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About the Prospects for Development of the Region on the Basis of Interregional Cooperation*

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Abstract. The paper considers issues related to the development of interregional economic cooperation. The primary hypothesis is the thesis that the strengthening of interregional relations is an important factor in regional economic development. This thesis is confirmed by analysis and generalization of several scientific theories. Using an industrialized region of Russia (Vologda Oblast) as a case study, the authors test their own methodological tools of activization of interregional cooperation as a factor in the development of economy in an industrialized region. The general logic of using this tool involves three main interrelated steps: informational-analytic, target and implementation. The information-analytical step involves collection, systematization and analysis of the materials that constitute the necessary information base. The target step defines possible solutions to the problems related to interregional cooperation of the Vologda

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Oblast, forms the targets and objectives (taking into account national goals and regional tasks of industrial development), highlights the priorities of work in this area and calculates possible consequences of their implementation. The mechanism for this activity is formed at the implementation phase, which includes a specific set of tools that are selected in accordance with the current conditions and opportunities of the government. The paper puts forward a methodological approach to forecasting the development of regional industry taking into account changes in the economy in connection with the planned modernization and implementation of major investment projects and the possible subsequent growth of regional supplies of industrial products. The approach is based on the principles of the theory of general economic equilibrium, "input-output" balance method and methodology of the system of national accounts. The tools proposed by the authors can be used by regional authorities in developing strategies for economic and social development, assessing the direction and degree of influence of interregional cooperation on the development of the territory. The paper outlines the goals, objectives and directions of development of interregional relations.

Key words: region, regional cooperation, prospects, regulation mechanism, forecasting, input-output balance.

Addressing a most urgent task concerning the development of the regional socio-economic system makes it necessary to search for sources of its growth. Regional integration based on the development and enhancement of economic interaction of Russian constituent entities is one of these sources. Interregional economic interaction provides the market with goods that are not produced in the region and local producers – with sustainable supply of raw materials and components; this interaction boosts the development of the internal market of goods and enhances domestic demand for products, helps diversify the economy, eliminate territorial barriers that impede the transfer of production, investment and labor resources between regions.

At the same time, interregional relationships that had existed within the country and between former USSR republics were almost completely destroyed in the course of economic reforms that Russia went through. This fact, as well as significant decline in economic activity and production decrease, led to a deep economic recession in the regions and the country in the mid 1990s, which, in turn, resulted in a sharp deterioration in the welfare of the population [4].

The majority of economists and politicians recognize the fallacy of the current policy, the need to strengthen the regulatory role of the government, among other things, with regard to the development of interregional cooperation. Meanwhile, regional public authorities do not pay due attention to these issues and do not make efficient use of the tools to influence economic entities that generate interregional flows of goods and services. The impact of interregional cooperation on the economies of these regions is not assessed. Regional laws aimed at its

development do not provide for specific methods and levers for its stimulation. Target programs elaborated in the regions are usually focused on separate directions or sectors and are often formal in nature; besides, they do not get enough financing, and the implementation of their measures is controlled insufficiently [10]. Moreover, available forecasts of socio-economic development and industrial development do not consider the strengthening of interregional ties properly.

In view of the above, the development of methods for their activation as one of the effective factors in economic development of the region comes to the fore as an important task. The reproductive approach to economy management proves that production needs economic resources not only available in the region but also imported from other regions; besides other territories should have a demand for the products manufactured in this region [23]. This leads to the dependence of regions on interregional economic integration and makes economic cooperation between them an essential factor in their industrial development. The importance of interregional cooperation is confirmed by several scientific theories.

Fundamentals of the theory of interregional cooperation were laid in the 18th century in the theory of absolute and comparative advantage (A. Smith, D. Ricardo), the essence of which consists in the idea that some countries (regions) can produce goods more efficiently and at a lower price than others and on this basis they have an absolute advantage implemented through trade [18].

The classical theories of accommodation such as J.H. von Thünen's location theory, W. Christaller's central place theory, and V. Launhardt and A. Weber's industrial location theory made a significant contribution to the development of the theory of interregional cooperation. In framework of these theories key attention was paid to geographical (distance) and economic (amount and structure of costs) factors that determine the efficiency of location and functioning of an economic entity (enterprise, city, area). Location theories were further developed in the territorial integration concept as a tool for enhancing competitiveness of countries (regions) in the face of competition for space and resources; in particular, this served as an argument in favor of integrational association of European countries (the concept of Middle Europe developed by Friedrich Naumann [5]). In addition, these theories became the basis for the formation of the majority of modern spatial theories of development [34], which began to develop rapidly in the 1930s and were based on the principle of general rather than partial equilibrium, in contrast to classical location theories.

Spatial economic equilibrium theory developed by August Lösch is a model of territorial self-organization of society and its economic life. He created the concept of

economic landscape, in which the crucial factor is the market area, forming a network of economic regions, the main role is given to profits maximization rather than costs (commodities and transport) reduction [1].

According to economic geography theories (represented mainly by Soviet scientists: N.N. Baranskii, N.N. Kolosovskii, M.K. Bandman, etc.), the strengthening of interregional economic interaction is a driving force of regional competitiveness because it promotes technological specialization, cooperation and agglomeration effect [17].

In general, the major provisions of the interregional interaction theory are as follows:

1. Wealth of population in different territories is based on the division of labor and subsequent exchange of its results.

2. Sources of economic specialization in a given territory are spatial growth, uneven allocation of resources, and a growing competition.

3. There is a direct correlation between the efficiency of allocation of production factors (territorial and sectoral organization of the economy) and performance.

In the mid-twentieth century, economists revised the factors that determine the direction and pattern of trade flows between countries and regions. For instance, Swedish scientists E. Heckscher and B. Ohlin supplemented the theory of comparative advantage: they put forward the theorem of "equalization of prices of production factors". Its essence lies in the fact that each country (region) specializes on the production of those goods for which the ratio of its own production factors is most favorable. In other words, a country (region) exports those goods, for the production of which the total value of all costs is lower than in other countries (regions), and their sales bring profit.

In 1948, Paul Samuelson and Wolfgang Stolper put forward their theorem that represented an improved proof of the Heckscher–Ohlin theorem: in case of homogeneous production factors, perfect competition, identical technology and complete mobility, the exchange of goods equalizes the price of production factors between countries (regions). The concepts of trade that are based on the works of D. Ricardo, E. Heckscher, B. Ohlin and P. Samuelson consider trade not only as mutually beneficial exchange, but also as an instrument to reduce development disparities between territories.

The second half of the 20th century was marked by a sweeping growth of world trade and an increased competition between countries and regions. As a result, competitive advantage theories for individual territories began to emerge. In particular, Michael Porter has identified consistent patterns in competition between areas: the more developed competition in the domestic market, the greater the likelihood of success of this country (region) on international markets (and vice versa, the weakening of

competition on the national market can lead to a loss of competitive advantage) [31].

Investigating trade interaction of territories, Paul Krugman notes that international trade assumes more and more the nature of interregional trade, because production factors and competences in strategic decision-making are gradually shifting to the regional level. The driving force of trade when there is competition and when production factors are similar is the benefit that countries obtain as a result of differentiation of product supply and economies of scale; competitiveness of countries and regions that experience a shortage of production factors is determined by the advantage of using special forms of organization and concentration of production [24; 27; 28].

The final thesis was elaborated in cluster development theories and concepts. They studied the structure and forms in which economic activities were organized in space (vertically and horizontally integrated organizations, clusters, networks), drivers of competitiveness of economic agents, ways of their interaction [33]. Major representatives of these scientific theories are M. Porter, M. Enright, J. Humphrey, H. Schmitz, and M. Storper. The cluster form of production organization:

– increases productivity and boosts innovation process by creating favorable conditions [31];

– contributes to a more efficient use of benefits of proximity (concentration), to create favorable conditions for the manifestation of economies of scale, reduce transaction costs [14];

– helps optimize value chains, which, in turn, enhances reproduction structure of the regional economy.

As well as their foreign colleagues, Russian scientists focus on the development of interregional cooperation between territories. During the Soviet era, their research aimed to solve the problem of rational territorial organization of economy and find methods for planning and regulating economic development. V.S. Nemchinov, A.E. Probst, R.I. Shniper, A.G. Granberg are among the most prominent domestic researchers engaged in regional studies. A.I. Tatarkin [19-21], S.Yu. Glazyev [3], P.A. Minakir [11], O.A. Romanova [15], R.A. Latypov [8], I.M. Rukina [16], and K.V. Pavlov [13] carried out their research on the formation and development of interregional economic relations, coordinated functioning of regions in the major economic areas (i.e. federal districts) under modern Russian conditions.

However, many aspects of the methodology for the formation of regional policy in the sphere of interregional relations and methods of its implementation still do not have sufficient scientific substantiation. They include critical issues such as linking the regional component to the national policy, defining state support priorities, the sequence of implementation

of program activities in the regions, coordinating their implementation in economic sectors.

General logic of boosting interregional economic interaction involves three main interrelated steps: information-analytical, target, and implementation *(tab. 1)*.

The information-analytical step involves collecting, systematization and analysis of the materials that form the information base for the development of interregional cooperation and include the data provided by statistical agencies; data provided by corresponding structural divisions of the authorities; data provided by expert estimates and obtained in the course of special surveys.

In our opinion, the range of issues dealt with at this stage should include: assessment of the current state, main trends and regularities in the development of interregional relations; analysis of industrial market environment in the region; identification and systematization of prerequisites for, limitations on and problems in the development of interregional links.

In practice, diagnostics of the current state of interregional relations of the region and their development trends is carried out with the help of an extensive range of various methods and approaches: comparison; bringing the indicators to a comparable form; application of relative and average values [9]; grouping of information; factor, correlation, multivariate comparative analysis methods [25; 26; 35]; expert diagnostics methods [36], and others. For the purpose of analyzing the situation on the industrial market in the region, taking into

Table 1. Principles of interregional cooperation development *

Principle	Essence
Purposefulness	Elaboration of policy in the sphere of interregional cooperation should be based on a system of strategic and tactical goals for industrial development of the region
Complexity	Necessity to take into account economic, social, environmental, political and other factors in the development of the region when elaborating and implementing the policy in the sphere of interregional cooperation
Systemacy	Setting out targets and objectives for industrial development in the region and mechanisms of its implementation should take into consideration the relations characterizing the mutual dependence of its development on other regions and the country as a whole
Adaptability	Formation of policy in the sphere of interregional cooperation should take into account possible changes in external environment, which may cause the necessity to adjust the objectives, tasks, main directions and mechanisms of their implementation
Effectiveness	Necessity to prove that the very set of goals, objectives, key areas selected as priority ones, and a set of regulatory tools for policy implementation will help achieve the desired result
Consensus of interests	Necessity to identify and meet the needs of all businesses and management entities that enter into economic relations when the policy in the field of interregional cooperation is elaborated and implemented

* Compiled with the use of [12].

account the capacity of regional statistics, one uses the indicators that characterize the direction, structure and volume of supply and demand for the products of intraregional, interregional and foreign markets [12].

The target step defines possible solutions to the problems of interregional relations of the region, sets out the targets and tasks of development of interregional cooperation (taking into account national objectives and regional tasks of industrial development), highlights priorities in this sphere, and calculates the possible consequences of their implementation.

Methods used in SWOT and PEST analyses can serve as a methodological basis at this stage. This makes it possible to characterize the status and assess the impact of external environment on the object under consideration for the purpose of developing methods and ways of adaptation and response to changes in external environment, as well as to aggregate the results of detailed investigations and justifications in the judgments on the object's advantages or disadvantages.

In order to highlight the purposes, tasks and directions of development of interregional cooperation of the region, the methodological approach [2; 22] can be used; it is based on the construction of matrices that show the prospects of development of interregional trade and economic cooperation of the region on the basis of portfolio analysis methodology. This approach will help diagnose the status of interregional relations, develop a system of differentiated areas of their development in the context of groups of consumer regions and goods supplied.

To determine potential opportunities for increasing the interregional export of products of industrial enterprises of the region, we use the following algorithm [10]:

– analyze the structure of the region's industrial complex, identify key products produced there, and explore the possibilities of increasing their production volumes;

– evaluate the existing national, regional and sectoral strategies and programs for development of the industry concerning the possible participation of the region's enterprises in them (as suppliers of products and modernization objects);

– define contractors for supplies (this should take into account the geography of their location, existing volumes of supply and those required by contractors);

– assess the potential increase in the volumes of interregional export taking into account specific goods and industries in general.

The data obtained can be used to assess the effects of implementation of the policy in the field of interregional cooperation. The change in the industrial production output in the region taking into account interregional supplies is a quantitative characteristic of this policy. The impact of interregional activities on industrial production in the region can be assessed

with the help of input-output models[1] [4; 29; 30; 32]. They use a basic input-output equation, which in its matrix form is as follows:

$$x = Ax + y, \quad (1)$$

where x is the vector of output; A – the matrix of coefficients of direct costs; y – the vector of the final product.

Using this equation it is possible to calculate the output x in all the sectors of economy in the region if the final demand y is planned to be changed. The calculation algorithm is as follows:

1. Based on the data of the table of goods and services usage[2] the A matrix of direct costs of the product/industry type is calculated. For this purpose, we determine the proportion of direct costs F_{ij} in the output X_j:

$$a_{ij} = F_{ij} / X_j. \quad (2)$$

The element aij of the matrix A shows the consumption of the product i directly under the unit of production of industry j.

2. Based on the data presented in the table of resources of goods and services[3] we calculate the W correction matrix of the industry/product type. The W matrix is used to transform the A matrix of direct costs of the product/industry type into a symmetric matrix of direct costs $A \cdot W$. For this purpose, we calculate the share of costs X_{ij} in the output X_j:

$$w_{ij} = X_{ij} / X_j. \quad (3)$$

3. We calculate the $A \cdot W$ symmetric matrix of direct costs of the product/product type.

4. We calculate the symmetric matrix of total costs:

$$B = (E - A \cdot W)^{-1}. \quad (4)$$

The element b_{ij} of the B matrix characterizes the demand for the gross output of the industry i, which is required to obtain a unit of the final product of industry j. in the process of material production This enables us to consider the gross output of industries x_i as a function of the planned values y_j of the final products of industries:

$$x_i = f(y_1, y_2, \ldots, y_n) = \sum_{j=1}^{n} b_{ij} y_j. \quad (5)$$

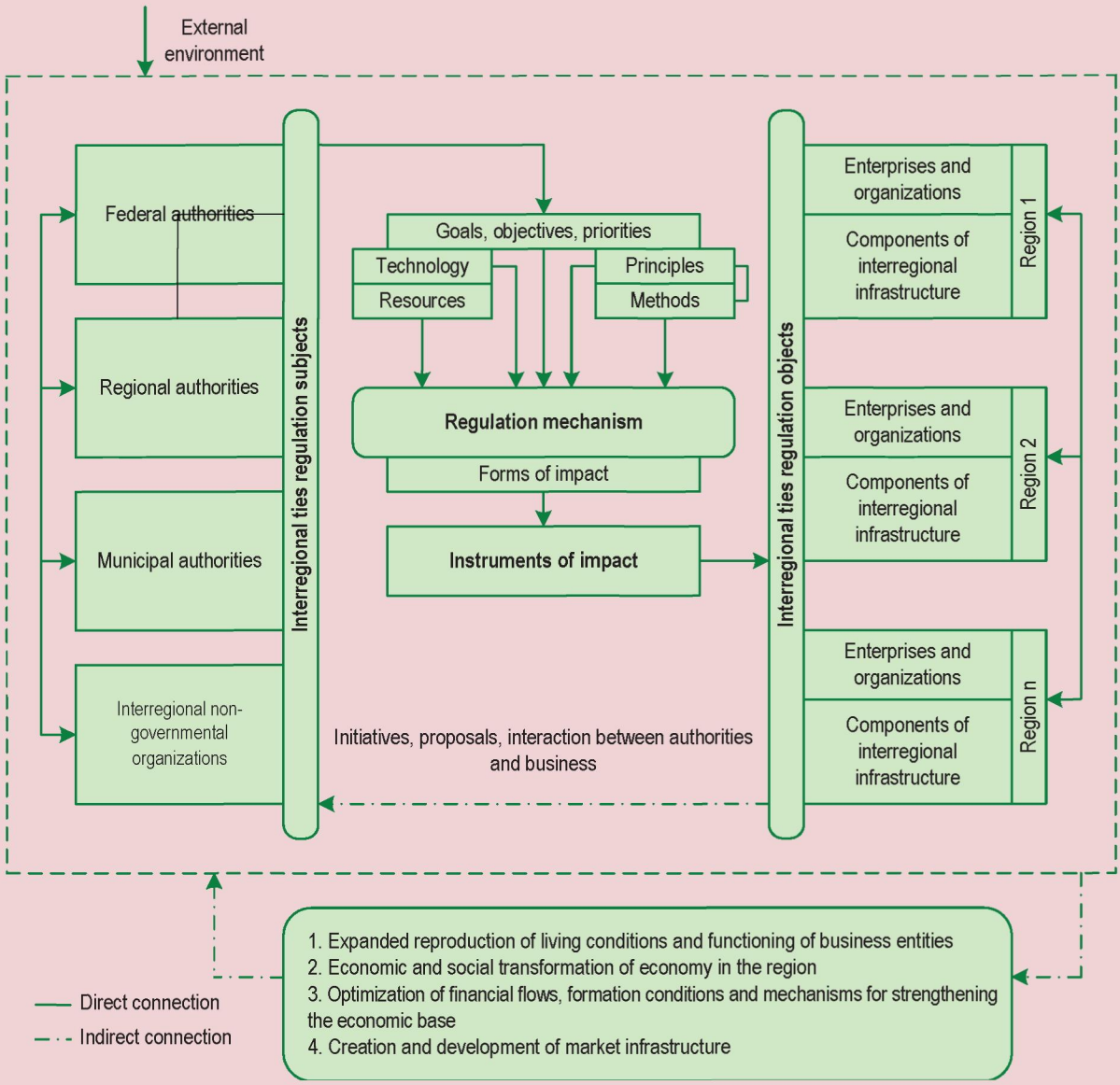
[1] Under the planned economy, input-output balances (IOB) were used to assess the effect of interregional interaction on the economy. According to the last reporting IOB for economic regions of the USSR for the year 1987, the share of interregional export in the structure of supply of goods manufactured in 11 economic regions was 20–26%, the share of interregional imports in the consumption was 23–32%. According to calculations, if interregional relations are changed by 1%, then the change of domestic end product in regions varies from 0.49 to 0.92% (source: Mantsev D.A. *SNG: mezhgosudarstvennoe regulirovanie ekonomicheskoi integratsii* [CIS: interstate regulation of economic integration]. Moscow: RAGS, 2003. 238 p).

In the 1990s, the Institute of Economics and Industrial Engineering, Siberian Branch of RAS and the Council on Study of Productive Forces developed models of economic cooperation of regions and interregional optimization models to assess the impact of interregional relations.

[2] The table of goods and services usage characterizes the use of goods and services for intermediate consumption in industries and final consumption, gross capital formation and exports; it is part of the system of "costs-output" tables.

[3] The table of resources of goods and services shows the formation of resources of goods and services through domestic production and imports and also the main components of formations of purchasers' prices by product group; it is part of the system of "costs-output" tables.

Figure 1. Conceptual scheme of the mechanism for managing interregional economic relations in the region



5. By multiplying the matrix of total costs of the product/product type and the vector of final consumption (y) we calculate the volume of commodity output for each product produced in the economy:

$$x = (E - B \cdot W)^{-1} \cdot y . \qquad (6)$$

Based on the matrix dependencies obtained, we can estimate the volume of production in all industries in the region, at a forecasted growth of demand in other regions to produce goods.

The *implementation stage* focuses on the formation of a mechanism for the implementation of activities in the field of interregional cooperation and includes a specific set of applicable tools that are selected in accordance with the current

Table 2. Description of regulation methods for interregional cooperation

Regulation methods	Essence	Main spheres of regulation
Resource	Methods of direct impact on the object, they provide regional economic entities with reproductive resources to meet the challenges of their effective functioning	Direct financing; economic regulation (instruments of tax, credit, foreign trade policy, state regulation of prices and tariffs)
Institutional	Methods aimed to form an organizational-economic and legal environment corresponding to market principles and objectives of industrial development of the territory	Legal regulation; administrative-economic regulation; development of property relations; development of new organizational and legal forms
Information	Methods that aim to provide management authorities with complete, timely and accurate information on interregional cooperation	Monitoring of the region's industrial development; evaluation of options and prospects of functioning of branches; development of recommendations
Program-target	Methods aimed to form and implement development programs in accordance with the goals and objectives defined, resource capabilities and limitations	Programs for development of interregional relations; program for development of branch-wise complexes; programs addressing individual problems in their development

conditions and opportunities of public administration. A conceptual diagram of the mechanism is shown in *Figure 1.*

Analysis of approaches to this issue [6; 7] helps make a typology of the tools for implementing the policy in the sphere of interregional cooperation according to several features:

– spatial feature – methods used at the macro, meso and micro level;

– orientation of impact of the objects – administrative, legal, economic and program-oriented methods;

– nature of the impact of objects – direct and indirect methods;

– content function of control method – macroeconomic, resource, institutional, and informational methods.

With regard to the regional level, in our opinion, one can use the classification based on the substantial function of methods of implementation of policy in *the sphere of interregional cooperation (tab. 2).* At that, we propose to consider the program-target method as a separate unit; this method is a form of policy implementation, which is based on establishing links between goals and development objectives and resource capabilities and constraints to their implementation.

Thus, the algorithm to boost interregional economic cooperation as a driver of economic development in the region can be represented as a diagram that consists of three phases: information-analytic, target and implementation. It is also important to develop a feedback system that helps assess the impact that the measures have on industrial development, to assess the effectiveness and impact of the policies under implementation. This algorithm was tested on materials of the Vologda Oblast.

Industry in the Vologda Oblast is a diversified complex that produces critically important products for the national economy: 17.7% of the national output of rolled ferrous metals; 7.5% of synthetic ammonia; 6.9 % of lumber; 6.6% of steel pipes; 2% – of whole milk products. The industry branches form over 38% of gross regional product, about 26% of the workforce employed in the economy, and almost 40% of tax revenues in budgets of all levels.

Interaction with other regions is of great importance for the work of the regional industry. The results of the survey of managers of large and medium industrial enterprises of the Vologda Oblast that we conduct on a regular basis show that the vast majority of enterprises (94%) cooperate with Russian regions. Cooperation is effected mainly in the form of trade: sales of ready products (79%), supply of raw materials (61%), and purchase of raw materials (21%). Advanced forms of cooperation such as industrial cooperation (20%), technology transfer (14%), investment activity (12%) and involvement of specialists from other regions (9%) are used not so widely.

A significant part of products produced by the Vologda Oblast industry is sold on the domestic market. High dependence on markets of other Russian regions is typical of the production of steel pipes, rolled ferrous metals, timber, and dairy products *(tab. 3)*.

The amount of products that the region sells to other Russian regions considerably exceeds the amount it purchases: export exceeds import in 1.5–2 times (in the pre-crisis years – in 2.5 times). In recent years, the interregional commodity turnover of the Vologda Oblast shows a negative trend. Products used for industrial and technology purposes form the basis of commodity turnover (from 82 to 90% in different years). Interregional relations of the Vologda Oblast are based mainly on resources; moreover, in its export there is a strong monostructural aspect – 80–85% of export is formed by

Table 3. Pattern of supplies of key commodities produced in the Vologda Oblast in 2014, % of total*

Type of product	Own territory	Other RF subjects	Export
Rolled ferrous metals	13.7	43.9	42.4
Steel pipes	10.0	81.3	8.7
Mineral fertilizers	4.0	19.2	76.8
Industrial wood	53.5	40.4	6.1
Lumber	33.4	11.2	55.4
Meat	75.1	24.9	0
Whole milk products	61.6	38.4	0

* Compiled with the use of the following source: *Vvoz i vyvoz potrebitel'skikh tovarov i produktsii proizvodstvenno-tekhnicheskogo naznacheniya po Vologodskoi oblasti v 2014 godu: stat. byulleten'* [Import and export of consumer goods and products for industrial purposes in the Vologda Oblast in 2014: statistics bulletin]. Vologdastat. Vologda, 2015. 211 p.

metallurgical products of low processing stages. Other important items of supply are the products of chemical and timber sectors, and food products of dairy and beef cattle breeding. A recent-year trend is to reorient the supplies of the region's industrial enterprises from external to internal markets. It is typical of industrial timber, lumber, paper, rolled ferrous metals, and steel pipes. Mineral fertilizers are an exception here, their share of regional supplies decreased slightly.

However, the capacity for interregional cooperation is not used fully. The main problems that hamper the development of interregional trade and economic activities in the Vologda Oblast and do not allow its potential to be used for the purposes of industrial development include the following.

1. Unbalanced industry structure. During the years of reforms it did not see any positive changes. In 2014, the share of production of machinery and equipment in the total volume of shipped products was only 4.5%, whereas the share of metallurgical production was 56%.

2. A high degree of obsolescence and physical depreciation of industrial assets. The wear rate in the whole industry in 2014 was 45.9%.

3. The narrow range of products the Vologda Oblast exports, which is based on a small group of goods with a low degree of processing. The Oblast is represented in the national market mainly by raw materials and products of low processing. It becomes the reason why the regional economy is vulnerable to external shocks.

Development of the region's industry largely depends on the changes in the situation on the domestic and foreign markets. In recent years, the development of the industrial sector of economy in the Vologda Oblast and in Russia as a whole is characterized by a negative trend associated with compression of the current commodity markets due to several reasons.

First, the markets sank sharply after the global financial crisis of 2008–2009.

Second, there was a significant drop in prices for basic goods exported by the Vologda Oblast (rolled steel and fertilizers).

Third, there was a significant reduction in the Russian domestic market of consumer goods that occurred due to the influence of several factors – the loss of people's savings as a result of significant inflation and a reduction in current incomes due to production recession and increase in the scale of non-payment.

These factors resulted in reduced demand and a slower growth or decline in production in virtually all the interrelated sectors of the region's industrial complex *(tab. 4)*.

The current situation in the industrial market and the trends of its development necessitate the formation and implementation of effective policy to strengthen interregional cooperation. For this purpose, it is important to identify

Table 4. Index of physical volume of production in key branches of industry in the Vologda Oblast, % to the previous year*

Industry	2008	2009	2010	2011	2012	2013	2014	2014 to 2008, %
Industrial production as a whole	95.3	90.5	111.8	105.6	101.3	102.5	103.7	115.0
Metallurgy	92.2	87.3	114.5	107.6	98.9	106.5	101.7	115.2
Chemical production	97.4	106.8	103.5	102.4	105.0	99.9	109.0	129.4
Woodworking	96.9	94.3	106.8	113.9	104.6	106.4	103.0	131.5
Food industry	101.4	98.5	113.5	100.0	99.7	99.3	103.1	114.1
Mechanical engineering	112.0	68.3	116.7	104.0	114.3	86.6	106.9	87.7

*Compiled with the use of the following source: *Promyshlennoe proizvodstvo Vologodskoi oblasti: stat. sbornik* [Industrial production in the Vologda Oblast: statistics collection]. Vologdastat. Vologda, 2015. 146 p.

the targets and main directions of its development in the long and medium term, and to develop appropriate forms and methods of their implementation.

Development of interregional relations of the Vologda Oblast in the medium and long term pursues the following goals: improvement of inter- and intraindustry structure of interregional relations; use of sustainable flows of goods to attract financial resources from regional partners; improvement of the territorial-geographical structure of interregional relations.

Substantiation of priorities and main directions of strengthening interregional cooperation as a factor in the development of the regional industrial complex and organization and promotion of its effective functioning involves the necessity to determine the development prospects of such cooperation. Assessing the plans for development of Russian industry helps forecast the state of domestic demand and the possibilities of increasing the supply of products by the region's enterprises to international markets.

We provide such an assessment as applied to the metallurgical industry of the Vologda Oblast. This industry is a major participant in the national market. Domestic demand for its products in recent years is growing quite actively, the supplies of products that used to be exported are being redirected to the Russian market. Key enterprises of the Vologda Oblast – Cherepovets Steel Mill OAO Severstal (coke, cast iron, steel, long and flat rolled sheet with polymeric coating), JSC Severstal-metiz (rolled steel, profile, wire, rope, mesh, nails), OOO Severstal TPZ-Sheksna (pipes for construction industry and engineering).

The energy strategy of Russia clearly reflected the situation concerning the demand for metallurgical products (oil and gas pipelines, ports and transportation

infrastructure) on the part of several infrastructural projects of the fuel and energy complex. The machine-building complex makes the greatest contribution to the development of the industry. The automotive industry development strategy identified long-term demand for high quality rolled metal *(tab. 5)*. Target indicators contained in the Strategy for transport engineering development and in the Strategy for development of railway transport for production of rolling stock and transport infrastructure elements can help form a long-term forecast of the market and make substantiated investment in the development of modern production facilities.

Automobile manufacturers located in Saint Petersburg, Kaliningrad, Moscow, Kaluga, Nizhny Novgorod, Ulyanovsk, Tolyatti; heavy engineering enterprises located in Elektrostal, Podolsk, Syzran,

Table 5. Forecast of development of engineering products market in Russia, thousand units*

Market segment	Year								2020 to 2013, %
	2013	2014	2015	2016	2017	2018	2019	2020	
Motor cars	1964	2093	2235	2397	2690	2907	3048	3150	160.4
Light commercial vehicles	203	204	210	220	243	261	272	280	137.9
Trucks	158	175	192	209	237	257	270	280	177.2
Buses	29	28	28	28	31	33	34	35	120.7
Tractors	16.1	16.8	17.6	18.4	19.3	20.2	21.1	21.9	136.0
Combine harvesters	6.4	6.6	6.8	7.0	7.2	7.4	7.7	7.9	123.4
Forage harvesters	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.5	136.4
Bulldozers	1.9	2.4	2.8	3.0	3.2	3.5	3.7	4.0	2.1-fold
Excavators	2.5	3.0	3.6	3.8	4.0	4.3	4.7	5.0	2.0-fold
Motor graders	1.0	1.3	1.5	1.8	2.0	2.3	2.5	2.8	2.8-fold
Construction loader	0.5	0.8	1.5	2.5	3.0	3.5	4.0	4.5	9.0-fold
Shunting diesel locomotives	0.26	0.26	0.26	0.23	0.25	0.28	0.30	0.42	161.5
Mainline locomotives	60	60	150	180	190	220	290	320	5.3-fold
Freight cars	62.8	63.2	59.6	65	62.4	64	65	65	103.5
Passenger cars	0.30	0.35	0.55	0.62	0.62	0.75	0.92	0.98	3.3-fold
Mainline electric locomotives	0.45	0.45	0.45	0.50	0.50	0.55	0.63	0.7	156.7
Metal-cutting machine tools	4.0	4.9	5.1	5.4	5.6	5.9	6.2	6.5	162.5
Compression-type machines	2.3	2.5	2.7	2.8	3.0	3.1	3.3	3.4	147.8

* Compiled with the use of the following source: RF automotive industry development strategy up to 2020; Transport strategy of the Russian Federation for the period till 2030; Strategy for development of railway transport in the Russian Federation till 2030.

Orsk, Yekaterinburg, Krasnoyarsk, Irkutsk; transport engineering enterprises located in Moscow, Sochi, etc. – these are potential consumers of metallurgical products produced in the Vologda Oblast.

The growth in the amount of products manufactured at metallurgical enterprises of the Vologda Oblast and supplied on the Russian market is hampered by lack of competitiveness of the products because they do not always meet the requirements of steel consuming industries (machine building, construction sector, oil and gas industry, railway transport). In this regard, to increase competitiveness by improving the technological status of major enterprises of the region will be a priority in the development of the metallurgical complex. The Strategy for socio-economic development of the Northwestern Federal District until 2020 contains several measures that aim to solve this problem. They are as follows: extension of the lease of modern equipment, development of credit cooperation between metallurgical enterprises and banks of the Northwestern Federal District, a more efficient support of investment projects and creation of conditions for attracting investments (including tax incentives), provision of support to research and design in the metallurgical complex and to a special education system based on the expansion of cooperation with enterprises.

The Strategy for development of metallurgical industry in Russia until 2020 provides for reconstruction and modernization of production at metallurgical enterprises in order to ensure that their products be competitive and with a high added value.

On the whole, in line with the strategies for development of separate industries in the Russian Federation in the medium term, it is forecast that the capacity of the domestic market of ferrous metallurgy can increase by 30–40% *(tab. 6)* and, hence, there can be a proportional increase in the supply of metal products manufactured in the Vologda Oblast.

The trends identified in economic interaction of regions and the forecast data presented in the strategic and tactical documents on the development of the

Table 6. **Forecast of metal consumption in Russia**, million tons*

Type of production	2013	2020	2025	2030	2020 to 2013, %
Cast iron	45.9	48.9	50.9	52.0	106.5
Finished rolled iron, including:	38.0	50.4	57.8	62.0	132.6
profiled	19.1	23.8	26.8	28.5	124.6
листовой	19.3	26.6	31.0	33.5	137.8
Steel pipes, million tons	9.0	13.1	14.7	16.2	145.6

* Compiled with the use of the following source: Strategy for development of metallurgical industry in Russia for 2014–2020 and for a long term till 2030

Russian Federation, its regions and economic branches help determine the prospects for development of interregional links and formulate major directions and tasks for their implementation.

First. It is possible to increase the supply of steel products to the domestic market. This increase will be due to the enhancement of the products quality and competitiveness of metal products by improving the technological level of production at leading enterprises and the expected growth of production in almost all major steel consuming sectors (primarily in engineering) of Russia's economy. Promotion of new effective types of production with high added value, and conclusion of long-term agreements with partners are perspective areas in which the supply of metallurgical products in the domestic market can be expended. Stable demand on the domestic market can be formed and supply on the foreign market – preserved, if the following conditions are met:

– increase in the competitiveness of products by increasing the share of modern high-tech metallurgical products in it;

– strengthening positions in priority markets – mechanical engineering and fuel and energy.

Second. The expansion of inter-regional deliveries of chemical industry products will be constrained by the likely increase in their self-cost and decrease in their competitiveness in connection with the rise in prices for products of natural monopolies and deterioration of technology and facilities of the enterprises. We see the prospects for development of the chemical industry in the creation of new competitive industries based on modern equipment, and in expanding the list of products manufactured. The priority tasks are as follows:

– increase in production of fertilizers and phosphoric acid, modernization of sulfuric acid manufacturing enterprises;

– diversification of the industry by increasing the production of polymer materials and liquefied gases and by creating enterprises producing gas chemical products, i.e. goods, that will enjoy steady demand in both domestic and foreign markets;

– expanding the range of products tailored to the needs of internal and external markets;

– organization of effective marketing of the products.

Third. The prospects of increasing the supply of products of light industry and food industry will be associated with a growing demand for these types of goods within the region and beyond. This primarily relates to food, namely, dairy and meat products. The growth of income and effective demand in other regions of Russia will provide opportunities for the growth of supplies of non-food products manufactured from metal, wood and flax.

The capacity and competitive advantages of light industry in the region can be implemented if the following is done:

– technological breakthrough is achieved that would provide the quality upgrade of product range, technological re-equipment, improvement of technological base of production, improvement of labor organization;

– implementation of a set of measures to organize the distribution network.

It is necessary to do the following for the development of food industry:

– formation of vertically integrated structures engaged in the production, processing and marketing of agricultural products and foodstuffs, which will help reduce total costs during the movement of the product toward the consumer;

– use of modern technologies for raw materials processing, use of energy- saving technologies, implementation of effective systems of quality control that will improve the competitiveness of the products.

Fourth. Improving the competitiveness and technological level of products of machine-building industry in the region (by means of modernization and introduction of quality management systems based on ISO 9000 and ISO 14000 standards at the enterprises) will be a crucial factor in their export. Revitalization of machine-building enterprises in the Oblast in the domestic market will facilitate the increase in the volumes of their supply. At the same time, their commodity structure in the future will remain traditional (frictionless bearings, optical instruments, high- and low-voltage electrical equipment, wood- and metalworking machines). In view of the above, the tasks of functioning of the branch are as follows:

– restoration of science and technology potential;

– use of modern science-based technology (electron-ion-plasma technologies, robotic systems, etc.) and new materials (composites, polymers, special alloys, etc.);

– manufacturing products that are competitive in world markets and have improved consumer properties.

Fifth. The prospects for increasing regional supplies of timber products to a certain extent depend on the development of woodworking industries (that are major consumer of raw wood) and the spheres of final consumption of wood products – civil construction (mostly wooden housing construction).

The woodworking industry should be developed to ensure the efficient use of forest potential of the region, and to establish a sustainable timber industry complex. Thus, the main objectives should be as follows:

– deepening the degree of processing of raw wood at the expense of technological re-equipment of existing production facilities;

– development of industrial cooperation between loggers and timber processing enterprises in the region;

Table 7. Forecast of industrial production in the Vologda Oblast up to 2020 (in the prices of 2013)

Industry	Unit of measurement	2013	2015	2017	2020
Industry as a whole	Billion rubles	429.9	479.9	542.9	637.4
	% to 2013	100.0	111.6	126.3	148.3
Ferrous metallurgy	Billion rubles	245.4	257.6	274.8	294.4
	% to 2013	100.0	105.0	112.0	120.0
Chemical	Billion rubles	66.2	82.7	102.5	125.7
	% to 2013	100.0	125.0	155.0	190.0
Food	Billion rubles	30.7	34.1	39.9	49.1
	% to 2013	100.0	111.0	130.0	160.0
Woodworking	Billion rubles	20.7	24.9	31.1	38.3
	% to 2013	100.0	120.0	150.0	185.0
Mechanical engineering	Billion rubles	18.8	23.5	30.1	37.6
	% to 2013	100.0	125.0	160.0	200.0
Electrical power engineering	Billion rubles	32.2	33.8	35.8	38.0
	% to 2013	100.0	105.0	111.0	118.0
Other	Billion rubles	15.3	23.3	28.8	54.2
	% to 2013	100.0	152.3	188.2	354.2

– establishment of production that process low-grade wood and waste for energy purposes;

– development of transport infrastructure taking into account the location of timber production and processing enterprises.

Table 7 shows industrial production output in industrial sectors of the Vologda Oblast for the period up to 2020, the output is forecast on the basis of the input-output model[4] taking into account the assessment of the prospects for development of interregional supplies.

When intensifying the work on strengthening interregional cooperation, four industries, namely, ferrous metallurgy, timber industry, mechanical engineering, and chemical industry are promising "engines" of growth of industrial production in the region. It is these industries that will show the largest growth in absolute production output due to its modern structure and the availability of raw materials, facilities, and financial resources. The impact of these industries on the regional economy will be direct (increase in production output and replenishment of the budget) and multiplicative (increase in employment and wages of the population, redistribution of investment flows).

We should also point out the most significant reserves for development of

[4] While carrying out the calculations, we have made a number of assumptions. Due to the absence of statistical data, the matrix of coefficients of total costs for the Vologda Oblast went through expert assessment on the basis of the matrix of coefficients of total costs for Russia as a whole. The breakdown of value added for the industries in the Oblast was conducted on the basis of nationwide data and available data on the structure of production in the Vologda Oblast.

industries in the Vologda Oblast: for metallurgy it is expected to increase the production of steel, high quality roll products, and high-tech products of mechanical engineering; for chemical industry – new types of mineral fertilizers; for the timber industry it is expected to increase the production of furniture, plywood and paper; for mechanical engineering – products for metallurgy, heavy engineering, and other industries; the maximum increase in the food industry is expected in the dairy and meat sub-sectors.

Industrial production development will be accompanied by continuous growth of labor productivity, increase in the salaries of employees, acceleration of investment processes, introduction of innovation, and increase in enterprises' profits.

When in 2020 the production output reaches the volumes stated above, the industry structure of the region will change significantly. The share of metallurgy will decrease to 46% (vs. 57% in 2013), but there will be a corresponding increase in the share of products of other industries that will significantly diversify production structure and strengthen regional economic and budgetary security. Moreover, the data presented are considered as essential and yet as quite realistic. Excluding the essentially inertial (pessimistic) scenario, they suggest a possibility of shifting to the optimistic scenario, under which the industrial production output will grow in 1.6–1.7 times over a seven-year period.

The calculations presented above show the effectiveness of enhancement of interregional ties for the development of regional industry. The implementation of the directions highlighted in this sphere will be based on a combination of stimulating effects (by means of methods and forms of regulation), which should be chosen and implemented taking into account current socio-economic situation in the region and possibilities of government regulation of the economy. It is possible to recommend the following activities for the Vologda Oblast:

– elaboration and implementation of bilateral programs development for interregional economic relations development;

– participation in the work and development of the autonomous nonprofit organization "Strategic partnership on economic and social development of the Northwestern Federal District";

– establishment of cooperative relationships between participants of the same production process;

– promotion of exhibition and fair business, involvement of enterprises in participation in Russian and international exhibitions;

– creation of an information-organizational system of interregional relations and making it available on the Internet.

If the above tasks and other measures are implemented, it will boost interregional economic cooperation.

Thus, enhancing economic cooperation between regions is an important factor in their development as they undergo economic modernization and acquire significant independence in decision-making. This cooperation helps provide the intraregional market with consumer goods and products of production-and-technological purpose, and ensure sustainable import of raw materials and components for producers; it also stimulates the domestic market and increases domestic demand, contributes to economic diversification and reduced barriers to resources transfer.

The intensification of economic cooperation between regions should be based on institutional and regulatory support of this process, on the development of transport, information and other infrastructure, on the use of strategic planning of socio-economic development, forecasting and modeling of domestic demand, and a number of other economic instruments. All this will help develop a concept for the mechanism of state regulation of interregional cooperation. Its implementation will strengthen interregional links and help overcome negative trends in their development.

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