and railways Manufacture of refractory products Manufacture of paper and cardboard products
Pskov Region
Animal husbandry Processing and preservation of meat and meat food products Manufacture of cables and cable fittings Secondary raw material processing activities Production of dairy products Manufacture of other general purpose machinery and equipment Production of electric motors, generators, transformers and switchgears, as well as control and measuring equipment
Saint Petersburg
Production of motor vehicles Computer software development; related services in this field Activities in the field of architecture, engineering surveys; technical consultations in these areas
Source: own compilation.

Promising economic specializations

Next, we performed calculations of promising economic specializations for regions of the Northwest of Russia on the basis of own methodology described earlier *(Tab. 4)*.

The combined analysis of the promising economic specializations of the territories of the macroregion makes it possible to form several new fragments of value chains in such industries as the timber industry, mechanical engineering and chemical production of deep processing. It is worth highlighting the results of the Murmansk Region, which has prospects of becoming a transport hub in the Northwest of Russia.

Table 4. Calculation of promising economic specializations for regions of the Northwest of Russia for 2021

Type of economic activity	PC_i^{reg}
Republic of Karelia	
Production of machinery and equipment for agriculture and forestry	12.7
Production of pulp, wood pulp, paper and cardboard	11.8
Manufacture of wood products, cork, straw and weaving materials	11.7
Komi Republic	
Production of pulp, wood pulp, paper and cardboard	9.8
Production, transmission and distribution of steam and hot water; air conditioning	9.6
Manufacture of wood products, cork, straw and weaving materials	9.2
Arkhangelsk Region	
Production of other steel products by primary processing	10.6
Secondary raw material processing activities	10.3
Nenets Autonomous Area	
Passenger air transport activities	9.7
Fishing	8.8
Construction of residential and non-residential buildings	8.5
Vologda Region	
Production of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms	12.5
Production of cast iron, steel and ferroalloys	12.2
Production of other steel products by primary processing	11.7
Sawing and planing of wood	11.7
Manufacture of rubber products	11.6
Production of pulp, wood pulp, paper and cardboard	11.4
Manufacture of machine tools, machinery and equipment for processing metals and other hard materials	11.3
Kaliningrad Region	
Waste treatment and disposal	12.3
Production of motor vehicles	11.7
Production of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms	10.6
Leningrad Region	
Manufacture of rubber products	12.4
Production of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms	11.6
Production of steel pipes, hollow profiles and fittings	11.2
Production of railway locomotives and rolling stock	11.1
Murmansk Region	
Production of basic precious metals and other non-ferrous metals, production of nuclear fuel	14.2
Construction of roads and railways	12.1
Warehousing and storage activities	11.2
Novgorod Region	
Production of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms	14.1
Manufacture of refractory products	10.9

End of Table 4

Pskov Region	
Production of building metal structures and products	11.4
Production of paints, varnishes and similar materials for coating, printing inks and mastics	10.7
Manufacture of paper and cardboard products	9.9
Saint Petersburg	
Production of other chemical products	14.5
Production of motor vehicles	14.2
Production of machinery and equipment for agriculture and forestry	13.7
Production of petroleum products	13.5
Production of electric motors, generators, transformers and switchgears, as well as control and measuring equipment	13.4
Source: own calculation.	

Let us consider the possibilities of combining current and prospective economic specializations of the regions of the Northwest of Russia in the value chains of various products.

Timber industry complex

Taking into account the current and prospective specialization of the territories under review, it is possible to recognize the timber industry complex as the most suitable for the formation of a full-fledged value chain, which is facilitated by the high resource potential of the northern regions (the forest cover of the territories of the Northwestern Federal District is 54.2%) and the presence of large production facilities, largely preserved since the USSR (Cheplinskite, 2023) *(Tab. 5)*.

Despite the fact that the economy of the Northwestern Federal District regions specializes in woodworking, most of the products have low added value and low processing depth (although there are also productions of high-tech wood products, for example CLT panels). Trade sanctions against Russia have cut off the Northwestern

Table 5. Distribution of existing and prospective economic specializations in the value chain of timber products in the context of enlarged production stages

Production stage	Type of economic activity	Region	Specialization
Production of investment products	Production of machinery and equipment for agriculture and forestry	Republic of Karelia	Promising
		Saint Petersburg	
Harvesting and primary processing of raw materials	Logging operations	Republic of Karelia	Existing
		Arkhangelsk Region	Existing
	Sawing and planing of wood	Republic of Karelia	Existing
		Arkhangelsk Region	Existing
		Novgorod Region	Existing
		Vologda Region	Promising
Production of intermediate products	Production of pulp, wood pulp, paper and cardboard	Republic of Karelia	Existing/ promising
		Arkhangelsk Region	Existing
		Komi Republic	Existing
		Vologda Region	Promising
Production of end products of deep processing	Manufacture of wood products, cork, straw and weaving materials	Komi Republic	Existing/ promising
		Vologda Region	Existing
		Novgorod Region	Existing
		Republic of Karelia	Promising
	Manufacture of paper and cardboard products	Leningrad Region	Existing
		Novgorod Region	Existing
		Pskov Region	Promising
Source: own calculation.			

Federal District regions from a significant share of the export market, and the reorientation of commodity flows to the East is difficult due to the low profitability of timber transportation compared to other exported goods. In addition to these problems, obsolescence and maximum utilization of production capacities are observed against the background of a low inflow of investment resources into the industry (Chaplinskite, 2023). There is also a high import dependence of the timber industry on foreign equipment.

Nevertheless, the industry has some incentives to deepen the processing of wood and its consumption in the domestic market:

– implementation of measures within the framework of the Strategy for the Development of the Russian Timber Complex through to 2030 (implementation of priority investment projects in the timber industry, stimulation of the production of deep processing products using innovative technological processes, etc.)[4];

– restrictions on the export of roundwood from the country in order to stimulate its internal processing (protective duties)[5];

– fulfilling the instructions of the RF President based on the results of the meeting on the development of the timber industry; the main focus of which is to stimulate domestic demand for products (individual prefabricated houses, pellet fuel, etc.)[6].

Promising market niches in the case of the timber industry include the production of individual prefabricated houses from CLT panels, manufacture of composite structural beams and OSL panels, biorefining and specific forest chemistry.

Machine-building industries

The high level of consumption of imported investment products in the context of trade restrictions poses threats to the economic security of the country. The regions of the Northwest of Russia feel it most acutely: many machine-building items were imported from unfriendly countries, the share of imports of certain types of products reached 100% (Shirokova, 2022). At the same time, the resource base for own mechanical engineering in the Northwest is extensive: the main intermediate consumption falls on metallurgy, which is a market specialization in three regions – the Vologda and Murmansk regions and the Komi Republic. A strong production chain of ferrous metallurgy products has been formed in the macroregion; rolling is the end product in the chain, which means it does not have the production of final products, which includes mechanical engineering (Lukin, 2021).

However, the Northwestern Federal District has a significant potential for both production and consumption of machine-building products *(Tab. 6)*. Thus, the need for reproduction of forestry and timber processing equipment was noted above; active development of railway transport corridors within the Northwest requires the production of locomotives and wagons; the departure of automakers due to sanctions allows forming own automotive industry based on their capacities.

The following problems are noted in the industry:

– the use of foreign components in domestic assembly reduces the efficiency of mechanical engineering for economic development;

– the fragmentation of industry enterprises exacerbates the shortage of production capacity with growing demand;

– weak interregional cooperation on the supply of raw materials and final products of mechanical engineering;

– low level of innovation and R&D in engineering industries;

[4] Strategy for the Development of the Russian Timber Complex through to 2030 (approved by RF Government Resolution 312-r, dated February 11, 2021).

[5] On the rates of export customs duties on goods exported from the Russian Federation outside the customs territory of the Eurasian Economic Union (approved by RF Government Resolution 2068, dated November 27, 2021).

[6] List of instructions by the President of the Russian Federation following the meeting on the development of the timber industry. Available at: http://www.kremlin.ru/acts/assignments/orders/70764 (accessed: September 14, 2023).

Table 6. Distribution of existing and prospective economic specializations in the value chain of machine-building products in the context of enlarged production stages

Production stage	Type of economic activity	Region	Specialization
Production of investment products	Manufacture of machine tools, machinery and equipment for processing metals and other hard materials	Vologda Region	Promising
Harvesting and primary processing of raw materials	Mining and processing of iron ores	Republic of Karelia	Existing
		Murmansk Region	Existing
	Mining and processing of coal and anthracite	Komi Republic	Existing
	Production of basic precious metals and other non-ferrous metals	Komi Republic	Existing
		Murmansk Region	Existing/ promising
Production of intermediate products	Production of cast iron, steel and ferroalloys	Vologda Region	Existing
	Production of other steel products by primary processing	Vologda Region	Existing/ promising
		Arkhangelsk Region	Promising
	Manufacture of cables and cable fittings	Pskov Region	Existing
Production of final products	Production of motor vehicles	Kaliningrad Region	Existing/ promising
		Saint Petersburg	Existing/ promising
	Manufacture of other general purpose machinery and equipment	Pskov Region	Existing
	Production of electric motors, generators, transformers and switchgears, as well as control and measuring equipment	Pskov Region	Existing
		Saint Petersburg	Promising
	Manufacture of machine tools, machinery and equipment for processing metals and other hard materials	Vologda Region	Promising
	Production of railway locomotives and rolling stock	Leningrad Region	Promising

Source: own compilation.

– incompatibility of intermediate consumption products and demand for them on the part of machine-building industries (Melnikov, 2019).

The prospects for the development of machine-building industries are ambiguous; the development of each type of engineering has different trends both in the macroregion and in the country. The availability of functioning capacities allows the NWFD to compete for a leading position in the national market. Thus, due to the reorientation of JSC Scientific and Production Corporation "Uralvagonzavod" named after F.E. Dzerzhinsky to a defense order, there was a shortage of wagons and tank cars for rail transportation[7], which, in case of expansion of production capacities, could be compensated by the Tikhvin Freight Car Building Plant. Against the background of the closure of airspace in the south of Russia, the demand for rail transportation in this direction has significantly increased, which allows Russian Railways to accumulate funds at least for updating the carriage stock. The active development of shipbuilding can be stimulated by increased cargo transportation along the Northern Sea Route[8]. The shortage of domestic equipment for the timber industry, noted earlier, may become a trigger for the phased development of a full cycle of production of equipment for logging:

[7] Where is the carriage going. Available at: https://transportrussia.ru/razdely/zheleznodorozhnyj-transport/9957-kuda-katitsya-vagon.html (accessed: December 12, 2023).

[8] The Northern Sea Route will promote the development of the Russian economy. Available at: https://rg.ru/2023/08/07/severnyj-morskoj-put-pomozhet-razvitiiu-rossijskoj-ekonomiki.html (accessed: December 12, 2023).

– the first stage is the production of the most simple but in-demand components (high-pressure hoses, fittings, chassis components, etc.);

– the second stage is the production of major components competing with Western and Asian analogues in price and quality (engines, transmissions, hydraulic units);

– the third stage is the full production cycle of logging complexes (harvesters, forwarders, transport vehicles).

Chemical production

The chemical industry is one of the most promising types of economic activity in the global economy due to the fact that its products are actively replacing traditional materials in mechanical engineering, consumer goods production, and construction.

The Northwest of Russia has significant competitive advantages in the field of chemical production: the presence of a large resource base (oil, gas, minerals for the production of fertilizers and large-tonnage inorganic chemistry), transport infrastructure, research institutes in the field of inorganic and organic chemistry, significant production capacities (in terms of fertilizer production).

However, at the same time, the chain of chemical production cannot be called expanded: the main chemical products produced in the macroregion are large-tonnage fertilizers that are exported *(Tab. 7)*. In conditions of trade restrictions and the absence of an extension of the grain deal, chemical products become less useful for the economic growth of regions in Northwestern Russia. Significant reserves of oil and gas are not used for deep processing, but are exported in raw form or as primary semi-finished products. The key barrier to the development of petrochemistry in the macroregion is the lack of pyrolysis facilities for the production of large-tonnage polymers, which are raw materials for high-tech plastics and rubbers with high added value.

Table 7. Distribution of existing and promising economic specializations in the value chain of chemical products in the context of enlarged production stages

Production stage	Type of economic activity	Region	Specialization
Harvesting and primary processing of raw materials	Production of oil and petroleum (associated) gas	Komi Republic	Existing
		Nenets Autonomous Area	Existing
	Provision of services in the field of oil and natural gas production	Komi Republic	Existing
		Nenets Autonomous Area	Existing
	Secondary raw material processing activities	Pskov Region	Existing
Production of intermediate products	Production of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms	Vologda Region	Existing/ promising
		Novgorod Region	Existing/ promising
		Leningrad Region	Promising
		Kaliningrad Region	Promising
	Production of other chemical products	Saint Petersburg	Promising
Production of end products of deep processing	Production of petroleum products	Leningrad Region	Existing
		Saint Petersburg	Promising
	Manufacture of rubber products	Leningrad Region	Promising
	Production of paints, varnishes and similar materials for coating, printing inks and mastics	Pskov Region	Promising
Source: own compilation.			

One of the problems for the organization of petrochemical industries in the Northwestern Federal District is the lack of transport corridors for the creation of pyrolysis plants. As a solution to this problem, it may be proposed to use and further expand the branch of the gas pipeline from the Nenets Autonomous Area with the construction of a gas processing plant in the Vologda Region.

Existing enterprises in the macroregion produce mineral fertilizers, fuel oil products, aromatic hydrocarbons, polyethylene terephthalate. Promising niches based on existing production facilities are the production of small-tonnage highly efficient mineral fertilizers, production of polymer resins and composites based on aromatic hydrocarbons, as well as high-tech thermoplastics based on polyethylene for use in additive technologies and composite industrial materials.

Conclusion

The regulated structural transformation of the economy in the regions of the Northwest of Russia should be based on strengthening competitive advantages and corresponding economic specializations, which together will allow diversifying the economy of the macroregion.

With the help of our own methodological approach, promising types of economic activity for each region were identified. Coupled with the use of existing specializations, it was possible to form three potential value chains: in the timber industry, the engineering sector and the chemical industries. Promising market niches for producers in the Northwest were identified.

The following can be proposed as directions for the development of promising economic specializations:

– development of interregional industrial cooperation;

– promotion of innovation processes in regional economies;

– stimulation of deep processing of products for the end user.

Further research will be aimed at determining the mechanisms and tools of structural policy in the interests of developing promising economic specializations, as well as forecasting the trajectories of regional development dependent on management decisions.

The results of this study can be useful to a wide range of researchers in sectoral and regional economics, as well as to federal and regional authorities in the development and revision of various strategic and sectoral documents.

References

Caragliu A., de Dominicis L., de Groot H.L.F. (2016). Both Marshall and Jacobs were right! *Economic Geography*, 92(1), 87–111.

Cheplinskite I.R. (2023). Investment restrictions in the Vologda Oblast's forest industry complex and ways to eliminate them. *Voprosy territorial'nogo razvitiya=Territorial Development Issues*, 11(1). DOI: 10.15838/tdi.2023.1.63.6 (in Russian).

Content J., Frenken K. (2016). Related variety and economic development: A literature review. *European Planning Studies*, 24(12), 2097–2112.

Duranton G., Puga D. (2000). Diversity and specialisation in cities: Why, where and when does it matter? *Urban Studies*, 37(3), 533–555.

Essletzbichler J. (2015). Relatedness, industrial branching and technological cohesion in US metropolitan areas. *Regional Studies*, 49(5), 752–766.

Feldman M., Audretsch D. (1999). Innovation in cities: Science-based diversity, specialization and localized competition. *European Economic Review*, 43(2), 409–429.

Glaeser E.L., Kallal H.D., Scheinkman J.A., Shleifer A. (1992). Growth in cities. *Journal of Political Economy*, 100(6), 1126–1152.

Grashof N., Hesse K., Fornahl D. (2019). Radical or not? The role of clusters in the emergence of radical innovations. *European Planning Studies*, 27(10), 1904–1923.

Greunz L. (2004). Industrial structure and innovation-evidence from European regions. *Journal of Evolutionary Economics*, 14(5), 563–592.

Henderson V., Kuncoro A., Turner M. (1995). Industrial development in cities. *Journal of Political Economy*, 103(5), 1067–1090.

Hidalgo C.A. et al. (2007). The product space conditions the development of nations. *Science*, 317(5837), 482–487.

Ivanov O.B., Bukhvald E.M. (2019). Perspective economic specialization" as the innovation of the regional development policy. *ETAP: ekonomicheskaya teoriya, analiz, praktika=ETAP: Economic Theory, Analysis, and Practice*, 6, 49–65. DOI: 10.24411/2071-6435-2019-10122 (in Russian).

Jacobs J. (1969). *The Economy of Cities*. New York: Random House.

Ketels S., Protsiv S. (2014). *Methodology and Findings Report for a Cluster Mapping of Related Sectors.* Stockholm: European Cluster Observatory.

Kotov A.V., Grishina I.V., Polynev A.O. (2019). *Umnaya spetsializatsiya regiona – variant resheniya dlya Rossii: nauchnyi ocherk* [Smart Specialization of the Region is a Solution for Russia: A Scientific Essay]. Moscow: Vserossiiskaya akademiya vneshnei torgovli Ministerstva ekonomicheskogo razvitiya Rossiiskoi Federatsii.

Kutsenko E.S., Abashkin V.L., Islankina E.A. (2019). Focusing regional industrial policy via sectorial specialization. *Voprosy ekonomiki*, 5, 65–89. DOI: 10.32609/0042-8736-2019-5-65-89 (in Russian).

Lukin E.V. (2021). The ferrous metallurgy of the North-West of Russia: Trends and development problems. *EKO=ECO*, 10(568), 110–132. DOI: 10.30680/ECO0131-7652-2021-10-110-132 (in Russian).

Lukin E.V. (2022). Regulirovanie mezhregional'nykh tsepochek dobavlennoi stoimosti: problemy analiza i modelirovaniya. *Problemy prognozirovaniya=Studies on Russian Economic Development*, 1(190), 19–33. DOI: 10.47711/0868-6351-190-19-33 (in Russian).

Lyubimov I.L., Gvozdeva M.A., Kazakova M.V., Nesterova K.V. (2017). Economic complexity of Russian regions and their potential to diversify. *Zhurnal Novoi ekonomicheskoi assotsiatsii=Journal of the New Economic Association*, 2(34), 94–123. DOI: 10.31737/2221-2264-2017-34-2-4 (in Russian).

Lyubimov I.L., Lysyuk M.V., Gvozdeva M.A. (2018). Atlas of economic complexity, Russian regional pages. *Voprosy ekonomiki*, 6, 71–91. DOI: 10.32609/0042-8736-2018-6-71-91 (in Russian).

Melnikov A.E. (2019). Investment processes and structural changes in the economy of old industrial regions of the Northwestern Federal District. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz=Economic and Social Changes: Facts, Trends, Forecast*, 12(2), 91–102. DOI: 10.15838/esc.2019.2.62.5 (in Russian).

Rastvortseva S.N., Amanalieva A.B. (2020). Applying the technological proximity method for the analysis of national innovation systems. *Zhurnal ekonomicheskoi teorii*, 17(4), 781–788. DOI: 10.31063/2073-6517/2020.17-4.3 (in Russian).

Reynolds C., Agrawal M., Lee I. et al. (2018). A sub-national economic complexity analysis of Australia's states and territories. *Regional Studies*, 52.

Roos G., Voloshenko K.Yu., Drok T.E., Farafonova Yu.Yu. (2020). An economic complexity analysis of the Kaliningrad region: Identifying sectoral priorities in the emerging value creation paradigm. *Baltiiskii region=Baltic Region*, 12(1), 156-180. DOI: 10.5922/2079-8555-2020-1-9 (in Russian).

Rumyantsev N.M., Leonidova E.G., Gubanova E.S. (2022). Defining sectoral priorities of the region's structural transformation by searching for promising economic specializations. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz=Economic and Social Changes: Facts, Trends, Forecast*, 15(6), 94–109. DOI: 10.15838/esc.2022.6.84.5 (in Russian).

Shirokova E.Yu. (2022). Foreign trade economic dependence of the NWFD regions: Problems and opportunities. *Voprosy territorial'nogo razvitiya=Territorial Development Issues*, 10(1). DOI: 10.15838/tdi.2022.1.61.3 (in Russian).

Tullio B., Giancarlo C. (2018). *Structural Change and Convergence Across European Regions. University Ca'Foscari of Venice, Dept. of Economics Research Paper Series.* No. 16. DOI: 10.2139/ssrn.3197017

Uskova T.V., Kuvalin D.B., Lukin E.V., Shirokova E.Yu., Zinchenko Yu.V. (2022). The manufacturing sector of the economy of Northwest Russia: Problems of adaptation and prospects of functioning under sanctions. *Problemy razvitiya territorii=Problems of Territory's Development*, 26(6), 7–28. DOI: 10.15838/ptd.2022.6.122.1 (in Russian).

Information about the Author

Nikita M. Rumyantsev – head of laboratory, Vologda Research Center, Russian Academy of Sciences (56A, Gorky Street, Vologda, 160014, Russian Federation; e-mail: rumyanik.95@gmail.com)

Received September 21, 2023.