Региональная экономика
Regional economy

Оценка пространственного развития Волжских регионов

Леонтьева Лидия Сергеевна
Доктор экономических наук, профессор, МГУ имени М.В. Ломоносова, Москва, Российская Федерация.
E-mail: lldom@mail.ru
SPIN- код РИНЦ: 6508-6503
ORCID ID: 0000-0001-8504-0148

Проскурнова Ксения Юрьевна
Кандидат экономических наук, доцент, Ярославский филиал Финансового университета при Правительстве Российской Федерации, Ярославль; докторант, факультет государственного управления, МГУ имени М.В. Ломоносова, Москва, Российская Федерация.
E-mail: proskurnova@hotmail.com
SPIN-код РИНЦ: 2742-9482
ORCID ID: 0000-0002-4168-1282

Аннотация
Наиболее распространенные подходы к оценке развития регионов включают социально-экономический, инвестиционный и ресурсный анализ. При этом меньше внимания уделяется оценке пространственной структуры и организации территорий. Исследование существующих подходов к анализу пространственного развития регионов показало, что в них делается акцент на определении уровня развития пространственной структуры (организации), а не выявлении факторов, влияющих на развитие пространства региона. Данный факт определил необходимость разработки подхода оценки пространственного развития как процесса, а не как состояния. В данной статье представлена методика оценки пространственного развития Волжских регионов в средне- и долгосрочной ретроспективе с выявлением неблагоприятных факторов. Проведенное исследование базировалось на контент-анализе научной литературы, сравнительном анализе различных подходов, посвященных пространственному развитию территорий, анализе совокупности статистических показателей группы российских регионов, характеризующих их состояние. Результатом проведенного анализа является предложенный подход к оценке пространственного развития региона как процесса, оценка пространственного развития тринадцати Волжских регионов и определение факторов, негативно отразившихся на пространственном развитии выбранных субъектов РФ.

Ключевые слова
Пространство региона, развитие, территория, Волга, динамика пространственного развития.

Assessment of Spatial Development of the Volga Regions

Lidia S. Leontieva
DSc (Economics), Professor, Lomonosov Moscow State University, Moscow, Russian Federation.
E-mail: lldom@mail.ru
ORCID ID: 0000-0001-8504-0148

Ksenia Yu. Proskurnova
PhD, Associated Professor, Yaroslavl branch of Financial University under the Government of the Russian Federation, Yaroslavl; DSc applicant, School of Public Administration, Lomonosov Moscow State University, Moscow, Russian Federation.
E-mail: proskurnova@hotmail.com
ORCID ID: 0000-0002-4168-1282

Abstract
The most common approaches to assessing the development of regions include socio-economic, investment and resource analysis. Less attention is paid to assessing the spatial structure and spatial organization of territories. The study of existing approaches to the analysis of the regions' spatial development has shown that they focus on determining the level of the spatial structure (organization) development, rather than identifying the factors influencing the development of the region's space. This fact determined the goal to develop an approach for assessing spatial development as a process, and not as a state. This paper presents a methodology for assessing the spatial development of the Volga regions in the medium and long term with the identification of adverse factors. The study was based on a content analysis of scientific literature, a comparative analysis of various approaches devoted to the spatial development of territories, an analysis of a set of statistical indicators of Russian regions that characterize their state. The result of the analysis is the proposed approach to assessing the spatial development of the region as a process, assessing the spatial development of thirteen Volga regions and identifying the factors that negatively affected the spatial development of the selected subjects of the Russian Federation.

Keywords
Region space, development, territory, Volga, dynamics of spatial development.

Introduction

Traditionally, socio-economic analysis of territories of various levels (municipal, regional, national) uses an assessment of trends in changes of various indicators characterizing social and economic processes in a society. The results of such an analysis form the basis for the development strategies of these territories. The analysis conclusions are reflected in regional policy documents, often without taking into account indicators characterizing related areas of activity.

Despite the fact that such scientific areas as regional economics and management, spatial economics have been developing for more than half a century, spatial economics instruments of analysis have not yet been either formed or finally formulated. An analysis of Russian and foreign researchers' papers allows us to conclude that at present there is no methodology for assessing a region (territory) spatial development as a process, not as a result.

Russian scientist A.G. Granberg formulated three groups of parameters for assessing the quality of the regional economic space: density, location, connectivity [Гранберг 2006]. These parameters formed the basis of many approaches to the analysis of the region's economic space, of the spatial structure assessment, spatial organization or spatial development. The researchers in their own way fill each Granberg's group of parameters with indicators and coefficients for a comparative analysis of regions (territories).

A.A. Mirokhina proposed indicators of spatial development to assess the economic space of the region: centralization, narrowing, discontinuity (fragmentation) and openness (contact) [Мирохина 2018]. There are indicators of infrastructure, results of business entities activities, sold goods and services results, settlements' population, etc. At the same time, the researcher assesses and classifies regions based on their spatial organization (maximally spatially organized, highly spatially organized, spatially stable, spatially unstable, spatially unorganized). The characteristics of typological groups are based on the profitability of production, the remoteness of sales markets from production, the development of transport infrastructure and the level of socio-economic development. In our opinion, such an approach is not related to the assessment of spatial development, but allows analyzing the level of spatial organization of the territory at a specific time, while the dynamics of changes is not reflected — for example, it is impossible to determine if a region of the type "spatially stable" has moved from the category "spatially unstable" (positive dynamics) or from "highly spatially organized" (negative dynamics).

A.V. Suvorova analyzes the spatial development of the territory (region, municipality) based on an assessment of indicators characterizing the object placement in the economic space of the territory [Суворова 2020]. There are four groups: saturation of space (population density, volume of output per unit area, etc.), the degree of uniformity of object distribution in space (the Gini coefficient for determining the degree of differentiation in the development of spatial elements), the polarization of space (the coefficient and index of agglomeration, the coefficient of development of the agglomeration population, the rate of the agglomeration development) and the connectivity of spatial components of space (spatial autocorrelation coefficients — how similar the values of the considered indicator located objects are). It is worth noting, like A.A. Mirokhina, Suvorova's approach allows analyzing the spatial organization (spatial structure) of the territory, not a spatial development. The selected indicators do not show what trends take place in the space of the region (municipal unit, country).

The researchers A.G. Shelomentsev, A.V. Ukhanova, E.V. Smirennikova and L.V. Voronina formed an approach to the spatial development analysis of regions using mainly indicators of socio-economic development, adding three groups: economic development (GRP per 1 km^2 of territory), transport development (density of public railways, density of public roads with hard surface) and population of the territory (population density) [Шеломенцев и др. 2018]. The socio-economic development of

the territory involves an assessment within the framework of the sustainable development concept and includes indicators of social, economic and environmental development. But, as with previous approaches, the researchers assess the spatial development of the region at a specific time, without taking into account the state of the territory's space in the previous period and the territory's changes.

Yu. Danilov's approach is proposed not for assessing the spatial development of a territory (region, state) but for forecasting and planning spatial development[1]. At the proposed five blocks of indicators, four blocks belong to the category of socio-economic development, and only one contains a spatial component, based on a comparative analysis of territories — indicators of territorial differentiation (labor productivity, poverty level, income level, cultural components, etc.), indices of regional depression, the share of prosperous ("advanced") regions.

Some Russian and foreign researchers propose to assess the spatial development of particular type regions, or certain characteristics of both spatial development and the territories. N.T. Avramchikova and M.N. Chuvashova suggest to assess the quality of the economic space of a resource-oriented region [Аврамчикова, Чувашова 2015]. Their method includes 3 groups of indicators: agglomeration and distribution density of resources (indicators of natural resource potential, urbanization and economic density of the population, economic density of enterprises, density of communication routes, density of GRP, budget potential), backbone, connectivity and location (indicators of the development of transport and information infrastructure, the uniformity of the population distribution (variation) in the region, the uniformity of enterprises and industries distribution (variation) in the region) and the technological state of the economic sectors (indicators of the presence of industries of high technological modes, the transformation of the technological state of the economy, scientific and innovative and investment potential, indicators of innovation transfer and dissemination of innovations, indicators of strategic and legislative initiatives) [Аврамчикова 2012; Аврамчикова и др. 2020]. In our opinion, these indicators are applicable to assessing the space of not only resource-oriented regions, but also of any territories due to the lack of a narrow linkage of indicators and economic space to natural resources (their presence or absence) and taking into account the presence of various types of resources in the region.

M.M. Chernyshov's approach assesses the investment component of the spatial development effectiveness [Чернышов 2021]. The author singled out 4 spatial levels and grouped investments in various objects (indicators) depending on the type of space: geographical, economic, social, information, innovation and technological. In our opinion, the integral assessment of the territory development reflects the contribution of investments to socio-economic development, but does not allow analyzing the spatial development of the regions.

Foreign researchers assess not the spatial development of territories, but the influence of various factors on spatial planning or spatial structure. Moreover, the papers are mainly aimed at studying the spatial system of metropolises (agglomerations) or rural areas, but not regions or states as a whole. H. Dadashpoor and N. Malekzadeh analyze the driving factors that shape the spatial structure of metropolises: inner core growth constraints, disadvantages, cultural evolution and development, land use, local and regional planning system, affordable housing policy, planners and decision makers, administrative fragmentation and integration, government regulation, pressure from interest groups, proximity to natural resources, savings and de-savings on agglomeration, proximity to transport facilities and to the main city (capital), administrative restructuring [Dadashpoor, Malekzadeh 2020]. Their paper only gives the dependence

---

degree of the spatial structure on the actions of one or another factor, but does not assess changes in the spatial structure (positive or negative) under the influence of driving factors, both in aggregate and separately.

S. Tasnim, F. Mahbub, G. Biswas and D.M. Enamul Haque analyze changes in the environment of urban areas based on the use of several spatial indices: ISA (share of the impervious area within an urban area), VF (the percentage or fraction of vegetation or green coverage within an area), BAR (biotope area ratio — the amount of ecologically effective surface area compared to the total area) and NAUCI (normalized urban area composite index — the presence of vegetation, water bodies, and the built environment) [Tasnim et al. 2022]. The methodology makes it possible to assess only a part of the spatial characteristics of a certain territory (four large cities of Bangladesh were analyzed in this study) and trace their change over time, but does not give a complete description of the changes that have occurred in space and does not allow making a conclusion about spatial development or spatial degradation.

An analysis of the foreign researchers' papers shows the absence of the spatial development assessment of territories (rural or urban territories, regions, states), but only the use of spatial characteristics, elements or data for analysis in other areas, including within the framework of the concept of sustainable development.

In previous papers the authors researched individual characteristics (components) of the region (territory) space, or the spatial structure at a specific time. The presented approaches to assessment allow taking into account changes in the state of space or spatial structure in the past, but do not reflect the trends that occur in space (spatial structure) — development, stagnation or degradation. We suggest to use indicators in their dynamics for assessing the spatial development of a territory. The indicators we suggest partially coincide with the indicators presented above in the Russian researchers' methods.

Some researchers conduct a comparative analysis of the spatial development of regions, which, in our opinion, does not allow assessing the processes of spatial development, but only conditionally analyze the degree of development of the region's space. Such convention arises as a result of different natural and climatic conditions, the presence and diversity of the resource base, the development of territories, etc., therefore it is more expedient to assess the processes of changing the regional space and conduct a comparative analysis of exactly how the space is changing (both economic and geographical).

Spatial changes' factors of Volga regions

An analysis of the approaches to assessing the territory space (spatial structure, spatial organization, spatial development, etc.) showed that researchers apply the system suggested by A.G. Granberg to grouping the indicators — density, placement, and connectivity. We will also use such an approach to grouping indicators, but we will single out two groups — intensity and connectivity. The groups include different indicators and are presented in the Table 1.

Table 1. Groups of indicators for assessing the spatial development of the territory[2]

Space intensity indicators	Connectedness of space elements' indicators
population density	population
proportion of the urban population	area of region (territory)
railroad density	number of employees
paved road density	length of inland waterways
	index of physical volume of investments in fixed assets
	investment in fixed assets per capita

---

[2] Compiled by the authors.

	average growth rate of the GRP physical volume index (interval — 5 years)
	average growth rate of the GRP physical volume index per capita (interval — 5 years)
	transportation of goods by road transport organizations of all types of activities
	dispatch of goods by public rail transport

The Russian Federation subjects located on the Volga River — Tver, Yaroslavl, Kostroma, Ivanovo, Nizhny Novgorod, Ulyanovsk, Samara, Saratov, Volgograd, Astrakhan Regions and the Republics of Mari El, Tatarstan, Chuvash were chosen as objects of spatial development study. The Moscow Region as well as the Republic of Kalmykia through which the Volga River flows are not presented because of a small section of the river flowing through these regions. It makes possible not to attribute the Volga as an important element of the spatial structure that has a significant impact on the development of these two subjects' territory. Location of 13 selected regions on the Volga River characterizes the presence of the main water transport artery (including the navigable part), which was historically used not only for trade and agricultural activities, but also in the 20th century became an important resource for providing electricity to both business entities and households in the European part of the country (implementation of GOELRO plan), and later as a tourist and recreational facility. The Volga River is an important component of spatial development and a connecting element of the selected regions.

Since this study analyzes the spatial development of regions (cities, municipalities, macro-regions, countries, etc.) as a process, the selected indicators are considered in their dynamic change. The study of spatial development is based on an analysis of the growth rates of these indicators in a long-term retrospective (15 and 30 years).

To exclude inflationary processes from the assessment of spatial development, the change in the gross regional product (GRP), which reflects the economic processes in the territory, the values of the growth rates of the index of physical volume both in general and per capita were used. There is no similar indicator for investment in fixed capital in the Russian statistical database, so the calculations will be made in two versions — with these indicators (investment in fixed capital and investment in fixed capital per capita) and without them. In the case of indicators related to the transportation of goods, only two indicators are used because the most common modes of transport (transportation of goods) are road and rail transport. Despite the fact that the analyzed macro-region is united by a water artery — the Volga River, the transportation of goods by inland waterways in the Russian Federation accounts for less than 1% of the total volume of cargo turnover[3]. The non-proliferation of cargo transportation by air in Russia and the concentration of this type of transport only in the largest subjects of the Russian Federation (in terms of population, volume of economic and industrial activity, distance from the main railways and highways) also does not allow including this indicator in the calculation. The system of indicators does not include the volume of resources transfer through pipeline transport due to the fact that the network of oil and gas pipelines is located not only in the regions where production is carried out, but also passes through the territories located between the place of production and consumers.

Moreover, the limited statistical data on regions and municipalities necessitates the formation of an assessment model applicable to territories of different levels — municipal, regional, national — using a group of indicators that allow comparing the results of the analysis both at the same level (horizontally) and between levels (vertically).

---

[3] Обзор отрасли грузоперевозок в России, 2020 год // Ernst and Young [Electronic source]. URL: https://assets.ey.com/content/dam/ey-sites/ey-com/ru_ru/topics/automotive-and-transportation/ey-russia-transportation-services-2020.pdf?download (accessed: 20.05.2023).

The spatial development analysis is based on the assessment of the chain growth rates of the selected indicators, while within the selected retrospective periods of 15 and 30 years, the step for assessing the growth rates of the indicators is defined as 5 years (Formula 1):

$$\text{Rg}_{chain} = \frac{y_i}{y_{i-1}} \qquad (1)$$

Here Rg_{chain} is the growth rate of the indicator, y_i — the value of the indicator in i period, y_{i-1} — the value of the indicator in the period preceding i.

The spatial development assess of the territory is based on the average growth rate of each selected indicator (Formula 2):

$$\overline{\text{R}_g} = \sqrt[n-1]{\prod \text{Rg}_{chain\ i}} \qquad (2)$$

Here $\overline{R_g}$ is an average growth rate of the indicator of spatial development; $\text{Rg}_{chain\ i}$ — the value of the growth rate of the spatial development indicator in the i period.

The cumulative average growth rate of all indicators of spatial development, which underlies the spatial development analysis, is calculated using Formula 3:

$$\overline{\text{Rg}_{sd}} = \sqrt[n-1]{\prod \overline{\text{Rg}_i}} \qquad (3)$$

Here $\overline{\text{Rg}_{sd}}$ is an average growth rate of all indicators of spatial development; $\overline{Rg_i}$ — the value of the average growth rate of the i-indicator of spatial development.

Because of the significant devaluation of the national currency and high inflation rates in the 1990s in Russia, the average growth rate calculation of the spatial development indicators of regions was carried out in 2 ways. In the second case, indicators of the index of the physical volume of investment in fixed capital and investment in fixed capital per capita were excluded. Taking into account the fact that the calculation period covers 30 years (1990–2020), during which there were economic crises that had a negative impact on the spatial development of territories and it was an external factor that does not depend on the decision-making by regional governments, we introduce into the analysis an admissible deviation limit of 1%, which characterizes the absence of spatial changes in the considered time period.

Table 2 presents the calculation data for the average growth rate of selected indicators characterizing the spatial development of regions in 1990–2020. The highest rates of spatial development in that period are observed in the Republic of Tatarstan, the Astrakhan Region and the Republic of Mari El (average growth rate of 1.09, 1.07 and 1.05, respectively), while the Republic of Tatarstan demonstrates a positive value of the average growth rate of spatial development indicators even without taking into account the investment volume data (1.004). The worst value of spatial development indicators is in the Ivanovo Region — 1.0069 cumulative average growth rate and 0.91 average growth rate of indicators excluding invest indicators. It should be noted that a significant decrease in the transportation of goods by road and rail is the main factor that negatively affected the average growth rate of all indicators and the spatial development of the Ivanovo Region. In general, the volumes of transportation by road and rail for all the regions had a negative trend in the period 1990–2020. Only the indicator of freight dispatch by rail in the Astrakhan Region in 2020 exceeded the values of the base year of 1990, in the other regions

this indicator and the transportation of goods by road in 2020 are significantly less than in 1990, despite the development of the logistics network, recovery industry and trade.

Table 2. Average growth rate of spatial development indicators of regions in 1990–2020[4]

Regions	$\overline{Rg_{sd}}$ for 14 indicators	$\overline{Rg_{sd}}$ for 12 indicators (without the index of the physical volume of investment in fixed capital and investment in fixed capital per capita)
Tver Region	1.0188	0.941812
Yaroslavl Region	1.0453	0.96963
Kostroma Region	1.0204	0.946138
Ivanovo Region	1.0069	0.916493
Nizhny Novgorod Region	1.0496	0.957547
Mari El Republic	1.0562	0.972781
Chuvash Republic	1.0276	0.952538
Republic of Tatarstan	1.0908	1.00452
Ulyanovsk Region	1.0318	0.943576
Samara Region	1.0469	0.971433
Saratov Region	1.0335	0.94501
Volgograd Region	1.0364	0.954014
Astrakhan Region	1.0742	0.980536

If we analyze the data for the medium-term period of 2005–2020 (Table 3), the Republic of Tatarstan (1.124), the Republic of Mari El (1.109) and the Nizhny Novgorod Region (1.106) remain among the leaders in the growth of spatial development indicators. The Chuvash Republic (1.062), Kostroma Region (1.068) and Saratov Region (1.077) have the lowest growth rates for the totality of 14 indicators. It should be noted that the exclusion from the calculations of the average growth rate of the investments volume changes the leaders and those lagging behind in the spatial development of their territories. The Republic of Tatarstan continues to maintain leadership in terms of the average growth rate of 12 indicators (1.056), followed by Samara (1.027), Tver (1.024) and Astrakhan Regions (1.023). The lack of growth is observed in the Ivanovo Region (0.988), the Chuvash Republic (0.993) and the Ulyanovsk Region (0.992). A negative impact on the average growth rate for the entire group of indicators was exerted by a change in the population (decrease in number), a decrease in population density, a decrease in the number of employees and the volume of road transport.

Table 3. Average growth rate of all indicators of spatial development of regions in 2005–2020[5]

Regions	$\overline{Rg_{sd}}$ for 14 indicators	$\overline{Rg_{sd}}$ for 12 indicators (without the index of the physical volume of investment in fixed capital and investment in fixed capital per capita)
Tver Region	1.0844	1.024273
Yaroslavl Region	1.0800	1.010043
Kostroma Region	1.0680	1.019542
Ivanovo Region	1.0839	0.988166

[4] Compiled by the authors using Официальная статистика // Росстат [Электронный ресурс]. URL: https://rosstat.gov.ru/folder/10705. (accessed: 20.05.2023).
[5] Compiled by the authors using Официальная статистика // Росстат [Электронный ресурс]. URL: https://rosstat.gov.ru/folder/10705. (accessed: 20.05.2023).

Nizhny Novgorod Region	1.1065	1.009394
Mari El Republic	1.1097	1.016935
Chuvash Republic	1.0628	0.99323
Republic of Tatarstan	1.1249	1.056089
Ulyanovsk Region	1.0855	0.992949
Samara Region	1.0983	1.027556
Saratov Region	1.0772	1.000975
Volgograd Region	1.0942	1.009663
Astrakhan Region	1.0833	1.023246

Conclusion

Thus, regional authorities can use the suggested approach to identify factors that negatively affect spatial development, hinder it and prevent more complete use of the region's space for pursuing a policy of spatial development of territories. The trend of population decline is observed both at the national level and at the level of the regions represented.

If implementing state policy aimed at increasing the birth rate, it is necessary to differentiate it across the territories of regions with a significant reduction in the population. With a differentiated approach, it is suggested to use additional measures that involve the creation of attractive living conditions for the working-age population, which will not only increase the level of employment, but also increase the birth rate (policy to attract women of childbearing age to the regions). Another factor that negatively affects the assessment of the spatial development level of regions is the state of the system of goods' transportation by road and rail. The revealed trend characterizes its negative impact on the development of production and trade and on interregional exchanges. In this case, the creation of logistics centers and transport hubs, for example the redirection of cargo flows from one mode of transport to another, will contribute to an increase in freight traffic.

Список литературы:

Аврамчикова Н.Т. Теоретические аспекты оценки качества экономического пространства // Региональная экономика: теория и практика. 2012. № 35. С. 2–13.

Аврамчикова Н.Т., Рожнов И.П., Монгуш С.П., Захарова Л.Н. Концептуальная основа пространственного социально-экономического развития взаимодействующих регионов (на примере регионов Сибирского федерального округа // Экономика и управление: проблемы, решения. 2020. Т. 1. № 2. С. 55–67.

Аврамчикова Н.Т., Чувашова М.Н. Инструменты оценки качества экономического пространства ресурсно ориентированного региона // Региональная экономика: теория и практика. 2015. № 28(403). С. 29–39.

Гранберг А.Г. Экономическое пространство России // Экономика и управление. 2006. № 2(23). С. 11–15.

Мирохина А.А. Мониторинг аномалий в развитии экономического пространства: предпосылки, концепция, инструментарий // Kant. 2018. № 4(29). С. 324–329.

Суворова А.В. Особенности оценки пространственных факторов развития экономики региона // Российские регионы в фокусе перемен: Сборник докладов XIV Международной конференции (Екатеринбург, 14–16 ноября 2019 года). Екатеринбург: ООО «Издательство УМЦ УПИ», 2020. С. 608–610.

Чернышов М.М. Интегральная оценка инвестиционной составляющей эффективности пространственного развития макрорегионов Российской Федерации // Региональные проблемы преобразования экономики. 2021. № 10. С. 101–114. DOI: 10.26726/1812-7096-2021-10-101-114

Шеломенцев А.Г., Уханова А.В., Смиренникова Е.В., Воронина Л.В. Оценка пространственного

развития регионов Арктической зоны Российской Федерации // Региональная экономика и управление: электронный научный журнал. 2018. № 4(56). URL: https://eee-region.ru/article/5613/

Dadashpoor H., Malekzadeh N. Driving Factors of Formation, Development, and Change of Spatial Structure in Metropolitan Areas: A Systematic Review // Journal of Urban Management. 2020. Vol. 9. Is. 3. P. 286–297. DOI: 10.1016/j.jum.2020.06.005

Tasnim S., Mahbub F., Biswas G., Haque D.M.E. Spatial Indices and SDG Indicator-Based Urban Environmental Change Detection of the Major Cities in Bangladesh // Journal of Urban Management. 2022. Vol. 11. Is. 4. P. 519–529. DOI: 10.1016/j.jum.2022.09.004

References:

Avramchikova N.T. (2012) Teoreticheskiye aspekty otsenki kachestva ekonomicheskogo prostranstva [Theoretical aspects of assessing the quality of economic space]. *Regional'naya ekonomika: teoriya i praktika.* No. 35. P. 2–13.

Avramchikova N.T., Rozhnov I.P., Mongush S.P., Zakharova L.N. (2020) Conceptual Basis of the Spatial and Socio-economic Development of the Interactioning Regions (on the Example of Regions of Siberian Federal District). *Ekonomika i upravleniye: problemy, resheniya.* Vol. 1. No. 2. P. 55–67.

Avramchikova N.T., Chuvashova M.N. (2015) Tools for Evaluating the Quality of Economic Space of the Resource-Oriented Region. *Regional'naya ekonomika: teoriya i praktika.* No. 28(403). P. 29–39.

Chernyshov M.M. (2021) Integral Assessment of the Investment Component Spatial Development Efficiency Macro-Regions of the Russian Federation. *Regional'nyye problemy preobrazovaniya ekonomiki.* No. 10. P. 101–114. DOI: 10.26726/1812-7096-2021-10-101-114

Dadashpoor H., Malekzadeh N. (2020) Driving Factors of Formation, Development, and Change of Spatial Structure in Metropolitan Areas: A Systematic Review. *Journal of Urban Management.* Vol. 9. Is. 3. P. 286–297. DOI: 10.1016/j.jum.2020.06.005

Granberg A.G. (2006) Economic Space of Russia. *Ekonomika i upravleniye.* No. 2(23). P. 11–15.

Mirokhina A.A. (2018) Monitoring Anomalies in the Development of Economic Space: Background, Concept, Tools. *Kant.* No. 4(29). P. 324–329.

Shelomentsev A.G., Ukhanova A.V., Smirennikova E.V., Voronina L.V. (2018) Assessment of Spatial Development in the Regions of the Arctic Zone of the Russian Federation. *Regional'naya ekonomika i upravleniye: elektronnyy nauchnyy zhurnal.* No. 4(56). Available at: https://eee-region.ru/article/5613/

Suvorova A.V. (2020) Features of the Assessment of Spatial Factors of Development of the Economy of the Region. *Rossiyskiye regiony v fokuse peremen: Sbornik dokladov XIV Mezhdunarodnoy konferentsii (Ekaterinburg, November 14–16, 2019).* Ekaterinburg: OOO "Izdatel'stvo UMTs UPI". P. 608–610.

Tasnim S., Mahbub F., Biswas G., Haque D.M.E. (2022) Spatial Indices and SDG Indicator-Based Urban Environmental Change Detection of the Major Cities in Bangladesh. *Journal of Urban Management.* Vol. 11. Is. 4. P. 519–529. DOI: 10.1016/j.jum.2022.09.004