SPATIAL DEVELOPMENT OF THE RUSSIAN EUROPEAN NORTH IN THE POST-SOVIET PERIOD

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Abstract
The article explores the features of the spatial development of the European North of Russia in the post-Soviet period. It is shown that there are processes of polarization and disintegration of the region's space, which is manifested primarily in the concentration of both the population and economic activity in the "nodal" points, which, as a rule, are large cities, administrative and industrial centers, as well as an increase in the area of the economic periphery. The prospects for the development of resettlement systems are substantiated, and an assessment of the connectivity of the northern territories based on an analysis of the level of development of their transport and logistics infrastructure is given. The necessity of forming several reference points in the economic space of the European North of Russia is substantiated, which, in our opinion, should become a kind of "counterbalance" to the large cities of the central regions of the country and will allow to overcome the negative trends associated with the compression of the region's economic space.

Keywords: spatial development, economic space, space connectivity, urban agglomerations, small and medium-sized cities, transport and logistics infrastructure, European North of Russia.
JEL classification: R12

1. Introduction

The collapse of the USSR and the market transformations at the end of the twentieth century led to an increase in destructive, disintegration processes in the spatial development of Russia, a significant violation of existing interregional ties, and a decrease in the development of the domestic market. Thus, the share of interregional turnover in GDP decreased over a short period (1990-1994) from 25% to 16%. In the economy, the export bank focused on the supply of mineral resources to international markets has increased even more; while manufacturing continued to be in a state of prolonged depression.

This led to a violation of the internal cohesion of the country's space: a break in the existing technological ties between the territories led to an increase in the socio-economic crisis in many small and medium-sized cities (primarily single-industry towns) and rural areas. In spatial development, the unprecedented centripetal vector has intensified, manifested primarily in a sharp increase in the economic role of Moscow and several other large regional centers. As a result of these tendencies, the processes of compression of the previously developed space, a noticeable economic consolidation of city centers, have intensified; unprecedented interregional contrasts arose in the practice of foreign federations in terms of the level of socio-economic development of the country's territories.

The problems of ensuring balanced spatial development of Russia are also being updated in connection with the difficult geopolitical and geo-economics situation in which our country is currently located. These necessitates the search for internal sources of economic growth in the regions, one of which is the development of the domestic market, ensuring the deep processing of huge reserves of natural raw materials (oil, gas, timber, iron ore, etc.) and the production of high value-added products (precision engineering, petrochemicals, pharmaceuticals, etc.) based on the effective territorial and spatial organization of economic activity in the country.

In such a situation, the regions of the North and the Arctic, which have significant natural resource and geostrategic potential (significant reserves of gold (40% of all-Russian), oil (60%), gas (60-90%), should play an important role in the spatial development of the country)

chromium and manganese (90%), platinum metals (4 7%), diamonds (100%). So, the European North of Russia and its Arctic zone is one of the largest regions of the European part of the country (1,466 thousand sq. km), has a favorable economic and geographical position (in the north it is washed by the Barents and White Seas; in the west, it borders with Finland and Norway; in the east and south - with the economically developed Urals and Central Russia), which opens up enormous opportunities for the development of foreign trade (Figure 1).

Figure 1: European North of Russia (ENR) *

* In this paper, the composition of the ENR is considered within the boundaries, the composition of which is presented in the current All-Russian classifier of economic regions OK 024-95 (approved by the Decree of the State Standard of Russia dated December 27, 1995 No. 640).

Moreover, from the spatial organization view, the European North of Russia, in contrast to the Asian North, is more populated and economically equipped, with a developed frame of settlement and distribution of productive forces, a rather high level of urbanization.

At the same time, an analysis of strategic planning documents for the northern and Arctic territories of the federal, regional and municipal levels suggests that the spatial component in them is largely formal, and the integration factor is taken into account mainly when implementing large investment projects related to the export of hydrocarbons to global markets. The entire implemented policy regarding the northern territories in the post-Soviet period is aimed at the further conservation of the raw material development model.

In such a situation, it is necessary to conduct an objective assessment of the characteristics and socio-economic consequences of the transformation of the space of the European North of Russia (ENR) after the 1990s. at the regional and municipal level, which determined the relevance of the study.

The purpose of the work is to analyze the features of the transformation of the space of the European North of Russia in the post-Soviet period and the socio-economic consequences of these processes at the regional and municipal levels.

Achieving this goal involves solving the following tasks:

1. The study of theoretical approaches to understanding the essence of the economic space and the processes of its transformation.

2. Analysis of the features of the transformation of the space of the European Russian North in the post-Soviet period and the socio-economic consequences at the regional and municipal levels.

3. Scientific substantiation of the priorities for managing the space of the ENR in the development framework of a polycentric model.

In our opinion, the interregional space of the Russian European North should develop along a vector of increasing interconnections and interdependencies of regions based on the use of methods and forms of regional management, as well as the formation of territorial economic complexes and unified infrastructure systems. In this regard, the methodological justification of measures to improve state policy in terms of the spatial and territorial organization of the population and economy of the northern regions will ensure an internal balance of development and effective integration of these territories into a single economic space of the Russian Federation.

2. Literature Review

From the methodological point of view, the tasks of the spatial development of the economies of the country's regions (including the northern territories) were quite successfully solved during the USSR. Despite the high scientific and applied level of many developments of the Soviet period, the results obtained in them have now lost their relevance in connection with the radical transformation of the economic system in the end of the twentieth-century. The approaches, theories, and methods proposed by Soviet scientists, who made it possible to effectively manage the distribution of the productive forces of the northern regions in the interests of developing a single national economic complex of the socialist state, require a certain rethinking and adaptation to market economic conditions.

It is worth noting that various aspects of the spatial structure of modern Russia are in the focus of research by leading domestic researchers: G. Lappo (1983), A. Granberg (2003), A. Tatarkin (2012), P. Minakir (2013), T. Nefedova (2019) and others. Moreover, in the opinion of A. Granberg by the beginning of the XXI century the Moscow's, St. Petersburg's, Ural's, Siberian's and Far Eastern's schools of spatial economics were formed in Russia and are successfully developing. In the international science, the German, French, and Anglo-Saxon schools of spatial economics play a significant role in the works of A. Lyosha (1940), W. Isard (1956), P. Krugman, M. Fujita and E. Venables (1999). Also, the considerable attention is paid to the development of cities and urban agglomerations, the development of their effective interaction with non-urbanized territories in the papers of Shibusawa H., 1999; Uchida H., Nelson A., 2010; Prakash M., Teksoz K., Espey J., Sachs J., Shank M., 2017.

The research problems of Russian scientists in spatial economics are mostly devoted to discussions regarding the essence of the economic space (P. Minakir, 2013, A. Granberg, 2004, etc.), the features of its transformation (B. Grinchel, E. Nazarova, 2014) and various models of effective organization space of the country (N. Baransky (1956), V. Vorobyov (1959), O. Glezer and E. Weinberg (2013), S. Yakovleva (2014).

Moreover, in Russian science, there have been several directions towards the interpretation of the essence of the economic space. So, A. Granberg (2003), one of the leading scientists of the national school of spatial economics, understood economic space as a saturated territory containing a lot of objects and connections between them: settlements, industrial enterprises, economically developed and recreational areas, transport and engineering networks, etc. In this definition, economic space exists within the framework of physical space and is determined primarily through the presence of various socio-economic objects and the links between them.

Another group of Russian researchers considers this category primarily through the prism of relations between economic agents (P. Minakir and A. Demyanenko (2014), N. Gagarina (2013), Y. Krukovsky et al. (2001)) arising from the distribution of resources, funds, wealth. In other words, this approach assumes the formation of an economic space only subject to the existence of stable economic relations between economic agents of the analyzed territory. One way or another, this interpretation is similar to the definitions of space proposed by P. Krugman (Krugman R, 1994).

In this study, we will take as a basis the definition of R. Gataullin, A. Karimov, A. Komarov (2014), who understand the economic space as “a part of the physical space subjectively constructed during reproduction that reflects the process of transactions between economic agents that is territorially isolated and localized in time formed based on the realization of their economic interests.” This definition, in our opinion, more succinctly

reflects the nature and essence of the economic space, since it integrates the characteristics of the above approaches.

It should be noted that the problems of the spatial development of modern Russia are the sphere of scientific interests of some foreign researchers. In particular, according to the Brookings Institution (Washington, USA), the annual losses from the inefficient spatial organization of the Russian Federation are estimated at 2.3–3.0% of GDP. Scientists from the Institute for Economic Research of North-East Asia conducted an analysis of some tools for the development of export-oriented industries in the regions of Russia (Hirofumi A., 2019).

Spatial development issues are relevant not only for Russia, which is the largest country in the world but also for the theory and practice of other states. In particular, the framework documents for spatial planning in the EU are the European Spatial Development Perspective, the European Spatial Planning Monitoring Network, and the European Union's Spatial Agenda until 2020, which propose the principles of balanced spatial development for territories European countries and methods for monitoring their use.

Along with this study of the spatial organization of the northern and Arctic territories, several foreign universities are also involved. In particular, an analysis of their main ideas and directions of research showed that the topic of sustainability of the northern and Arctic cities is promising. Two international projects of recent years have been dedicated to her. The ARCSUS (Arctic Urban Sustainability) is associated with the activities of the Barents Institute at the University of Tromsø and the involvement of specialists from Russia. The main goal of the study is to assess the climatic and socioeconomic factors affecting the sustainability of urban communities in the Russian Arctic. The Artic PIRE (Partnerships for International Research and Education) project, carried out by specialists from the USA, Russia, Norway, Canada, Finland, and South Korea with the leading role of George Washington University, developed the Arctic Urban Sustainability Index (AUSI). It is shown that stability is largely predetermined by economic relations with a large system of settlements not only in the Arctic but also in the south of the lying territories.

Thus, it is advisable to use in practice the existing scientific backlog when improving the spatial management of the territories of the Russian European North based on the need to change its place in the system of distribution of the country's productive forces; rethinking the place and role of large, medium and small cities, as well as rural areas in these processes. At the same time, the lag of the existing methodological foundations for managing spatial development from the needs of the regions leads to a decrease in the opportunities for the economic growth of territories and an increase in the standard of living of the population.

3. Research methods

As theory and practice testify, the economic space has several properties or the so-called "Generic" signs, the accounting of which allows for a comprehensive assessment. Moreover, the quality of the economic space is usually determined by many characteristics and parameters. To evaluate it, we can distinguish, according to the approach of A. Granberg (2004), the following parameters:

- density (characterized by the economic and general population density of the territory, the density of communication lines: roads, railways, etc.);
- location (determined through indicators of uniformity, differentiation, the concentration of the population, subjects of economic activity and the presence of economically developed and undeveloped territories);
- connectivity (determined by the intensity of economic relations between parts and elements of space, the conditions of the mobility of goods and services, people, the development of transport and communication networks).

To analyze the level of the city network development, we tested the Zipf's Law (1936) for the Russian economy, which made it possible to assess the balance and development prospects of the largest, large, medium and small cities of the country.

The development of the economic space and ensuring its connectivity largely depends on the level of development of transport infrastructure. Currently, Russia ranks only 75th in the ranking of countries in the Logistics Performance Index behind both developed and developing countries (Germany, Sweden, Belgium, Brazil, Kazakhstan, Ecuador, Slovakia, Serbia, etc.).

To assess the level of the transport infrastructure development (railways, roads, waterways) in the regions of the Russian European North we calculated the coefficients of Engel (1), Holtz (2) and Uspensky (3):

$$K_e = \frac{L}{\sqrt{S \times H}}, \quad (1)$$

where *Ke* - Engel's coefficient; L is the total length of transport routes; S - the area of the territory (country, region); H is the population of the territory.

$$K_h = \frac{L}{\sqrt{S \times P}}, \quad (2)$$

where K_h is the Holtz's coefficient; L is the total length of transport routes; S - area of the territory (country, region); P - the number of settlements.

$$K_u = \frac{L}{\sqrt[3]{S \times H \times t}}, \quad (3)$$

where Ku - Uspensky's coefficient; L is the total length of transport routes; S - the area of the territory (country, region); H is the population of the territory; t is the total weight of goods sent to the territory.

The Holtz coefficient allows a more accurate assessment of the provision of the population with transport infrastructure compared to the Engel coefficient since it takes into account not only the population but precisely the settlements that are connected by the transport network. Uspensky's coefficient, in turn, makes it possible to assess the level of transportation in the industrial sphere of the territory.

4. Results

In the post-Soviet period of Russia's development characterized by sharp liberalization and transformation of the entire socio-economic system, these transformations were especially negatively reflected in the northern territories. The transition to the market led to a sharp decrease in the role of the state in managing the development of these territories. The destruction of existing technological ties with other regions of the country and the decrease in the role of many compensatory instruments had ensured a fairly stable and successful development of these territories under the conditions of the planned economy. At the same time, the northern territories have enormous natural resource potential and still play the most important geostrategic role in the development of the country, which requires increasing the efficiency of managing their development.

One of the key trends in the development of the Russian European North in the post-Soviet period is the reduction in the number of the resident population. In particular, the population of the Murmansk region in 1990-2017 decreased by 26.7%, the Komi Republic - by 22.2%. In general, in the European North of Russia in 1990-2017, the population decreased by more than 1.5 million people. The processes of population decline more rapidly took place in rural areas: over the same period, the number of rural residents in the Murmansk region almost halved, and the Arkhangelsk region fell by 38%.

One of the key reasons for these processes is the high rate of both natural and migratory population decline (due to relocation to more centrally located areas of the country). A significant scale of population decline is observed in small cities specializing in logging, with practically depleted resources of mineral deposits, old industrial areas (the so-called industrial periphery), and in the territories of the rural periphery.

In general, over the past half-century both in Russia and on the European North significant transformational changes have been observed in the system of settlement of residents. So, if in 1959, on average, almost 53% of the population lived in cities across the country, in 2018 - already 74%. In the Vologda and Arkhangelsk regions, urbanization processes proceeded even faster: the share of the rural population in the first period decreased by 37.6 percentage points (from 65.2 to 27.6%), the second - by 24.3 percentage points (from 46.3 to 22%, Kozhevnikov (2019)). Currently, more than ¾ of the population already lives in cities in the European North (Table 1).

Table 1. The share of urban and rural population in the total population of Russia and the European North of Russia in 1959-2018, %

Territory	1959		1989		2010		2018		2018 to1959, +/-	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Russian Federation	52.8	47.2	73.6	26,4	73.7	26.3	74,4	25.6	+21.6	-21.6
Russian European North's regions	55.7	44.3	76.5	23.5	77.8	22.2	79.3	20.7	+23.6	-23.6
Murmansk region	93.6	6.4	92.1	7.9	92.8	7.2	92.3	7.7	-1.3	1.3
Republic of Karelia (Karelian Autonomous Soviet Socialist Republic)	63.9	36.1	81.6	18,4	78.0	22.0	80,4	19.6	+16.5	-16.5
Komi Republic (Komi Autonomous Soviet Socialist Republic)	59.3	40.7	75,5	24.5	76.9	23.1	78.1	21.9	+18.8	-18.8
Arkhangelsk region	53.7	46.3	73,4	26.6	75.7	24.3	78.0	22.0	+24.3	-24.3
Vologda Region	34.8	65,2	65.0	35.0	70.7	29.3	72,4	27.6	+37.6	-37.6

Source: compiled according to the Federal State Statistics Service.

And if the increase in the share of the urban population of the regions of the European North of Russia during the Soviet period was primarily due to the large-scale pace of industrialization of the country, the emergence of new cities, then at present it was due to the migration of the population to large cities from rural areas due to their higher standard of living and quality of life. This conclusion is confirmed by the figures characterizing the population of small and medium-sized cities, for the majority of the functions performed in resettlement, which are intermediate links between a large city and a village.

There are currently 59 small and medium-sized cities in the European North of Russia. Moreover, in all of them (except Naryan-Mar) there is a population decline due to natural and migration reasons in the post-Soviet period. In particular, in 1989-2018 years the population of small towns of the Komi Republic and the Murmansk region decreased by almost 2 times. While in 1989 almost 205 thousand people lived in small and medium-sized cities of the Vologda Oblast, then over the next 30 years, this figure dropped to 167.2 thousand people.

Many of these municipalities are single-industry towns in a state of prolonged depression, and the existing socio-economic problems of the development of these territories are systemic and have been reproducing for several decades (Table 2).

Table 2. Problems of socio-economic development of small and medium-sized cities on the Russian European North

Problem	Content
1. Depopulation due to natural and migration reasons	In all small and medium-sized cities of the ENR in 1989-2018 years (except Naryan-Mar, which is the regional center of the Nenets Autonomous District), the population decreased from 3.5% in the city of Kostomuksha (Republic of Karelia) to 57.7 percentage points. - in the city of Inta (Komi Republic). The most severe processes of population outflow were manifested in the Murmansk region and the Komi Republic.
2. The unstable state of the budget system	In 2018, only 24 city districts and settlements out of 51 of more than half of the budget revenues accounted for their tax and non-tax revenues (from 50.6% in the city of Kirillov to 93.7% in Pechora). The negative point is the fact that more than half (27 of 51) of the budgets of municipalities in 2018 were scarce.
3. The crisis state of enterprises of the leading sectors of the city's economy	Many of these municipalities are single-industry towns in a state of prolonged depression. A high degree of depreciation of fixed assets of enterprises and organizations; low

	investment activity in the development of industrial and agricultural production.
4. The low level of provision of social infrastructure in the field of health, education, culture, and sports	So, in all small and medium-sized cities of the regions of the ENR, there are 32 doctors per 10 thousand inhabitants (the average figure for large cities is 63 doctors). In 2006-2017, in the majority of small and medium-sized cities in the regions of the ENR there was a decrease in the number of general educational organizations. Particularly significant changes in the field of preschool education occurred in Vorkuta, Inta (Komi Republic), Apatity, Kirovsk (Murmansk region) - the number of kindergartens decreased by more than 40%. There was a significant reduction in the number of cultural and leisure organizations.
5. Weak consumer market development	There is a large gap between large and small cities in terms of retail trade and catering per capita. So, on average, in small and medium-sized cities of the ENR, retail trade turnover is 71 thousand rubles / person, and in large cities - 121 thousand rubles / person.

Source: compiled by the author.

In such a situation, it seems important to attract small and medium-sized cities as key participants in cluster projects initiated in large regional and territorial centers and agglomerations. This will make it possible to turn these territories into centers of economic development on a regional scale based on the most efficient use of their competitive positions.

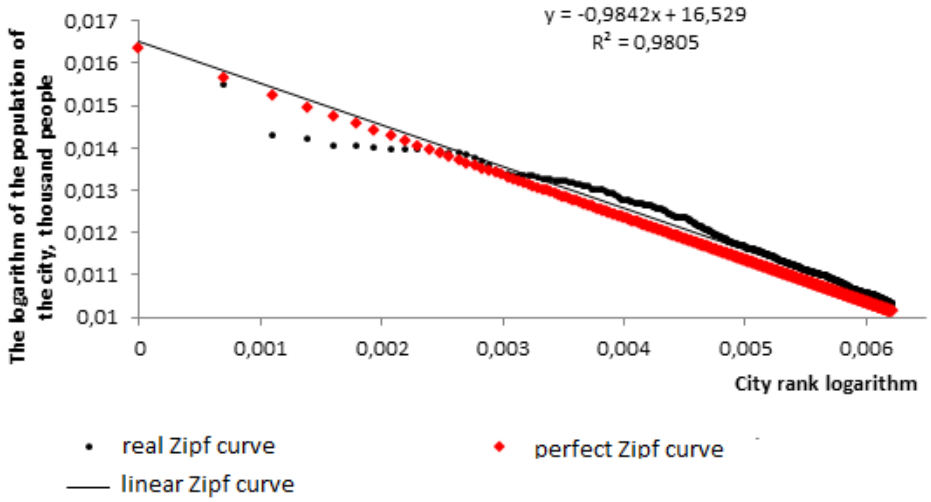
Given the ongoing demographic processes in the northern territories, one of the indicators characterizing the quality of the economic space is the population density of the territory. So, in most of the studied subjects (except the Vologda Oblast), the population density is 2-5 people / sq. км, which is significantly lower than the average Russian level (8.6 people / sq. км). These figures indicate an extremely low concentration of human and labor resources in the northern territories, the presence of a focal nature of settlement in large nodes, which are primarily large cities and centers of concentration of industrial production. All this limits the possibilities of ensuring a balanced development of the space of the European North of Russia.

To predict the vector of further urbanization processes in the country and the region, we use the Zipf's law to analyze the urban settlement system in the country, which indicates that there is an inversely proportional pattern between the population of the city and its place in the overall ranking of cities in the territory (relationship “rank”-"size"). The literature on the study of urban development processes in various countries is very extensive: the authors study the development of urban systems in the USA (for example, Black, D. and Henderson, V. 2003), China (Anderson, G. and Ge, Y. 2005), India and Brazil (Soo, KT 2014), Spain and Italy (Gayán-Navarro C., Puente-Ajovin M., Sanz-Gracia F. 2019) and others.

Based on the existing methodological tools, we built the Zipf curve for cities of the Russian Federation with a population of at least 30 thousand as of 2018. In determining these boundaries, we proceeded from the premises traditional for domestic economic geography: cities are the nodal form of space organization, while the smallest nodes (class IV) should have a population of at least 10-15 thousand economically active people, that is, their total number According to our estimates, the population should be at least 30 thousand people (Lazhentsev V.N., 2015: scientists distinguish 4-class economic nodes in space in accordance with the number of economically active population in them: I class - more than 100 thousand people, II class - 60-99 thousand people, III class - 30-59 thousand people the fourth - 10-29 thousand people. At the same time, the rest of the economy has a nodal layout. In addition, in classical Soviet economic geography, a city was considered a city with a population of at least 12 thousand people). Many cities in modern Russia have a population of less than this level since the status of the city was often assigned historically, or this decision was political in nature, not always based on objective laws of economic geography.

The calculations allow us to draw the following conclusions. The obtained values of the coefficient K of the regression equation are less than 1 (0.98), which indicates the concentration of the Russian population in large and largest cities (Figure 2). Similar results were obtained in the study (R. Fattakhov, M. Nizamutdinov, V. Oreshnikov, 2019); the authors showed that since 1959 the number of free members of the presented regression has been constantly increasing, which indicates an increase in the population of the largest cities of the country.

Figure 2: Distribution of Russian cities with a population of more than 30 thousand people (2018, 502 cities; given values)



Source: calculated on the basis of data of Federal State Statistics.

As follows from the schedule, a number of the largest cities in Russia (Novosibirsk, Yekaterinburg, Nizhny Novgorod, Kazan, Chelyabinsk, Omsk, Samara, Rostov-on-Don, Ufa) is below the ideal Zipf's curve, which indicates the presence of a certain potential for further growth in their numbers, including due to the active attraction of human resources of large, medium and small cities, as well as rural areas. The same conclusion is confirmed by existing migration flows from medium and small cities, as well as the fact that a significant part of these municipalities is above the ideal Zipf's curve, which indicates a decrease in the population of these territories in the future. In the European North of Russia, Arkhangelsk and Cherepovets have prospects for population growth.

Thus, we can conclude that the urban settlement system in modern Russia is at the stage of a certain transformation, due, among other things, to the transition to a market economy in the early 1990s. At the same time, the existing system of urban settlement of Russia by its characteristics is currently closer to countries with developing economies, when the first several largest cities by population are significantly displaced by the population from the rest of the mass, and other large cities are below the ideal Zipf's straight line (for example, Uzbekistan, Thailand, etc.)

At the same time, it should be noted that the conclusions of this law should be taken with a certain degree of conditionality, since the presented pattern applies more to countries where the city network is quite well developed, their active economic interaction with each other within the network structures is observed; the largest city in the country does not play the role of a kind of metropolis (for example, Moscow) or the world financial center (for example, London), which can lead to certain distortions of the results.

Besides, as practice and research shows the deviation in the distribution of cities from Zipf's law, cannot be considered as unconditional evidence for making practical decisions while concerning the management of the development of the country's urban system since the findings strongly depend on the size of the sample (the analysis of all cities or only cities with a population of more than 30, 100 thousand people and the study should be carried out only for cities within their administrative borders or as part of an urban agglomeration, etc).

Speaking about the economy of the Russian European North it should be noted that in the structure of gross regional product (GRP) of its subjects, a significant share is occupied by the types of economic activities associated with mining (in 2017 in the Nenets Autonomous

Okrug - 76.2% of its total Komi Republic - 37.2%, Arkhangelsk region - 30.9%). At the same time, manufacturing activities were more developed in the Vologda (38.1%) and Arkhangelsk regions (26.9%). The leading areas of specialization of the ENR are timber industry, ferrous and non-ferrous metallurgy, the chemical industry, and the fuel and energy sector, based on the region's mineral resources base; In the Vologda Oblast, livestock breeding and mixed farming have a rather high level of development. This, in particular, is indicated by the localization coefficients calculated by us for the main types of economic activity of the regions of the Russian European North (Kozhevnikov, 2019)

Therefore, the obtained results also indicate a key feature of the Russian European North's spatial development in the post-Soviet period which is the concentration of the population and economic activity at the "nodal" points and the increase in the area of the economic periphery. So, in the Komi Republic, which is one of the key subjects of the ENR, there is a tendency to concentrate the population near Syktyvkar, the administrative center of the Republic (its share in the total population of the subject increased from 19.8 to 30.6%; similar trends are observed in Syktyvdinsky area); the share of Ukhta increased from 11.3 to 14%, Sosnogorsk - from 5 to 5.2%. At the same time, there is a significant outflow of the population from the territories of the industrial periphery, municipalities of the northeast "corner", Table 3).

Table 3. The municipalities share Dynamics of the Komi Republic in the total population and industrial production,% (pp)

Population				Industrial output			
Municipality	Share%		2017 to 1990, p.p.	Municipality	Share%		2017 to 1990,p.p.
	1990	2017			1997	2017	
Syktyvkar	19.8	30.6	+10.8	Usinsk	12.7	37.0	+24.4
Ukhta	11.3	14.0	+2.7	Princely Pogost	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	Trinity-Pechora	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
Udora	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
Trinity-Pechora	2.0	1.4	-0.6	Ust-Kulomsky	0.6	0,0	-0.6
Princely Pogost	3.0	2,3	-0.7	Ukhta	17.6	16.8	-0.7
Vuktyl	2.1	1.4	-0.7	Udora	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: calculated on the basis of data of Federal State Statistics

The leading centers of industrial production in Komi are Usinsk, Syktyvkar, Ukhta, Pechora. Moreover, the role of Usinsk in the last twenty years has increased significantly (its share in the total industrial production of the Republic of Kazakhstan has increased from 12 to 37 percentage points). At the same time, a number of single-industry towns of the republic significantly lost their positions due to the damping of economic activity (Vorkuta, Inta and some other cities of the industrial periphery).

Similar processes are characteristic of the southernmost subject - the Vologda Oblast. Two major cities - the administrative (Vologda) and industrial centers (Cherepovets), as well as the municipal areas bordering them, became its main supporting centers, nodes of the "first-class". So, in these municipalities about 73% of the population of the region live, 93% of industrial and 65% of agricultural products are produced; the same municipalities accounted for 68% of fixed capital investment and 79% of retail sales.

Moreover, in 1990-2017, the share of Cherepovets in the total industrial production of the Vologda Oblast increased from 60.1 to 71.4%; at the same time, there is a decrease in the weight of other municipalities, and at present, the share of most regions in the industrial production of the subject of the Russian Federation does not exceed 1%. In general, the industry is concentrated mainly around large cities (for example, Vologda accounted for 14.2% of the total industrial production of the region, Gryazovetsky district - 1.8%, Sokolsky - 1.7%, Kaduysky district - 1.4%, etc.).

In general, in the economic nodes of the European North of Russia, according to estimates by V. Lazhentsev (2015), 70% of industrial production, a significant part of the available resources, is concentrated.

At the same time, these processes of population concentration and urban space densification are rather negatively reflected in rural areas, while maintaining the manageability and connectedness of Russia's space as the largest country in the world. The fact is that the countryside as a whole, as well as large rural settlements creates a specific support framework for settlement at the local and regional level, connecting remote villages and villages, poorly settled territories with both small and medium-sized cities, and large agglomerations into a single network.

According to the concept of "center-periphery", a significant part of the rural territories of the European North, according to our estimates, belongs to the near periphery of the 3rd order (that is, territories whose center is a small or medium city, 32% of their total number) and distant (rural areas remote from the cities of the region, 37%). Taking into account this specificity, as well as the vector of processes taking place on them, is the basis for developing the priorities of state policy for the development of rural territories.

In this situation, the degradation of the settlement network observed in the post-Soviet period, the polarization of rural settlements, in which due to a fairly large category of medium (from 500 people to 7 thousand people) settlements, the number of small and large (increases up to 500 people and more than 7 thousand people), "pulling" the population into urban areas are factors in reducing Russia's national security.

In particular, the decline in the rural population due to intraregional migration in the Vologda Oblast in 2018 amounted to 1024 people, and interregional - 923 people. As a result, the number of rural settlements decreased by 35 units during the census period, while the sparsely populated ones increased by 506 units. (31.1%, Table 4). According to preliminary data, the number of settlements in the Vologda Oblast in 2018 was already just over 6 thousand.

Table 4. The number of settlements, units

Territory	2002			2010			2010 to 2002,%		
	Urban	Rural	without population	Urban	Rural	without population	Rural	without population	without population
Russia	2940	155289	13086	1386	153124	19416	47.14	98.61	148.37
Vologda Region	27	8041	1625	24	8006	2131	88.89	99.56	131.14

Source: compiled from Results of the All-Russian Population Census 2002, 2010.

Along with the restructuring of the settlement network, there is an increase in the processes of degradation of production and infrastructure potential in small and medium-sized settlements and aggravation of other socio-economic problems. So, according to a survey of residents of rural territories of the Northwestern Federal District (the district completely includes the territories of the European North of Russia) conducted by the VolRC RAS , the key problems of their village are lack of work - 69.7% of respondents; low living conditions - 49.2%; state support of citizens - 47.1%; low quality of social services - 35.7% (Table 5). Their presence limits the attractiveness of these territories for living and causes an increase in the outflow of the population from the village.

Table 5. The main problems of the municipality, % of the number of respondents

Problem	The frequency of choice in response, %
Lack of job opportunities	67,9
Low level of state support for citizens and municipality	50,1
Low standards of living	48,8
Low quality of public services (hospitals, schools, kindergartens, etc.)	38,6
Lack of kindergarten places	26,4
Lack of hospital, first-aid post	25,1
Lack of schools	21,4
Closing of educational institutions	13,8
Other	12,6
Difficult to answer	7,7

Note: the amount in the column exceeds 100% since it was possible to select all the suitable answer options. The sample is representative by gender and age; its total volume was 238 respondents. As part of the study, villagers living in 17 large villages, 12 in medium-size villages, 12 in small villages were surveyed. Among respondents, 42% live in large villages, 34% - in medium-size villages, 24% -small villages, remoteness from the district center - 13% - residents of district centers, 57% - people living in a radius of up to 20 km, 20% - in 21- 50 km, 10% - further 50 km.

It should be noted that the development of transport is one of the conditions for ensuring the internal connectivity of the country's territories. To assess the level of security of the European North of Russia with transport infrastructure using the methodological tools presented above, the coefficients of Engel (Кэ), Holtz (Кг), and Uspensky (Ку) were calculated. There are no established normative or threshold values of these coefficients in science and practice, but it should be noted that the greater their value, the higher the level of regional provision of transport infrastructure.

The calculated Engel coefficient for roads on average in Russia was 0.029 (in the Vologda Oblast - 0.069, the Republic of Karelia - 0.033, the Arkhangelsk Oblast - 0.024, the Komi Republic - 0.013, the Murmansk Oblast - 0.011, Table 6), while in Canada, it is comparable in area with Russia and also the northern country, it is 0.056 (P. Shvalov, 2019). From the data obtained it follows that the highest level of development of the transport system among the regions is characteristic of the Republic of Karelia and the Vologda Oblast.

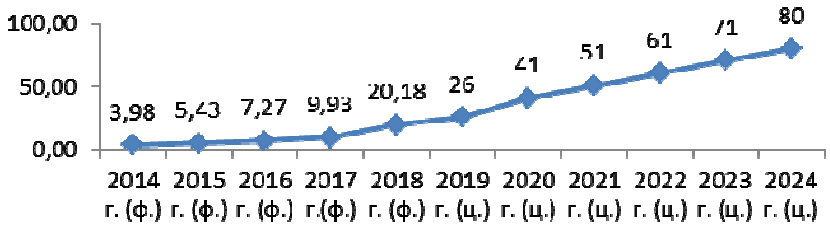
Table 6. Assessment of the level of security of the regions of the European North of Russia with transport infrastructure as of 2018

The subject of the Russian Federation	Total length of transport ways (automobile, railway, internal water, L), *thousand km* (RF - million km)	Area (S), *thousand square meters km (RF - million sq. km)*	Population (H), *thousand people (RF - million people)*	Number of populated points (with residents, P), *units*	Total weight of goods sent to the territory (t), *million tons*	Coefficient		
						Engel (K_e)	Holtz (K_h)	Uspensky (K_u)
RF	1.7	17.1	146.8	136094	6788.2	0,034	0,035	0.007
Vologda Region	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 region	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 region	4.4	144.9	748	126	32.6	0.013	1,030	0,029

Source: calculated on the basis of data of Federal State Statistics

A key trend in the functioning of the transport system of the European North in the post-Soviet period is a decrease in the volume of cargo turnover of the main types of transport (rail, road), despite the fact that in 2000-2018 this indicator increased. The only transport artery, the volume of traffic on which is increasing, is the Northern Sea Route (in 2014-2018 this indicator increased from 3.98 to 20.18 million tons per year), which, in fact, indicates the dominance of the foreign market over domestic in the economy of modern Russia (Figure 3).

Figure 3: Volume of cargo transportation in the waters of the Northern Sea Route (NSR), million tons



Note: ф - actual values; ц - target values according to the Comprehensive Plan for the modernization and expansion of the main infrastructure for the period until 2024.

Source: Data of Federal State Statistics

These circumstances actualize the problem of ensuring internal transport connectivity of the space and the development of logistics in the territory of the regions of the REN.

In this regard, in our opinion, the Vologda Oblast should play an important role in the quality of the outpost of the development of the North and the Arctic. One of the priority areas is the transformation of the city of Vologda into a developed transport and logistics center. This is facilitated by the fact that the following major railway transport corridors pass through the region: “Transsib” (Vladivostok – Chelyabinsk – Bui – Vologda – Cherepovets – Babaevo – Saint Petersburg); “North-South” (Moscow – Danilov – Vologda – Vozhega – Arkhangelsk with a branch to Vorkuta and Murmansk). In addition, there is a Volga-Baltic waterway, two airports (Vologda, Cherepovets).

5. Conclusion

Destructive processes in the post-Soviet period associated with the polarization and compression of the previously developed space of the European North of Russia, the violation of its internal connectivity actualize the tasks of improving the management of the spatial development of these territories. In this situation, in our opinion, it is necessary to create conditions for the development of not only urbanized territories but also the territories of industrial and rural periphery through their inclusion in unified internal production chains.

In other words, in such a situation there is an urgent need for the implementation of regional policies aimed at overcoming destructive trends in the studied territories based on the effective use of their potential and the establishment of inter-municipal cooperation. At the same time, it is necessary to form and develop several reference points in the regions of the European North of Russia, which, in our opinion, should become a kind of "counterweights" to the large and largest cities of central Russia and will allow to overcome the negative trends in the activation of centripetal processes, to preserve the existing supporting spatial framework of the region.

Currently, a whole series of large nodal forms of settlement has been formed in the European North of Russia, the core of which is large and medium-sized cities, which also become centers of attraction for neighboring municipalities (Table 7).

Table 7. Cities of the European North of Russia, which can serve as the basis for a nodal polycentric model of the spatial organization

City	The list of municipalities included in the spatial gravity zone of the city	The population of the city and these municipalities, thousand people
1. Arkhangelsk	City district "Novodvinsk", City district "Severodvinsk", Primorsky municipal district	608.0
2. Vologda	Vologda, Gryazovetsky, Sokolsky municipal areas	455.0
3. Murmansk	City District Aleksandrovsk, City District v. Vidyaevo, City District Severomorsk, Kola Municipal District	450.7
4. Cherepovets	Kaduysky, Cherepovets, Sheksninsky municipal districts	408.4
5. Petrozavods	Kondopoga, Prionezhsky, Pryazhinsky municipal areas	352.3
6. Syktyvkar	Kortekros, Syktyvdinsky, Sysolsky municipal areas	316.2
7. Apatite	City District Kirovsk, City District Monchegorsk, City District Olenegorsk, City District Polyarnye Zori	178.0
8. Uhta	Municipal District Sosnogorsk	163.0
9. Kotlas	Koryazhma City District, Kotlas Municipal District	131.2
10. Vorkuta	Vorkuta City District	80.1

Source: calculated on the basis of data of Federal State Statistics

A previous analysis showed that these nodes of the first and second classes play an important role in the economy of their subjects due to the high density of economic activity and have the potential for further development based on the formation and effective use of agglomeration effects.

Ensuring balanced spatial development, overcoming destructive processes and maintaining the developed space of the northern territories requires the formation of reference points at the intra-regional level. Such a “counterbalance”, for example, the city of Vologda and the city of Cherepovets and the center of gravity in the east of the Vologda region is currently the city of Veliky Ustyug. It has turned not only into an economic hub, but also a kind of center for social services of the neighboring areas.

At the same time, the management of the formation and development of such reference points should be carried out taking into account objective factors that influence the development of the city system. It is worth mentioning the study (Manaeva, Kanishteva 2017), where the authors experimentally, based on the available empirical data, proved that the volume of investments in the city budget and the level of development of transport infrastructure have a significant impact on socio-economic inequality in the development of Russian cities territory.

Thus, the formation of such nodal forms of space organization will allow maintaining the optimal supporting framework in the northern territories, and such group settlement systems themselves can serve as the basis for the formation and development of a polycentric model of spatial organization in the European North of Russia, focused on the revival and development of sustainable socio-economic ties along the line "large city-small city-village".

An important place in these processes, in our opinion, should be played by small and medium-sized cities. At the same time, the strategically important task of their development is, on the one hand, establishing close cooperation with large cities and regional centers, and on the other hand, ensuring the development of the functions of organizational, economic, industrial, and cultural and educational centers of rural areas.

Given the identified characteristics and prospects of socio-economic development, including in the framework of the Spatial Development Strategy of the Russian Federation until 2025, it is advisable to place enterprises and organizations of industries both in the traditional (based on the processing of mineral resources of the territories) and the "new" economy (post-industrial production, including for the needs of the Arctic: biotechnology, electronic industry, and another precision engineering, etc.), which will ensure the revival of

many small and medium-sized cities s (primarily single-industry towns) that are now in a systemic crisis (Table 8.).

Table 8. Priority areas for the economic development of small and medium-sized cities in the European North of Russia within the framework of a nodal polycentric model of spatial organizational

"Traditional" economy	"New" Economy
Enterprises and organizations of traditional industries: - producing homogeneous products in activities that are not subject to economies of scale (textile industry, machining of metal, wood, plastics, some chemical industries); - using small reserves of local raw materials for their production needs (enterprises producing construction materials, furniture, peat enterprises, etc.); - on the processing of non-transportable or perishable agricultural products produced in rural areas; - to fulfill the functions of organizing, industrial, economic and service centers of rural areas, gravitating to a small city (repair of agricultural machinery, roads and vehicles, etc.); - to ensure transit transport links between large territorial-economic complexes or elements of one complex; - handicrafts, developing mainly on the basis of the use of skills of the local population.	Post-industrial production, including for the needs of the Arctic: Biotechnology, electronic industry, knowledge-based business services, etc., oriented in its deployment to new factors: knowledge, innovation, entrepreneurial energy, venture capital, staff qualifications, etc.

Source: compiled by the author

This will give a new impetus to the development of small and medium-sized cities, as well as non-urbanized territories, but at the same time, it will require a qualitatively new level of infrastructure development and radical investment decisions on the part of the state. At the same time, technological chains formed within the framework of this model that goes beyond the European North and its Arctic zone, in our opinion, should be focused not on integration into international chains as products of the first redistribution, but on strengthening economic integration with other Russian regions through "North-South". This implies the need for the formation of new forms of territorial organization of the economy in the North, the scientific substantiation of recommendations for reducing territorial imbalances between the allocation of "Arctic" and "Northern" resources and their processing and consumption centers.

Under such conditions, rural territories and rural economies will receive a new impetus for development, suggesting the emergence of new opportunities to increase efficiency and radically change agricultural production technologies, bring agricultural products closer to production, etc. At the same time, the transformation of the existing spatial structure of the economy and the settlement of the European North requires a qualitative review of the principles of federal and regional policy.

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