SPATIAL ASPECTS OF TERRITORIAL DEVELOPMENT

Spatial and Territorial Development of the European North: Trends and Priorities of Transformation*

Sergei A. Kozhevnikov
Vologda Research Center of the Russian Academy of Sciences
Vologda, Russian Federation, 56A, Gorky Street, 160014
E-mail: kozhevnikov_sa@bk.ru
ORCID: 0000-0001-9063-6587; ResearcherID: I-8373-2016

Abstract. One of the key goals in the development of Russia, the largest country in the world, is the necessity to provide optimal and efficient usage of its huge territories. However, transformational market changes, which happened after the collapse of the USSR in the 1990s, led to a sharp decrease in the state's role in the governance of spatial development. This policy had extremely negative economic and social implications: settlement contrast increased due to the production and population's retraction into areas of concentration. Simultaneous "washing" of population out from deep regions also took place. At the same time, these problems are especially relevant for Russia's northern territories, which are characterized by focal settlement, production's placement, and for other territories, which experienced negative consequences of market transition. These factors justify the relevance of this research. The goal of the paper is to study the features and substantiate priority areas of perfecting governance of Russian European North (REN) regions' spatial territorial development. Theoretical and methodological approaches toward understanding the essence of economic space and its development, the analysis of key trends and specifics of Russian European North's spatial development in the post-soviet period were studied. Also, we prove that economic space of REN is currently linear-nodular with significant areas of economic periphery. The article shows the role of first- and second-class nods in preserving supporting carcass of territories of Russian European North. Also, it is shown that such settlement systems might be a basis for formation and development of polycentric model of region's space organization. This model is aimed at

---

the revival and development of sustainable socio-economic and technological connections through the system "large city—small town—village".

Key words: spatial development, economic space, Russian European North, agglomeration, small- and medium-sized towns, Arctic Zone of the RF.

Introduction. There is a difficult and extremely painful set of problems, challenges, and threats in spatial development of modern Russia. It is, first of all, tied to inefficient usage of huge territories and phenomenal country's wealth[1]. Moreover, this space is sometimes considered a burden. There are even foreign studies, the authors of which try to assess Russian Federation's losses from inefficient spatial organization of the country[2].

It needs to be mentioned that the peculiarity of Russian spatial economic development at all of its stages (including Imperial and Soviet stages) is dominative participation of the state in this process[3]. However, a quarter of a century ago, in the period of active transformational economic changes, authorities almost completely abandoned direct participation in country's spatial development. This policy led to extremely negative economic and social consequences: settlement contrast increased due to the production and population's retraction into areas of concentration with simultaneous "washing" of population from deep regions. The basic trend of the last few centuries has been the strengthening of concentration of production, human capital, and infrastructure in large cities (first of all, in Moscow and Saint Petersburg agglomerations). All these processes lead to escalation of new challenges of Russian spatial development[4] (*Tab. 1*).

Obviously, such spontaneous spatial self-organization is the movement toward territorial desertification and economic degradation of a large part of Russian territories.

Top officials of the state pay special attention to the necessity of increasing efficiency of governance of country's spatial development. Thus, V.V. Putin, the president of the Russian Federation, suggested "launching a large-scale program of Russian spatial development, including the development of cities and other settlements, and, at least, doubling spending on these purposes in the next six years" during his Presidential Address to the Federal Assembly[5]. At the same time, the development of cities and other settlements should be connected with the solution of problems in the spheres of health, education, environment, and transport.

Thus, taking into account these principles and country's development targets, which are identified by the Strategy-2020, Russia's National Security Strategy, and the Strategy of Spatial Development of the Russian Federation until 2025, adopted in 2019, significant efficiency increase of spatial factor's usage should become the purpose of spatial development governance. It must be used for strengthening Russia's competitive position in

---

[1] Thus, currently, each RF citizen has almost 12 hectares of land, i.e. almost 40 hectares per family [1].

[2] In particular, according to the assessment of Brookings Institution (Washington, USA), estimated losses constitute 2.3–3.0% of GDP [2].

[3] At the same time, the policy was based on the ideas of such prominent figures as S. Witte, P. Stolypin, V. Vernadsky, N. Kondratiev, A. Chayanov, and others.

[4] These problems were analyzed quite comprehensively and systematically in one of the first drafts of "The concept of the spatial development strategy of the Russian Federation for the period up to 2030", developed by the Ministry of Economic Development of the Russian Federation. Available at: http://карьеры-евразии.рф/uploadedFiles/files/Kontseptsiya_SPR.pdf

[5] Presidential Address to the Federal Assembly, dated March 1, 2018. Available at: http://www.consultant.ru/document/cons_doc_LAW_291976

Table 1. Main challenges of current Russian spatial development

Challenge	Its content
1. Unprecedented centripetal vector of development	It appears, first of all, *in the form of a sharp increase in Moscow's economic role according to all major economic development's indicators* and *in the form of intensive strengthening of regional centers' economic and political role on the level of many RF entities.* As a result of these centripetal trends, *there was a significant compression of previously developed space, a noticeable economic consolidation of city-centers' space.*
2. Interregional contrasts, unprecedented in the practice of foreign federations, a very significant unevenness in modern regional development	Often interregional differences are so significant that *RF entities, dragging behind, according to experts, will need hundreds of years to reach the level of modern developed regions.* It shows the presence of intercontinental-wide contrasts in the country (for example, such as between the countries of Europe and Africa).
3. Unfavorable global geopolitical situation, which actualizes problems of Russian national security	The period of unprecedented openness in the 1990s *was replaced by a period of rivalry and confrontation between Russia and developed countries.* At the same time, there has been a real threat of preserving economic and political sanctions pressure on the country. *There is a high probability of artificial maintenance of geopolitical instability on Russian borders.*
4. Poorly developed infrastructure	*A significant contradiction between the country's spaces and forms of its infrastructural, technical and technological arrangement is characterized as a communication (or network) gap.* Thus, high-speed highways are still rare, even nearby federal centers. The same goes for sustainable high-speed broadband connection. *Many remote Russian periphery territories, situated far away form cities-centers, might be characterized by transport and electronic inaccessibility*
5. Extreme unification of norms and rules of country's spatial arrangement and insufficient elaboration of the territorial block of federal legislation	For Russia and its enormous diversity of natural, social, and environmental conditions, *it is important to show territorial differences in federal legislation* (take into account the specifics of the North and the Arctic, old developed moderate Central zone, problematic territories of different types, etc.). Legal asymmetry is necessary, because it might be the most important prerequisite for the alignment of conditions for various RF territories' development.

the global economy, while taking into account the preservation and strengthening of the national security's foundations in a changing world.

It is also important to improve the population settlement system, taking into account the preservation of its supporting carcass on the basis of diversification of different settlements' functions, creating conditions for the development of urban agglomerations and non-urbanized territories of different hierarchical levels and scales. It is necessary to create a framework[6] of regional and sub-regional centers of economic growth concentration, capable of forming and transferring impulses of modernization and

economic development to adjacent entities on the basis of network effect implementation [3]. These issues are particularly important for northern territories of the country, which are characterized by the focal nature of settlement and production placement. This factor caused *the relevance* of the presented work.

The goal of this paper is to study specific features and to substantiate priority directions of spatial and territorial development management improvement of Russian European North's (REN) regions.

The result will be achieved through the completion of following objectives:

1. The study of theoretical and methodological approaches for understanding the essence of economic space and its development.

2. Analysis of key trends, peculiarities of territorial and spatial development of Russian European North at the current stage.

---

[6] A framework is a binding mechanism that holds together different territorial socio-economic systems, heterogeneous, differently specialized parts of the territory. To date, a large set of "framework" terms has been introduced into scientific circulation: urban framework, infrastructure framework, support framework of settlement, framework of development of new areas, support ecological framework, etc.

3. Justification of priority areas of improving Russian European North territories' management on the basis of developing polycentric model, which is aimed at the revival and development of sustainable socio-economic and technological connections through the system "large city—small town—village".

Theoretical aspects of the research. Issues of studying peculiarities and problems of increasing governance efficiency of Russia's spatial development have been an important scientific objective for the last few centuries. At the same time, as the academician P.A. Minakir notes, "the common problem is that the spatial economy cannot formulate the primary hypothesis: what is the economic space as the subject of research and the object of economic policy". In economic studies, economic space is usually considered a real (physical) or abstract (conceptual) [4].

One of the key scientists, who belong to the domestic school of spatial economy, is the academician A.G. Granberg: he understood economic space as the saturated territory which contains many entities and connections between them — settlements, industrial enterprises, economically developed and recreational areas, transport and engineering networks, etc. [5, 6]. So, economic space exists inside physical space, and it is defined, first of all, through existence of different socio-economic objects and connections between them. Anyway, the similar interpretation of space is proposed by P. Krugman [7].

The whole group of researchers analyzes this category through the prism of relations between economic agents (P.A. Minakir, A.N. Dem'yanenko, N.Yu. Gagarina[7], Ya. Krukovskii, etc.): this approach implies that the emergence of economic space is only possible due to the emergence of economic relations [8, 9].

In this study, we take the definition of R.F. Gataullin, A.G. Karimov, A.G. Komarov (2014): economic space is "the part of physical space which is subjectively constructed in the course of reproduction; it reflects geographically isolated and localized in time process of transactions between economic agents, formed on the basis of their economic interests' implementation" [10]. This definition, in our opinion, precisely sums up the nature of economic space, and it is more informative, because it allows integrating characteristics of real and conceptual spaces inside it.

Economic space has a number of features and characteristics, or so-called "generic" features [11, 12, 13]. In real situations, region's space acts as discrete (i.e. the space where all the points are isolated from each other); heterogeneous (the presence of different parts in the structure); polarized (heterogeneous, economic development takes place around the leading industry, the "growth pole"); anisotropic (ability to show different features in different directions).

The quality of economic space is defined by many characteristics and parameters[8]. According to A.G. Granberg's approach, it is possible to point out the following parameters for assessment:

— density (it is characterized by economic and common density of territory's population, density of communication's ways (automobile, railways, etc.)[9], etc.);

---

[7] Gagarina G.Yu. Development of methodology of spatial integration management of Russian regions' economy: Candidate of Sciences (Economics) dissertation. 08.00.05. Moscow, 2013. 328 p

[8] Chuvashova M.N. Assessment of the quality of economic space of the region of raw materials orientation: Candidate of Sciences (Economics) dissertation. 08.00.05. Krasnoyarsk, 2016. 235 p.

[9] This is one of the key indicators of the quality of the economic space, since the developed transport infrastructure accelerates the flow of all economic processes and provides conditions for the activation of production processes.

— placement (it is determined through the indicators of uniformity, differentiation, concentration of the population, entities of economic activity, and the presence of economically developed and undeveloped territories);

— cohesion (it is determined by the intensity of economic relations between parts and elements of space, by the conditions of goods, services, people's mobility, the development of transport and communication networks) [5].

At the same time, the space is constantly changing or transforming. The authors [14] understand the transformation of economic space as "the change in physical economy's localization and regional population, change of features of economic and social environment, which affect the efficiency of life activity and competitiveness of regional economy". This process is usually spontaneous, but it should have controllable nature[10].

Management of transformation and organization of economic space is implemented with the usage of various spatial models: functional (socio-economic zoning, formation of specialized zones, areas, parks), carcass (development of territorial carcasses, corridors, development axes, agglomerations and core cities on the basis of infrastructure); cluster [15].

At the same time, as G.M. Lappo notes, the carcass approach is efficient for solving traditional and constantly important research tasks: identifying differences in various areas; studying connections; studying the dynamics of processes [16]. N.N. Baranskii in his article

"On economic and geographic study of cities", published in 1946, overviewed economic carcass of a territory as the "basis which holds everything together, forms the territory, and gives it a certain configuration" [17, 18]. The carcass is an integral part of territorial structures (production, infrastructure, non-production, natural resources, and resettlement): it is the combination of centers of economic, social, and cultural life, as well as the combination of socio-economic lines, connecting these focuses in the interaction between them [19].

The concept of the supporting carcass is relevant for solving the problem of rational usage of large cities' economic potential. Thus, the mechanism of growth regulation of a large center may have different options: formation of agglomerations; targeted development; priority development of the "second" city; development of the selected (limited number) cities-"counterbalances"; development of sub-districts' centers; activation of small- and middle-sized cities (outside the agglomeration) [20, 21, 22, 23].

Thus, the concept of territory's carcass is based on the recognition of cities' special role (as focuses of economic activity) and its interconnections in country's economy. At the same time, the rest of the country is perceived as an auxiliary part of the economy, which is sometimes named a "fabric".

Primary results of the research. In the post-Soviet period of Russia's development, which is characterized by sharp liberalization and transformation of the whole country's socio-economic system, these changes negatively affected northern territories (market transition led to dramatic decrease of government's role in these territories' management, destruction of existing technological connections with other regions, reduction of many compensatory instruments' value which provided stable and successful development of these territories in a planned economy environment).

---

[10] See: Minakir P.A. Modern approaches to the study of spatial development problems. Modern problems of spatial development. Proceedings of the International scientific conference dedicated to the memory and 75th anniversary of academician A. G. Granberg, Moscow, 2011, p. 47.

Okrepilov V.V. Sustainable spatial development and quality. Modern problems of spatial development. Proceedings of the International scientific conference dedicated to the memory and 75th anniversary of academician A.G. Granberg, Moscow, 2011, p. 52.

However, northern territories still have huge natural and resource potential and play an important geostrategic part in country's development. Thus, Russian European North[11] is one of the pivotal and largest (1.466 thousand km²) regions in the European part of the country, which has a beneficial economic and geographic position (the Barents and White seas on the north; Finland and Norway on the west, which opens up huge opportunities for developing foreign trade; economically developed Ural and central part of Russia on the east and south).

Russian European North, unlike Asian, is more populated and developed. It has an established carcass of settlement and production powers' placement, quite high level of urbanization. At the same time, post-Soviet market changes in the 1990s also negatively affected socio-economic and spatial development of these territories.

One of the key problems of REN, and many other regions of the country as well, is the reduction of permanent population number: from 1990 to 2017, it was near 1.6 million people (*Tab. 2*).

Thus, the number of the Murmansk Oblast's population in 1990−2017 decreased by 26.7%, in the Komi Republic − by 22.2%. Depopulation processes avoided the Vologda Oblast. Even more rapid reduction of population happened in rural areas: over the same time period, the number of rural residents in the Murmansk Oblast decreased nearly by two times, in the Arkhangelsk Oblast − by 38%, etc.

A more stable demographic situation is currently typical for administrative centers of Russian European North's entities, which are called "first class" nods[12] (Petrozavodsk, Syktyvkar, Arkhangelsk, Vologda) in the system of regional spatial organization. Significant natural and migration population decrease is observed

Table 2. Population numbers in Russian European North entities (at the beginning of the year), thousand people

Territory	Year											2017 to 2000, %	2017 to 1990, %
	1990	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017		
Constant population													
Vologda Oblast	1354	1290	1235	1201	1199	1196	1193	1191	1187	1183	1177	91.2	86.9
Arkhangelsk Oblast (including Nenets AO)	1569	1369	1291	1225	1214	1202	1192	1183	1174	1166	1155	84.4	73.6
Komi Republic	1240	1043	985	899	890	881	872	864	856	851	841	80.6	**67.8**
Murmansk Oblast	1189	923	864	794	788	780	771	766	762	758	753	81.6	**63.3**
Republic of Karelia	792	729	698	643	640	637	634	633	630	627	622	85.3	78.5
Rural population													
Vologda Oblast	462	403	393	350	356	343	339	335	333	329	325	80.6	70.3
Arkhangelsk Oblast	411	343	349	297	289	282	280	27	265	259	254	74.1	**61.8**
Komi Republic	297	258	240	207	203	200	196	193	189	187	184	71.3	**62.0**
Republic of Karelia	144	186	171	141	138	135	132	129	127	124	122	65.6	84.7
Murmansk Oblast	100	71	74	57	57	57	56,6	57	57	57	58	81.7	**58.0**
Source: calculated on the basis of data from the official website of Unified Interdepartmental Statistical Information System (UISIS). Available at: www.fedstat.ru													

---

[11] In this work, a REN content is reviewed within borders, the content of which is given in the current All-Russian Classifier of Economic Regions. OK 024-95 (approved by the Resolution of Russian State Standard no. 640, dated 27.12.1995).

[12] In Russian European North, researchers distinguish 4 classes of economic nodes, in accordance with the number of economically active population: first class nodes − more than 100 thousand people, second class − 60−99 thousand people, third class − 30−59 thousand people, fourth class − 10−29 thousand people. The rest of the economy has a non-node form of placement [24].

in small towns, which are specialized in timber cutting, with practically developed mining resources, old industrial areas (so-called "industrial periphery"), and in rural periphery [25].

One of the key aspects characterizing the quality of economic space is the density of population, including residents of able-bodied age. Thus, in many studied entities (excluding the Vologda Oblast), population density is 2—5 people/km^2, which is much lower than average Russian level (8.6 people/km^2) (*Tab. 3*). In the post-Soviet period, this indicator continued to lower. Density of able-bodied population does not exceed 2 people/km^2. These numbers show extremely low concentration of human and labor resources on northern territories, existence of the focal settlement in the "first" and "second" class nodes, which limit the possibility of ensuring a balanced spatial development.

At the same time, as V.N. Lazhentsev notes, there are quite stable, so-called historic-cultural, "cores" of settlement in REN: Pomor'e, Vologda-Belozersk land, Veliky Ustyug, Vychegodsky, Sysolsky, Mezensky, and Pechorsky districts [26].

Significant changes in territorial placement of main sources of added value appeared in the post-Soviet period. Thus, in 1995—2017, a share of the Vologda Oblast's GRP in Russia's GDP decreased by 0.73 p. p. (from 1.29 to 0.55%), by 0.60 p. p. — in the Komi Republic (from 1.23 to 0.62%), and by 0.47 p. p. — in the Murmask Oblast (from 0.96 to 0.48%). In the last few years, the role of the Arkhangelsk Oblast and Nenets Autonomous Okrug in these processes has become more important (*Tab. 4*).

In the structure of the European North entities' GRP, types of economic activities related to mining play a major role (in 2017, in the Nenets Autonomous Okrug — 76.2%, the

Table 3. Density of population in Russian European North entities, people/km^2

| Region | Year | | | | | | | | | 2017 to 2000, +/- | 2017 to 1990, +/- |
	1990	1995	2000	2005	2008	2010	2015	2016	2017		
RF	8.7	8.7	8.6	8.4	8.3	8.4	8.5	8.6	8.6	0.0	**-0.1**
NWFO	9.1	8.8	8.5	8.2	8.0	8.1	8.2	8.2	8.3	-0.2	**-0.8**
Vologda Oblast	9.4	9.2	9.0	8.6	8.4	8.3	8.2	8.2	8.2	-0.8	**-1.2**
Murmansk Oblast	8.2	7.3	6.4	5.9	5.8	5.5	5.3	5.2	5.2	-1.2	**-3.0**
Republic of Karelia	4.4	4.2	4.1	3.8	3.8	3.6	3.5	3.5	3.5	-0.6	**-0.9**
Komi Republic	3.0	2.7	2.5	2.3	2.3	2.2	2.1	2.0	2.0	-0.5	**-1.0**
Arkhangelsk Oblast (including NAO)	2.7	2.5	2.3	2.2	2.1	2.1	2.0	2.0	2.0	-0.4	**-0.7**

Table 4. Share of entity's GRP in RF GDP, %

| Region | Year | | | | | | | | 2017 to 2016, p.p. (+/-) | 2017 to 1995, p.p. (+/-) |
	1995	2000	2005	2008	2010	2015	2016	2017		
NWFO	9.741	7.919	8.329	8.238	8.515	8.671	8.982	8.898	-0.08	-0.84
Arkhangelsk Oblast (including NAO)	0.978	0.846	0.770	0.722	0.805	0.755	0.791	0.807	0.02	-0.17
Komi Republic	1.225	0.814	0.793	0.716	0.764	0.636	0.637	0.624	-0.01	**-0.60**
Vologda Oblast	1.286	0.947	0.898	0.722	0.567	0.576	0.555	0.552	0.00	**-0.73**
Arkhangelsk Oblast. (without NAO)	n.d.	n.d.	n.d.	n.d.	n.d.	0.482	0.495	0.507	0.01	-
Murmansk Oblast	0.956	0.755	0.615	0.523	0.504	0.483	0.503	0.484	-0.02	**-0.47**
Nenets Autonomous Okrug	n.d.	0.163	0.207	0.222	0.315	0.273	0.296	0.300	0.00	0.30
Republic of Karelia	0.560	0.386	0.357	0.284	0.260	0.255	0.269	0.274	0.01	-0.29

Komi Republic – 37.2%, the Arkhangelsk Oblast – 30.9%). At the same time, processing activities have been developed more in the Vologda (38.1%) and Arkhangelsk (26.9%) oblasts.

The leading branches of REN specialization are TIC, ferrous and non-ferrous metallurgy, chemical industry, and FEC, based on the mineral resource base of the region; in the Vologda region, animal husbandry and mixed

Table 5. Localization coefficient according to main types of economic activity in the regions of Russian European North (2017)

RF entity	Types of economic activity
1. Republic of Karelia	– mining and enrichment of iron ores (32.8) – mining of stone, sand, and clay (16.9) – production of cellulose, wood pulp, paper, and cardboard (16.9) – fishery and fish farming (13.8) – timber cutting (12.0)
2. Komi Republic	– production of cellulose, wood pulp, paper, and cardboard (16.9) – pipeline transport activity (8,4) – wood processing and manufacture of wood and cork products (except furniture), manufacture of straw products and weaving materials (5.4) – production of crude oil and petroleum (associated) gas (3.2) – coal mining (2.5) – provision of services in the area of mining (2.4)
3. Arkhangelsk Oblast	– production of cellulose, wood pulp, paper, and cardboard (20.8) – sawing and planing of wood (9.8) – manufacture of other vehicles and equipment (9.5) – logging, provision of services in the area of forestry and logging (8.9) – hunting, control, and shooting of wild animals, including the provision of services in these areas (7.5) – production of crude oil and petroleum (associated) gas (3.2) – activities of internal water passenger transport (3.4)
4. Nenets Autonomous Okrug	– production of crude oil and petroleum (associated) gas (18.5) – provision of services in the area of oil and natural gas (13.9) – pipeline transport activity (1.9) – activities in the areas of architecture, engineering surveys, and provision of technical advice in these areas (1.2)
5. Vologda Oblast	– production of other steel products through primary processing (15.7) – production of cast iron, steel, and ferroalloys (15.5) – sawing and planing of wood (8.0) – timber cutting (7.6) – forestry and other forestry activities (7.3) – production of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms (6.8) – manufacture of wood products, cork, straw, and weaving materials (4.9) – production of dairy products (2.7) – mixed agriculture (1.9) – animal husbandry (1.5)
6. Murmansk Oblast	– fishery and fish farming (45.1) – development of construction projects (construction of buildings, 30.9) – mining and enrichment of iron ores (20.1) – supporting activities in financial services and insurance (8.1) – production of basic precious metals and other non-ferrous metals, production of nuclear fuel (5.2) – repair and installation of metal products, machinery, and equipment (4.2)

Source: own calculations on the basis of UISIS data according to formula: $C_l = \dfrac{V_r}{Sh_r} : \dfrac{V_c}{Sh_c}$, where: V_r – the volume of goods (services) production according to type of economic activity on the territory of the RF entity; V_c – the volume of goods (services) production according to type of economic activity across the country; Sh_r – total shipment of goods and services according to all economic activities of the region (entire economy); Sh_c – total shipment of goods and services according to all economic activities across the country (entire economy).
High values of the coefficient are due to calculations of detailed TEA of the region.

agriculture are quite developed. This is proved, in particular, by the calculated localization coefficients for the main types of economic activity of Russian European North regions (*Tab. 5*).

The main trend in the spatial development of Russian European North regions' in the post-Soviet period is the concentration of population and economic activity in "node" points and periphery growing. Thus, for example, there was a trend of population con-centration near the administrative center in the Komi Republic in 1990−2017 (Syktyvkar's share in the number of entity's total population increased from 19.8 to 30.6%; the same is observed in Syktyvdinsky District); Ukhta's share increased from 11.3 to 14%, Sosnogorsk's − from 5 to 5.2%. At the same time, there is a considerable population's

outflow from the territories of industrial periphery, municipalities of the northwestern "corner" (*Tab. 6*).

Primary centers of industrial production in the Komi Republic are Usinsk, Syktyvkar, Ukhta, and Pechora. The status of Usinsk, as being the key industrial center, has noticeably grown over the last twenty years (its share in the total volume of industrial products' production increased from 12 to 37 p.p.), and currently this entity accounts for more than a third of the total industrial products' production. The main industry is the production and transportation of oil and gas. At the same time, a number of the Republic's single-industry towns (Vorkuta, Inta, and some other industrial periphery cities) have significantly lost their positions due to the attenuation of economic activity.

Table 6. Share of Komi Republic municipalities in total population number
and volume of entity's industrial production, dynamics of its change, % (p.p.)

Total population in an entity				Total volume of industrial products' production			
Municipality	Share, %		2017 to 1990, p.p.*	Municipality	Share, %		2017 to 1990, +/-***
	1990	2017			1997 г.**	2017 г.	
Syktyvkar	**19.8**	**30.6**	**+10.8**	**Usinsk**	**12.7**	**37.0**	**+24.4**
Ukhta	**11.3**	**14.0**	**+2.7**	**Knyazhpogostsky**	**0.8**	**2.6**	**+1.8**
Syktyvdinsky	**2.3**	**2.8**	**+0.5**	**Pechora**	**7.9**	**9.3**	**+1.4**
Sosnogorsk	**5.0**	**5.2**	**+0.2**	**Vuktyl**	**1.7**	**2.8**	**+1.1**
Izhemsky	**2.0**	**2.1**	**+0.1**	**Ust-Vymsky**	**0.7**	**1.0**	**+0.3**
Sysolsky	1.6	1.5	-0.1	**Syktyvdinsky**	**0.6**	**0.7**	**+0.1**
Ust-Tsilemsky	1.5	1.4	-0.1	Priluzsky	0.5	0.4	-0.1
Kortkerossky	2.3	2.2	-0.1	Ust-Tsilemsky	0.3	0.1	-0.2
Koygorodsky	1.0	0.9	-0.1	Troitsko-Pechorsky	0.3	0.1	-0.2
Ust-Vymsky	3.3	3.1	-0.2	Koygorodsky	0.3	0.0	-0.2
Priluzsky	2.4	2.1	-0.3	Izhemsky	0.3	0.0	-0.3
Udorsky	2.4	2.1	-0.3	Kortkerossky	0.3	0.0	-0.3
Ust-Kulomsky	3.2	2.9	-0.3	Sysolsky	0.3	0.0	-0.3
Usinsk	5.6	5.2	-0.4	**Syktyvkar**	16.7	**16.3**	-0.4
Troitsko-Pechorsky	2.0	1.4	-0.6	Ust-Kulomsky	0.6	0.0	-0.6
Knyazhpogostsky	3.0	2.3	-0.7	**Ukhta**	17.6	**16.8**	-0.7
Vuktyl	2.1	1.4	-0.7	Udorsky	0.8	0.1	-0.8
Pechora	7.4	6.1	-1.3	Sosnogorsk	7.0	3.9	-3.0
Inta	5.4	3.4	-2.0	Inta	7.5	0.8	-6.7
Vorkuta	6.5	9.4	-7.1	Vorkuta	23.2	7.5	-15.7

Source: * the table is sorted according to the rate of the indicator's change in 2017–1990.
** data on the volume of industrial production by municipalities have been publicly available since 1997.\
*** the table is sorted according to the rate of the indicator's change in 2017–1997.

Similar processes of population and economic activity's concentration are also specific for the southernmost entity of Russian European North – the Vologda Oblast. Primary pivotal centers of the region, "first class" nods are two large cities, which are administrative (Vologda) and industrial (Cherepovets) "capitals", and municipal regions bordering them. Thus, in 2017, 73.1% of Oblast's population lived there, 93.3% and 65.1% of industrial and agricultural production was manufactured there; also, 67.5% of investment volume into fixed capital and 79% of retail trade turnover is accumulated there. In turn, major number of (periphery) municipal regions, which are far from large cities, are currently characterized by growing problems in socio-economic development [27].

Development of economic space and provision of its connectivity largely depends on the level of transport infrastructure development. Currently, Russia is placed 75th in rating of the countries according to the efficiency of transport logistics (Logistics Performance Index): the country is behind developed and developing states (Germany, Sweden, Belgium, Brazil, Kazakhstan, Ecuador, Slovakia, Serbia, etc.).

Key trend of the European North's transport system functioning in the post-Soviet period is the decrease in the volume of cargo turnover of primary transport means, despite the fact that in 2000–2017, in some regions, the value of this indicator increased. Thus, in 1990–2017, shipments by railway transport decreased by almost ¾ in the Komi Republic,

in the Arkhangelsk Oblast – by 51.7%, in the Murmansk Oblast – by 38.3% (*Tab. 7*). The only entity which shows growth is the Republic of Karelia (3.8% growth).

In a similar way, decrease of cargo volumes shipped by automobile transport is happening. For example, in 1990–2017, cargo turnover of automobile transport of economic sectors in the Murmansk Oblast decreased almost by 82%, in the Republic of Karelia – by 68% , etc. These processes, along with significant decrease of cargo turnover and marine transport, show the sighs of decreasing amounts of interregional cooperation in Russian European North.

To assess the level of transport infrastructure development (railways, automobile roads, water routes) in the regions of Russian European North, coefficients of Engel (1), Goltz (2), and Uspensky (3) were calculated:

$$C_e = \frac{L}{\sqrt{S \times P}} \ , \tag{1}$$

where: C_e – Engel's coefficient; L – total length of transport roads; S – area of a territory (country, region); P – population of the territory.

$$C_g = \frac{L}{\sqrt{S \times N}} \ , \tag{2}$$

where: C_g – Goltz's coefficient ; L – total length of transport roads; S – area of a territory (country, region); N – number of settlements.

$$C_u = \frac{L}{\sqrt[3]{S \times P \times t}} \tag{3}$$

where: C_u – Uspensky's coefficient; L – total length of transport roads; S – area of a territory (country, region); P – population of the territory; t – the total weight of cargo sent to the territory.

Table 7. Departure of goods by public railway transport, million tons

Territory	1990	2000	2017	2017 to. 2000, %	2017 to 1990, %
Russian Federation	2140.1	1046.8	1384.3	132.2	64.7
Russian European North	182.1	88.7	101.9	114.9	55.9
Murmansk Oblast	47.2	24.6	29.1	118.3	61.7
Republic of Karelia	25.5	14.7	27.6	187.8	108.2
Vologda Oblast	30.7	15.5	20.4	131.6	66.4
Komi Republic	55.7	24.9	13.7	55.0	24.6
Arkhangelsk Oblast	23.0	9.0	11.1	123.3	48.3

Goltz's coefficient allows conducting more correct assessment of transport infrastructure provision for population. In comparison with Engel's coefficient, it takes into account not only the number of population but settlements which are connected by transport network. Uspensky's coefficient, in turn, lets us evaluate the level of transport provision for territory's production sphere [28]. Acquired data is given in *Table 8*.

There are no clearly developed normative and threshold values of these coefficients in science and practice. However, it should be mentioned that the more these values are, the higher the level of regional transport infrastructure provision is. Thus, average Russian Engel's coefficient on automobile roads was 0.029 (in the Vologda Oblast − 0.069, in the Republic of Karelia − 0.033, in the Arkhangelsk Oblast − 0.024, in the Republic of Komi − 0.013, in the Murmask Oblast − 0.011). At the same time, in Canada, for example, which is also a northern country and comparable in terms of area, this coefficient is 0.056 [29]. Based on the data obtained, it follows that the highest level of transport infrastructure development, among the REN

regions, is typical for the Republic of Karelia and the Vologda Oblast. It is definitely a factor which provides a higher infrastructural spatial security of these territories.

In this regard, in our opinion, the Vologda Oblast should play a role of an outpost in the process of the North's development. One of the key priorities is the transformation of Vologda into transport and logistics center. The city has large railway transport corridors: "Transsib" (Vladivostok−Chelyabinsk−Buy−Vologda-Cherepovets−Babaevo−Saint Petersburg); "North−South" (Moscow−Danilov−Vologda−Sochi−Arkhangelsk, with a branch to Vorkuta and Murmansk), the Volga−Baltic Waterway, two airports (Vologda, Cherepovets). The multimodal logistics center will allow establishing close cooperation between northern, Arctic territories and southern regions. Counter flows of goods and services may go through it in order to provide northern territories with food, essential products, machinery and equipment, and southern territories with raw materials and products of its processing for the further development of technological chains [30]. All these factors support aforementioned idea.

Table 8. Assessment of the level of Russian European North regional provision with transport infrastructure* (2018)

RF entity	Total length of transport roads (auto-mobile, railway, internal waterways, L) thousand km (RF − million km)	Area of a territory (S), thousand sq. km (RF − million sq. km)	Number of population (P), thousand people (RF − million people)	Number of settlements (with residents, N), units	The total weight of cargo shipped on the territory (t), mil. tons	Coefficient		
						Engel (K_e)	Goltz (K_g)	Uspensky (K_u)*
RF	1.7	17.1	146.8	136094	6788.2	0.034	0.035	0.007
Vologda Oblast	31.3	144.5	1167	5899	70.8	**0.076**	**1.072**	**0.137**
Republic of Karelia	16.9	180.5	618	691	36.3	**0.051**	**1.513**	**0.106**
Arkhangelsk Oblast (including NAO)	25.9	589.9	1144	3156	37.8	0.032	0.600	0.088
Komi Republic	13.3	416.8	830	723	42.1	0.023	0.766	0.054
Murmansk Oblast	4.4	144.9	748	126	32.6	0.013	**1.030**	0.029
* sorting in the table is made according to the values of Uspensky's coefficient.								

Besides, Murmansk and Arkhangelsk's seaports should be further developed as bases of the Northeast Passage, the most important railways (Belkomur, Barentskomur), reconstruction and active usage of domestic water ways (Pechora, the Northern Dvina River, Sukhona, etc.), etc. It will allow providing domestic transport connectivity of Russian European North territories and its interregional integration with southern regions of the country.

Current conditions are characterized by the necessity to provide digitalization of the economy and its innovative development. In this regard, the important aim is to provide connectivity of economic space on the basis of Internet and cellular communication development. It should be mentioned that over the last few years there has been a positive trend in this aspect: the growing number of active Internet users (thus, in 2011−2017 their number in REN regions increased by 40−70%, *tab. 9*). Quite often, the number of mobile Internet users grew more rapidly. At the same time, there are still not enough digital technologies in the production sphere: for example, only 25−35 employees (out of 100) have a PC with available Internet access.

In this regard, the conducted analysis shows that the spatial structure of Russian European North's households is currently linear-nodal, with the existence of significant economically remote periphery (or "hinterlands"). According to RAS Corresponding Member Doc. Sci. (Geography) V.N. Lazhentsev, 70% of industrial production and significant part of available resources are concentrated in REN's economic nodes. Such nods are usually republican and districts' centers ("first class nodes") [26].

In general, economic space of Russian European North, as a region, is quite complicated. In its structure, researchers point out two economic sub-regions (Karel−Kola and Dvina−Pechora) which are different in geological and geographical characteristics, and features of the economic activity organization. Meanwhile, the European North, according to the E.E. Lejzerovich's grid, consists of 35 economic micro-regions which include several municipal regions, urban settlements, neighboring communes [31].

Table 9. Number of active users of fixed and mobile broadband Internet
access per 100 people (at the end of the year), units

Region	2011	2012	2013	2014	2015	2016	2017	2017 to 2016, %	2017 to 2011, %
Fixed broadband Internet access									
RF	12.2	14.4	16.5	17.0	18.3	18.6	21.0	112.90	172.13
Republic of Karelia	21.6	23.9	25.6	27.5	28.9	29.8	30.9	103.69	143.06
Murmansk Oblast	15.3	17.2	18.4	19.5	23.4	25.9	28.3	109.27	184.97
Komi Republic	14.7	16.5	16.9	17.6	26.7	28.8	25.1	87.15	170.75
Vologda Oblast	13.8	16.2	17.7	18.9	20.0	20.2	22.5	111.39	163.04
Arkhangelsk Oblast (including NAO)	14.1	15.6	16.2	16.8	17.5	17.3	21.9	126.59	155.32
Mobile broadband Internet access									
RF	47.8	52.6	59.8	64.5	68.1	71.1	79.9	112.38	167.15
Murmansk Oblast	43.0	47.1	54.1	58.9	61.2	56.0	76.3	136.25	177.44
Komi Republic	38.9	44.7	45.5	47.4	74.5	75.6	75.2	99.47	193.32
Arkhangelsk Oblast (including NAO)	38.5	43.6	47.2	49.7	51.7	57.1	66.9	117.16	173.77
Republic of Karelia	38.1	40.8	44.3	48.4	52.0	47.2	63.1	133.69	165.62
Vologda Oblast	47.7	51.8	56.2	57.0	62.3	56.2	61.2	108.90	128.30

Propositions and conclusions. Destructive processes in the development of economic space of Russian European North in the post-Soviet period and its compression actualize the task of improving economic activity centers' placement while preserving its support carcass by creating environment for the development of urbanized territories of different hierarchical levels and scales (economic nodes), as well as the territories of industrial and rural periphery; improving availability of social infrastructure services and the quality of living environment. In other words, it is necessary to form not just one or two (it is called "first class" nodes (republican and district centers) on the REN territories and largest and biggest urban agglomerations – across the country) but numerous centers of economic growth. Academician A.I. Tatarkin noticed that "small- and middle-sized towns should get development impulse through development and inclusion into agglomeration and other deep, outlying territories" [3].

At the same time, there is a development of a slightly different economic landscape in Russia. Its main feature is the formation of several dozen extra large (first of all, Moscow and Saint Petersburg agglomerations) and large compact areas of relative well-being, which have some attributes of post-industrial economy with simultaneous stagnation and degradation of vast agricultural and industrial territories outside these agglomerations[13]. Thus, in "The Strategy of Spatial Development of the Russian Federation until 2025", approved by the Resolution of the RF Government no. 207-r, dated 13.02.2019, 41 largest (more than 1 million people population) and large (0.5– 1.0 million people) agglomerations are marked as prospective large centers of country and RF entities' economic growth. Meanwhile, in documents, not a single European North city is marked as the core of agglomeration. Several municipalities (Arkhangelsk, Vologda, Murmansk, Petrozavodsk, Syktyvkar, Cherepovets) are attributed to prospective centers of economic growth, which will contribute to economic development of the country by 0.2– 1.0% annually.

We should agree with the author [32] that the current shift in the organization of production powers in favor of large and largest cities in Russia is the opposite to the agglomerating process, and it could be called enclavization[14], which is the spontaneous and virtually uncontrollable compression of the national economy's economic environment to several dozens of economic activity pockets in the main area of country's settlement.

In the environment of foreign-oriented and primarily export-raw materials model of the domestic economy functioning with the weak development of the domestic market and interregional economic and technological relations, such enclavization of economic activity will ensure short- and medium-term economic growth only through mobilization and periphery resources' redistribution. The consequences of this development model might be the strengthening of disintegration trends in the development; economic basis and social infrastructure's degradation of the territories located outside large cities [32].

---

[13] In Russian scientific literature, the hypertrophied development of a city has always been considered one of the essential shortcomings of the territorial settlement organization and economy (See: Lappo G.M. *Cities of Russia: A geographer's view*. Moscow: Novyi khronograf, 2012. 504 p. Pivovarov Yu.L. *Fundamentals of geourbanistics: Urbanization and urban systems*. Moscow: VLADOS, 1999. 232 p. Smirnyagin L.V. Agglomeration: Pros and cons. *Gorodskoi al'manakh=City almanac*, 2008, vol. 3, pp. 152-168.)

[14] "Enclave" (fr. enclave and lat. inclavatus) – "closed, locked" and means part of the country's territory.

At the same time, in our opinion, there are more potential "second order" agglomerations[15] and other nodular forms of organizing space in the North. It might act as the counterweight to "first order" agglomerations (large and largest, according to the Strategy of the RF Spatial Development until 2025), might provide preservation of country's habitable large space outside the zone of cities' (with more than 500 thousand people population) direct influence, and might stop processes of its suppression on the basis of its integration into inter- and intraregional processes of labor division.

In particular, in the original project of "The Strategy of Spatial Development of the Russian Federation until 2025", the availability of 124 formed and developing agglomerations was justified. In turn, famous Russian scientist-urbanist A.M. Lola points out 146 large-city agglomerations, including nine agglomerations on the territory of Russian European North: Arkhangelsk, Vologda, Vorkuta, Kotlas, Murmansk, Petrozavodsk, Syktyvkar, Ukhta, and Cherepovets [33].

The results of studies conducted at VolRC RAS show that, currently, on Russian European North, there is a number of first and second class nodes which, due to high density of economic activity, play a major role in the economy of its entities and have further potential for the development on the basis of formation and efficient usage of agglomeration effects. Thus, sufficient high values of economic power indicators of nodal forms with agglomeration effect are typical for: Cherepovets (8061.6 million rub/km, 17th position among 50 studied Russian agglomerations (41 large and largest agglomeration, marked in the Strategy of RF spatial development, and nine REN agglomerations), Ukhta (5202.6 million rub/km, 23rd position), Murmansk (4782.8 million rub/km, 24th position), Vologda (3713.6 million rub/km, 27th position), and Arkhangelsk agglomerations (2524.7 million rub/km, 35th position), which shows significant potential for further development *(Tab. 10)*.

These territories might provide preservation of existing pivotal carcass of Russian European North and connectivity of region's space; it might stop current negative trends on the basis of reconstruction and development of sustainable socio-economic and technological connections through the system "large city—small town—village".

Important part in these processes, in our opinion, should be played by middle- and small-sized towns, the number of which is 942 units (84.6% of cities' total amount) with total population exceeding 26.5 million people (18.1% of country's total population)[16]. For most of the functions performed, small towns in the settlement process are intermediate links between a large city and a village in the settlement system.

Thus, the production sphere of many small- and middle-sized European North towns is currently based on the usage of natural resources (the timber industry is widely developed in the towns of Republic of Karelia, Arkhangelsk and Vologda oblasts, hydrocarbon production and processing — in the Komi Republic, mining industry — in the Murmansk

---

[15] A number of modern works, based on rich empirical material, is devoted to the study of the role and place of "second order" agglomerations in country's spatial development. See: Dmitriev M.E., Chistyakov, A. A. Romashina. Role of spatial policy in economic growth acceleration. Obshchestvennye nauki i sovremennost'=Social Sciences and Contemporary World, 2018, no. 5, pp. 31—47.

[16] City classification is given according to "CI 42.13330. 2011. Set of rules. City building. Planning and development of urban and rural settlements. Updated edition CNaR 2.07.01-89", according to which middle-sized towns have 50—100 thousand people population, small-sized cities — up to 50 thousand people.

Table 10. Rating of Russian agglomerations in terms of gravity indicator (economic capacity)

Place and name of agglomeration	Power rating of interaction, *million rub/km*	Place and name of agglomeration	Power rating of interaction, *million rub/km*
1. Moscow	-*	26. Chelyabinsk	3919.6
2. Saint Petersburg	-*	**27. Vologda**	**3713.6**
3. Tyumen	33463.2	28. Ulyanovsk	3606.2
4. Perm	28509.0	29. Krasnodar	3388.2
5. Omsk	18807.2	30. Krasnoyarsk	3341.3
6. Lipetsk	16649.1	31 .Voronezh	3137.2
7. Novosibirsk	14894.8	32. Rostov	2943.1
8. Orenburg	14693.1	33. Kazan	2763.1
9. Ufa	14251.0	**34. Arkhangelsk**	**2524.7**
10. Saratov	13784.1	**35. Apatity-Kirovsk- Monchegorsk**	**2210.4**
11. Ryazan	12312.0	36. Izhevsk (Udmurtia)	2170.9
12. Kemerovo	12172.7	**37. Petrozavodsk**	**2052.9**
13. Novokuznetsk	11082.6	38. Tula	2002.2
14. Samara	9433.3	39. Barnaul	1776.8
15. Volgograd	8830.2	**40. Syktyvkar**	**1687.9**
16. Irkutsk	8488.8	41. Stavropol	1582.5
17. Cherepovets	**8061.6**	42. Astrakhan	1258.2
18. Kamskii	7513.2	43. Vladivostok	1236.6
19. Penza	7403.6	44. Kirov	1097.4
20. Yaroslavl	6277.7	**45. Kotlas**	**867.9**
21. Yekaterinburg	5922.6	46. Pyatigorsk	741.5
22. Nizhny Novgorod	5708.9	47. Makhachkala	444.4
23. Ukhta	**5202.6**	48. Khabarovsk	-**
24. Murmansk	**4782.8**	49. Tomsk	-**
25. Cheboksary (Chuvashia)	4081.9	**50. Vorkuta**	**-****

* For the Moscow and Saint Petersburg agglomerations, this indicator was not calculated due to the "blurring" of the boundaries of the agglomeration itself. At the same time, it can be assumed that these agglomerations might be leaders according to this indicator, since they concentrate the largest volume of production and have a sufficiently developed network of settlements, located close to each other.
** For the Khabarovsk and Tomsk agglomerations, the indicator was not calculated, because it includes only 3 municipalities (the Tomsk agglomeration also includes CC "Seversk", for which there is no statistical information on most indicators), which does not allow reliably calculating average gravity coefficient for the agglomeration. In Vorkuta agglomeration, calculations were also not carried out due to the fact that it includes only the city district of Vorkuta.

Note. To assess the degree of economic interaction between the municipalities included in the agglomeration, the gravity indicator (economic power of the agglomeration) was used, which takes into account the economic potential (the volume of shipment of goods and services) and the distance between the agglomeration core and the municipality center entering it:

$$G_A = \frac{\sum_{j=1}^{n}(G_{cj} \cdot f_j)}{\sum_{j=1}^{n} f_j} \quad ,$$

where G_A – gravity coefficient (economic capacity) of an agglomeration A, million rub/km; G_{cj} – the index of interaction between the core of the agglomeration (i) and the municipality (j) included in this agglomeration; f_j – population of a municipal formation (except for a core of agglomeration's area), included in the agglomeration A, thousand people; n – number of municipalities (excluding a core of agglomeration) included in the agglomeration.

Sources: Voroshilov N.V. Approaches to assessing the development of agglomerations in Russia. *Problemy razvitiya territorii=Problems of Territory's Development*, 2019, no. 4 (102), pp. 40–54. DOI: 10.15838/ptd.2019.4.102.2; Uskova T.V., Voroshilov N.V., Kozhevnikov S.A. *Problems of spatial restructuring on the example of the formation and development of urban agglomerations as points of territory's growth in the context of solving development's strategic problems of Russia's European North and the Arctic zone: Research report.* Vologda, 2018. 157 p.

Oblast)[17]. Agriculture and agro-industrial complex, due to severe climatic conditions, is developed only in a few settlements, situated primarily in the Vologda Oblast.

Many of these municipalities are currently single-industry towns of the industrial periphery in a state of long depression. So, the relevant task is the search of instruments of its sanitation. Since the economic activity of many such cities has historically been based on the usage of natural resources, one of the priority ways of its further development is in the modernization and diversification of existing industries, ensuring deep processing of raw materials on the basis of neo-industrialization and the use of NTP technologies in economic activity, which will increase production efficiency, ensure broad cooperation with other links of the national and global economy [24].

Since the economic activity of many such cities has historically been based on the usage of natural resources, one of the priorities of its further development is the modernization and diversification of ongoing industries, the insurance of deep processing of raw materials on the basis of neo-industrialization, and the usage of STP technologies in economic activity. It will increase the production efficiency, and ensure broad cooperation with other links of national and global economy [26].

At the same time, strategically, the development model for these cities, in our opinion, should imply cooperative development and integration of "traditional" (industrial, mass production of large enterprises, focusing on the following factors of placement: raw materials, labor resources, sales, transport, and energy) and "new" economy (post-industrial production, including the needs of the Arctic (biotechnology, electronic industry and other machine-building, etc.)[18]. That is why the new role is the attraction of small- and middle-sized towns (and other deep territories) as important participants of cluster projects, initiated at large regional and territorial centers and agglomerations. It will allow changing these territories into centers of regional economic development on the basis of maximum efficient usage of its competitive positions, including the solution of strategic tasks of the RF Arctic zone development [1].

It may give new impulse to the development of small-, middle-sized towns and non-urbanized territories. At the same time, it will require a qualitatively new level of infrastructural development and drastic investment decisions from the state. Meanwhile, technological chains, which are formed within this model and situated outside European North and its Arctic zone, in our opinion, should be oriented toward strengthening of economic integration with other Russian regions through "North-South" line, not integration into international chains as production of the first redistributions. It implies the necessity to organize new forms of territorial household organization in the northern environment, scientific justification of recommendations for reducing territorial disproportions between placement of "arctic" and "northern" resources and centers of its processing and consumption.

Strategically important task of small- and middle-sized towns development is, on the one hand, establishment of close cooperation with large cities-regional centers (which have functions of scientific, industrial, socio-cultural, and service center of the highest order), and, on the other hand, ensuring the maximum development of functions of

---

[17] Source: compiled on the basis of municipal documents and data from the website "People's encyclopedia of Russian cities and regions "My city". Available at: http://www.mojgorod.ru/cities/index.html (accessed: 28.06.2019).

[18] See: The Concept of the Strategy of Spatial Development of the Russian Federation until 2030. Ministry of Economic Development of the Russian Federation. Moscow, 2016. 111 p. Available at: http://карьеры-евразии.рф/uploadedFiles/files/Kontseptsiya_SPR.pdf

organizational, economic, industrial, cultural and educational centers of rural areas.

Inclusion of small- and middle-sized cities in the economic complex of the region can be ensured, in particular, by placing there specialized industrial enterprises (placement of branches and divisions of enterprises located in the regional center and other large cities of the settlement system: for example, machine-building, radio and electric industry enterprises), scientific and scientific-production facilities (these activities might be organized as an addition to the scientific-production complex of a large city-center); cooperation of local enterprises with entities of regional economic complex.

Taking into account features of small- and middle-sized towns in settlement systems, its local conditions and resources, it is advisable to place there the following enterprises and organizations of traditional economic centers:

— which produce homogeneous industrial products in those types of economic activities, which are not influenced by the scale effect (textile industry, machine processing of metal, wood, plastics, some chemical productions);

— which use small reserves of local raw resources for production needs (for example, enterprises on production of building materials, furniture, peat enterprises, etc.);

— which process low-transportable or perishable agricultural products manufactured in rural areas;

— which perform functions of organizational, industrial-economic, and rural service centers, close to small towns (repair of agricultural machinery and transport means, sewing studios and workshops);

— which provide transit transport connections between large territorial-economic complexes or elements of one complex;

— which produce folk crafts, primarily formed on the basis of local population's skills [34].

In this environment, rural territories and village economy will receive new impulse for the development, which imply emergence of new opportunities for efficiency increase and core change in the technology of agricultural production, approximation of agricultural products processing to production, etc. [3]. At the same time, transformation of current spatial structure of household and settlement of European North requires qualitative revision of federal and regional policy's principles [35, 36]. The obtained results might be used for the development of strategy and program development of Russian European North and its constituent entities of the RF; justified forms, methods, and management tools are oriented toward the formation of a single socio-economic space of Russian European North and development of interregional integration of Russian regions according to "North-South" line.

Further prospects of the study include the development and approbation of the methodology for determining the placement of "settlement centers" (growth points of inter-settlement and interregional value, provided with infrastructure and potential for further economic development), mechanisms of increasing efficiency of interregional cooperation on the basis of the development of long added value chains; the formation of new forms of territorial organization of the Arctic and North's economy.

References

1. Bokov A.V. On the strategy of spatial development. *Building Expert*. Available at: https://ardexpert.ru/article/13907 (In Russian).

2. Gontar N.V. Territorial policy: structure and its impact on the spatial organization of society and economy. *Izvestiya RAN. Seriya Geograficheskaya= Izvestia RAS. Geographical Series,* 2016, no. 2, pp. 18−26. (In Russian).

3. Tatarkin A.I. Formation of regional institutions of spatial development of the Russian Federation. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz=Economic and Social Changes: Facts, Trends,* 2012, no. 6 (24), pp. 42−59. (In Russian).

4. Minakir P.A. Spatial analysis in Economics. *Zhurnal NEA=The Journal of the New Economic Association*, 2013, no. 1(17), pp. 176−180. (In Russian).

5. Granberg A.G. *Osnovy regional'noi ekonomiki* [Foundations of regional economy]. Moscow: HSE University, 2003. 495 p.

6. *Strategii makroregionov Rossii: metodologicheskie podkhody, prio-ritety i puti realizatsii* [Strategies of Russian macro-regions: Methodological approaches, priorities, and ways of implementation]. Ed. by A.G. Granberg. Moscow: Nauka, 2004. 720 p.

7. Krugman P. Complex Landscapes in Economic Geography. *American Economic Association. Papers and Proceeding*, 1994, no. 84, 413 p.

8. Minakir P.A., Dem'yanenko A.N. *Ocherki po prostranstvennoi ekonomike* [Essays on Spatial Economics]. Ed. by V.M. Polterovich. Khabarovsk: IEI DVO RAS, 2014. 272 p.

9. Krukovskii Ya.V. Fractal analysis of time ranges in forecasting trends of socio-economic systems. In: *Fraktaly i tsikly razvitiya system* [Fractals and cycles of systems' development]. Tomsk: IOM SO RAS, 2001. Pp. 38−41. (In Russian).

10. Gataullin R.F., Karimov A.G., Komarov A.G. Economic space: content, unity, and gaps. *Problemy sovremennoi ekonomiki=Problems of Modern Economics*, 2014, no.4 (52). Available at: http://www.m-economy.ru/art.php?nArtId=5194 (In Russian).

11. Perru F. *Les techniques quantitatives de la piar Economic et societe*. Paris: Economic, 1969. 25 p.

12. Isard I. Interregional and regional input-output analysis: a model of a spaceeconomy. *The Review of Economics and Statistics*, 1951, vol. 33, no. 4, pp. 318−328.

13. *OECD Territorial Reviews: Competitive Cities in the Global Economy*. OECD Publishing, 2016. 449 p. Available at: https://www.researchgate.net/publication/46059498_OECD_Territorial_Reviews-Com-petitive_Cities_in_the_Global_Economy

14. Grinchel' B.M., Nazarova E.A. *Methods of assessing the competitive attractiveness of regions.* Available at: https://docviewer.yandex.ru/?url=http%3A%2F%2Fwww.citytrategy.ru%2FUserFiles%2FFile%2FmonografGrinch.pdf&name=monografGrinch.pdf (In Russian).

15. Yakovleva S.A. Spatial models in strategies of Russian regions' social and economic development. *Pskovskii regionologicheskii zhurnal=Pskov Regional Journal*, 2014, no. 17, pp. 3−16. (In Russian).

16. Lappo G.M. The concept of the supporting carcass of the territorial structure of the national economy: development, theoretical and practical significance. *Izvestiya AN SSSR. Seriya Geograficheskaya=Izvestiya AS USSR. Geographical series*, 1983, no. 95, pp. 11−30. (In Russian).

17. Gornung M.B. et al. (Eds.). *Osnovnye problemy ekonomicheskoi i sotsial'noi geografii* [The Main Problems of Economic and Social Geography]. Moscow: Mysl', 1983. 292 p.

18. Baranskii N.N. On the economic and geographical study of cities. In: *Ekonomicheskaya geografiya. Ekonomicheskaya kartografiya* [Economic geography. Economic cartography]. Moscow: Geografgiz, 1956. P. 168. (In Russian).

19. Vorob'ev V.V. *Goroda yuzhnoi chasti Vostochnoi Sibiri* [Cities of the southern part of Eastern Siberia]. Irkutsk: Irkut. kn. izd-vo, 1959. 147 p.

20. Uchida H., Nelson A. *Agglomeration index: Towards a new measure of urban concentration. World Institute for Development Economics Research Working Paper*. 2010. No. 29. 18 p. Available at: https://www.wider.unu.edu/sites/default/files/wp2010-29.pdf

21. Prakash M., Teksoz K., Espey J., Sachs J., Shank M., Schmidt-Traub G. Achieving A Sustainable Urban America. *The U.S. Cities Sustainable Development Goals Index 2017*. Available at: http://unsdsn.org/wp-content/uploads/2017/08/US-Cities-SDG-Index-2017.pdf

22. Shibusawa H. Agglomeration diseconomies of traffic congestion and agglomeration economies of interaction in the information-oriented city economy. *Journal of Regional Science*, 1999, vol. 39, no. 1. pp. 21–49.

23. *OECD Territorial Reviews: Competitive Cities in the Global Economy.* OECD Publishing, 2016. 449 p. Available at: https://www.researchgate.net/publication/46059498_OECD_Territorial_Reviews-Com-petitive_Cities_in_the_Global_Economy

24. Lazhentsev V.N. Territorial organization of population and economy of Russian European North. *Region: Ekonomika i Sotsiologiya=Region: Economics and Sociology*, 2015, no. 2 (86), pp. 3–28. (In Russian).

25. Lazhentsev V.N. *Sever Rossii: voprosy prostranstvennogo i territorial'nogo razvitiya* [The North of Russia: problems of spatial and territorial development]. Syktyvkar, 2015. 176 p.

26. Lazhentsev V.N. Some results of the study of the spatial aspects of the development of the Russian European North. *Regionalistika=Regionalism*, 2015, vol. 2, no. 1, pp. 42–48. (In Russian).

27. *Sotsial'no-ekonomicheskoe razvitie munitsipal'nykh raionov (2000–2017)* [Socio-economic development of municipal districts (2000–2017)]. Vologda: FGBUN VolRC RAS, no. 6, 2019. 68 p.

28. Volkova N.V., Svistel'nik N.V. Road network of Altai Krai: state assessment and impact on socio-economic development. *Mir ekonomiki i upravleniya=World of Economics and Management*, 2018, vol. 18, no. 2. Available at: https://nsu.ru/rs/mw/link/Media:/74566/07.pdf (In Russian).

29. Shvalov P.G. Problem factors of the development of high-speed transportation logistics in macro- and meso-logistic systems. *Sotsial'no-ekonomicheskii i gumanitarnyi zhurnal Krasnoyarskogo GAU=Social and Economic and Humanitarian Magazine of Krasnoyarsk SAU*, 2016, no. 4, pp. 133–142. (In Russian).

30. Kozhevnikov S.A. Problems of the European North of Russia and the possibilities of its participation in the development of the Arctic Zone of the Russian Federation. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz=Economic and Social Changes: Facts, Trends, Forecast*, 2019, vol. 12, no. 1, pp. 87–107. DOI: 10.15838/esc.2019.1.61.5 (In Russian).

31. Leizerovich E.E. Grid of Russian economic micro-regions. 2008 variant. *Regional'nye issledovaniya=Regional Studies*, 2010, no. 4, pp.14–28. (In Russian).

32. Degtyarev P.Ya. Enclave vector of Russian spatial development. *Vestnik Chelyabinskogo gosudarstvennogo universiteta. Ekonomicheskie nauki=Bulletin of Chelyabinsk State University. Economic Studies*, 2018, no. 61 (417), pp. 67–73. (In Russian).

33. Lola A.M. *Gorodskoe i aglomeratsionnoe upravlenie v Rossii: sostoyanie i chto delat'* [Urban and agglomeration management in Russia: state and what to do]. Moscow: "Kanon+" ROOI "Reabilitatsiya", 2013. 292 p.

34. *Rukovodstvo po proektirovaniyu malykh gorodov v sistemakh rasseleniya* [A guide to the design of small towns in settlement systems]. Moscow: Stroiizdat, 1979. 129 p.

35. Uskova T.V., Voroshilov N.V., Gutnikova E.A., Kozhevnikov S.A. *Sotsial'no-ekonomicheskie problemy lokal'nykh territorii: monografiya* [Socio-economic problems of local territories: Monograph]. Vologda: ISEDT RAS, 2013. 196 p.

36. Uskova T.V., Chekavinskii A.N. Law on strategic planning in the Russian Federation: advantages and unresolved issues (expert evaluation). *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz=Economic and Social Changes: Facts, Trends, Forecast*, 2014, no. 4 (34), pp. 63–67. DOI: 10.15838/esc/2014.4.34.6 (In Russian).

Information about the Author

Sergei A. Kozhevnikov – Candidate of Sciences (Economics), Leading Researcher, deputy head of department, Vologda Research Center of the Russian Academy of Sciences (56A, Gorky Street, Vologda, 160014, Russian Federation; e-mail: kozhevnikov_sa@bk.ru)