

Modelling sustainable spatial development of Russian regions

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Abstract. The paper highlights the issues of spatial development of Russia's territory and its regions. The authors substantiate the interrelation of spatial development and sustainable development of territories, where the spatial organization of the country's economy is considered as one of the directions of achieving sustainable development. The problems of spatial development are analysed and disclosed. As an important indicator of the imbalance of modern spatial development of regions and the whole territory of the Russian Federation is considered the population density and concentration of economic activity, which have a close relationship and historical features of formation. The paper substantiates the allocation of macrozones and macroregions for a comprehensive analysis of social and economic problems and determining the prospects of spatial development of the Russian Federation regions. Statistical indicators in the context of six macrozones are given and analysed. The authors substantiate the allocation of macrozones from the position of the theory of economic zoning of the territory of Russia, which was applied before 2000, and the formation of Federal Districts as a result of the introduction of a new political and administrative reform of the country. The authors identify the regularities of development of six macrozones based on the results of analysing a sample of statistical indicators and trends in their dynamics. The study formulates and substantiates the problems of persisting imbalance and disproportions in the spatial development of Russia's regions and territory. In order to solve this problem, the authors propose a multilevel realization model of spatial development of the territory the Russian Federation, in which the criteria of differentiation are defined at the following levels: macro-level and meso-level. The basis for solving the problems of spatial differentiation is the choice by each region of a clear strategy of socio-economic development, the development which is fixed at the state level and is mandatory.

1 Introduction

In recent decades, since the 1990s of the XX century, the radical economic reforms that are taking place in Russia have begun to affect its spatial organization. This process is evidence of a deep internal change and the emergence the new imbalances in the territorial structure in the sphere of economics (population distribution, resettlement, migration, etc.),

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agriculture, state structure, etc. The most vulnerable link in this aspect is the socio-economic development of Russia. The most vulnerable link in this aspect is the socio-economic development of territories, where there is a significant gap in the level achieved by regions. In these circumstances, the issue of developing a new strategy for the spatial development of the country has become relevant, which required considerable time for discussions and resolution of controversial and debatable issues, which came into force on February 3, 2019. This strategy reflects new principles of settlement and distribution of the country's productive forces, which should contribute to the smoothing disproportions of its spatial and socio-economic development in the future. This statement determines the relationship between the concepts of spatial development and the sustainability of territorial development, which is reflected in the authors' proposed model for the implementation of the provisions of the spatial development of the Russian Federation in the future.

2 Materials and Methods

In this aspect, the five most common problems of spatial development have been clearly defined before the main Russian scientific schools of regional economists and agencies responsible for the formation the regional policy [3].

The first problem is centripetal processes at the federal level (a sharp increase in the role that Moscow plays in the main indicators of socio-economic development) and at the level of many constituent entities of the Russian Federation in the form an intensive strengthening of the economic and political role of their capitals, including for many municipalities with large metropolitan cities, successfully located on the key transport routes to the new market economy. This problem has led to increased concentration in the economic environment of industry, agriculture within the boundaries of large cities, on the one hand, and, on the other hand, to an increase in the number of territories with low activity. It is obvious that in this problem the important task is to increase the provision of the territories (regions) of our country with infrastructure facilities.

The second problem is related to the first one, because it is caused by the persisting interregional contrasts, significant imbalance of socio-economic development of the Russian regions. Interregional differences in Russia are so significant that, according to scientists, it will take decades to smooth them out [16-17]. Thus, it is necessary to ensure the spatial development of the country on the basis of more effective tools: more economical, rational, with low transaction costs. Along with the tools, it is necessary to use the forces of self-organization in the form of people's and firms' mobility in this area.

The third problem is the unfavourable geopolitical position of Russia in the world (largely artificially created) and its border territories, economic and political sanctions and pressure from unfriendly Western countries. This problem implies the search for ways of effective economic development of human, infrastructural, technological and institutional aspects, more closely related to the country's periphery [18], i.e. depressed areas of its territory.

The fourth problem of Russia's development is its weak infrastructure: the country's infrastructure forms do not correspond to its location, where many remote areas have low transportation and electronic accessibility. To solve this problem, the allocation of federal budgetary funds is important [18].

The fifth problem is institutional in nature and is related to excessive unification of norms and rules in spatial and infrastructural development [15]. Among the diversity that exists in our country's natural, social and other conditions, it is required to ensure that territorial differences are reflected in federal legislation, initially establishing different parameters for territories (arctic, northern, middle zone, etc.) that have problems of different types. In this case, such legal asymmetry is necessary and desirable, as it can be a

condition for solving socio-economic problems of regions of different types. Thus, the rules and provisions of federal standards should take into account regional peculiarities and reflect the spatial specificity of the country.

The appropriate response is to create conditions for the development of Russian federalism, taking into account regional specificities of laws and regulations at the federal level; to encourage and stimulate legislative creativity of regional authorities and LSG bodies in the sphere of spatial development; including facilitating the dissemination and exchange of reliable institutional innovations [14] and best practices aimed at self-development of territories [10].

The problems of spatial development of the Russian Federation highlighted above are not unusually new, but remain relevant and urgent at present. And the point is not even so much in the strength that these problems have, but in the impossibility to give a routine answer to them, as they require innovative solutions and measures corresponding to their scale.

Internal conditions of spatial development in Russia include distribution of socio-demographic, natural resources, industrial and economic opportunities, transport and energy frameworks, spatial aspects of interregional, international and cross-border cooperation, spatial aspects of economic and social development (including spatial distribution of institutional and managerial, scientific and innovative and financial investment development potentials in the long term).

The spatial development of the Russian Federation is significantly influenced by external conditions, including the existing system of international relations and its relations with foreign countries, including the current state of the world economy and its financial markets, current and long-term trends in the economic development of some influential countries, as well as regional interstate associations.

Russia's territory in its modern land and sea borders represents its inalienable heritage and strategic competitive advantage in the global economic system, which provides a combination of such fundamental conditions for its spatial development in the long term as: significant human potential of the regions (skilled workforce, advanced scientific and educational centres, etc.); the volume and diversity of natural resources, climatic conditions; unique geopolitical and geo-economic position of the Russian Federation; and a unique geopolitical and geo-economic position of the Russian Federation.

The development of Russian regions as an integral component of the Russian Federation's spatial development is determined by the nature and the combination as well as the prevailing trends and intensity of their changes.

Thus, the spatial development of the country is characterised by the territorial structure of the economy and the dynamics of its change, the ratio of individual parts of the country's economy and regions with regard to the main indicators of economic development, their balance (share) in the national economic system.

Since the beginning of the 21st century, the spatial organisation of Russia in territorial terms has undergone several changes. In 2000, a new political and administrative reform was introduced with the creation of a new territorial unit called a federal district [5] instead of the existing economic districts. The territories of federal districts are formed on the basis as a grid of economic districts by means of their enlargement (unification of economic districts in their entirety or their parts). Among other things, this reform has the purpose of "shortening" the vertical authority (the plenipotentiary representative of the president of the federal district, directly reporting to the President of the Russian Federation in the sphere of solving social and economic issues of the territory entrusted to him, has all the powers to do so). The boundaries of the federal districts have changed several times during their almost twenty-year existence: in 2010, the North Caucasus Federal District was separated from the Southern Federal District [6] by presidential decree (based on the national principle); in

March 2014, the Crimean Federal District was formed (the Crimean peninsula was incorporated into Russia on the basis of a referendum) [11] in 2016 The Crimean FD was abolished and incorporated into the Southern FD [7]; in November 2018, the boundaries between the Siberian and Far Eastern Federal Districts were legally changed as a result of the transfer the Republic of Buryatia and Zabaikalsky Krai from the Far Eastern Federal District to the Siberian Federal District [8-9].

Further, in February 2019, the Strategy for the Spatial Development of the Russian Federation is enacted, with the goal of "sustainable and balanced spatial development of the Russian Federation, reducing interregional differences in the level and quality the population's life, accelerating economic growth and technological development, as well as ensuring the country's national security" [9]. This document reflects territorial changes in the form of 12 macro-regions (based on a grid of federal districts), where promising specialisations for each region, the country's main centres of economic growth and other significant social and economic transformations of Russia's spatial structure are highlighted.

3 Results and Discussion

To study the key problems and imbalances of Russia's spatial development, its current territorial units are important in terms of analysing the main socio-economic indicators that reflect the essential features of these territories. In our opinion, when analysing in the current time, it is important to take into account the settlement of the population in the regions of the country. The population density of Russia's territory and by individual regions, which is closely related to the density of economic activity, is assessed as extremely uneven (Figure 1).

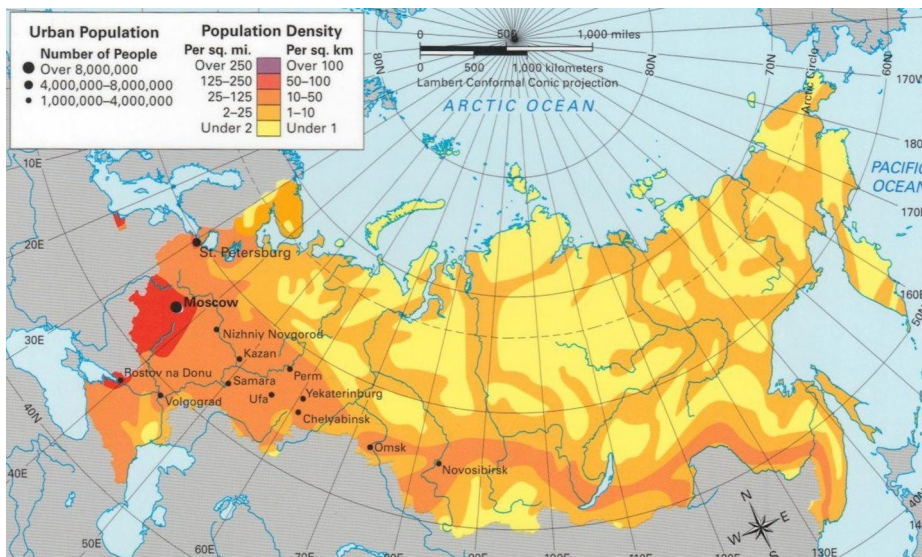


Fig. 1. Population density of the Russian Federation at 01.01.2019.

In the study of modern spatial organisation of Russia, we rely on the macrozones identified by experts [3-4], which in our opinion is appropriate from the position of identifying the causes of the existing key problems and imbalances of Russia's spatial development in order to find the most effective ways to solve them. The boundaries of macrozones largely characterise the grid of Russian economic zoning, used in practice for

quite a long time (1921-1999) [1,13]. Also, the boundaries of the identified 6 macrozones partially coincide with the boundaries as well, but their borders are formed based on the indicators of population density and concentration of economic activity (Fig. 1). Thus, the boundaries of macrozones include regions (constituent entities of the Russian Federation) similar in specialisation, economic structure, types of products, level of socio-economic development, etc.

It should be noted that economic districts in their time contributed to the formation an economic framework of the country, where the specialisation of regions was formed on the basis of the historical principle, based on their natural resource potential. Thus, during the period of functioning of economic districts, the formation of the industrial economic framework of the country was strengthened by the specialisation of economic districts.

Thus, this provision allows us to justify the choice of statistical indicators specifically in the context of the 6 macro-zones identified in the Strategy for Spatial Development of Russia [2], which reflect the density of population and economic activity, including the level of socio-economic development within the boundaries of these territories.

We supplemented the analysis of some basic socio-economic indicators in our study with the data of 1993, 2013 and 2021. The main socio-economic indicators for a sample of years to analyse and summarise the features of Russia's spatial development (a period of 30 years), are presented in Table 1.

Table 1. Main indicators population, creation of Gross Regional Product, value fixed assets of the economy in the Russian Federation macro-zones; sample by year; (%).

Key indicators	2001	2013	2019	2021
Central and North-West macrozone of Russia				
Population	31,4	32,9	33,4	33,4
Gross Regional Product	38,4	42,0	41,9	43,9
Value of fixed assets in the economy	29,0	38,5	44,7	42,9
Investments in fixed capital	29,1	30,4	36,0	41,6
European North macrozone				
Population	3,9	3,3	3,1	3,0
Gross Regional Product	4,6	3,5	3,3	3,4
Value of fixed assets in the economy	4,7	4,9	4,0	4,0
Investments in fixed capital	4,5	3,4	3,7	3,6
Macrozone South of Russia				
Population	14,9	16,4	18,0	18,2
Gross Regional Product	7,8	8,8	9,2	9,7
Value of fixed assets in the economy	9,8	8,7	10,7	10,4
Investments in fixed capital	10,1	14,0	10,0	9,9
Ural-Volga macrozone				
Population	28,4	26,8	25,8	25,7
Gross Regional Product	23,0	20,8	19,3	19,3
Value of fixed assets in the economy	25,9	19,8	18,5	18,6

Table 1. Continued

Investments in fixed capital	20,2	21,3	18,0	17,1
Macrozone Siberia				
Population	16,5	15,9	14,2	13,0
Gross Regional Product	21,2	19,6	20,2	17,4
Value of fixed assets in the economy	24,3	21,9	16,4	17,7
Investments in fixed capital	25,8	21,7	20,2	20,7
Macrozone Far East				
Population	4,9	4,3	5,6	4,2
Gross Regional Product	5,1	5,4	6,1	5,7
Value of fixed assets in the economy	6,2	6,3	5,7	5,6
Investments in fixed capital	5,4	6,1	8,2	7,6

The data in Table 1 allow us to identify the following patterns and proportions of spatial development of the regions (by macrozones) of the country from 2001 to 2021:

- growth in the share of the main indicators in the Russian economy of the macrozone Centre and North-West, including a significant increase in its metropolitan urban agglomerations (Moscow, St. Petersburg), as well as growth of indicators (except for investment) in the macrozone South of Russia;

- decrease in the share of contribution to the country's economy of the macro-zones European North, Ural-Volga, Siberia, including the Far East macro-zone in terms of population and the value of fixed assets, while these territories have significant resource potential, which means its underutilisation (such opportunities as the use of the Northern Sea Route; natural and lithogenic resources of the east of the country, etc.);

- the South of Russia macrozone has insufficient investment in fixed capital, while there are positive shifts in the other three indicators; the Far East macrozone shows positive shifts in GRP and investment in fixed capital, but there is a decrease in population and production potential.

The identified trends of spatial development are solved by measures of various documents: concepts, strategies, decrees, state programmes and other regulatory and legal documents. The current geopolitical situation allows us to determine that our country and economy need their own solutions to the identified spatial problems through the use of their own (generally rich) resources on the basis of multidimensional analysis of the existing proportions of spatial development.

4 Conclusion

The problem with the spatial contrasts of socio-economic development, when the main contribution to the growth of the national economy is made by a few of the 85 regions of the country (until October 2022, after - 89 subjects of the Russian Federation), and the vast majority of them do not have a clear strategy for the formation of competitive market specialisation will tend to intensify, if there is no own target model of spatial development, built on the basis of a set of priorities for the development of the state and its regions. The choice of a clear development strategy for each constituent entity of the Russian Federation,

including municipalities, is provided by the Federal Law No. 172-FZ "On Strategic Planning in the Russian Federation" [12].

The main direction of increasing the efficiency of spatial development is, in our opinion, in smoothing the existing differentiation, inequality between territories of the same level (between macrozones, between macro-regions, between constituent entities of the Russian Federation, etc.). To achieve this goal, it is necessary to apply effective mechanisms for the implementation concept of spatial development.

In this regard, we propose a model for the implementation of spatial development of the Russian Federation, the essence that consists in the allocation of spatial development levels with the simultaneous application of differentiation criteria that take into account the specifics of the development in each territory (fig. 2).

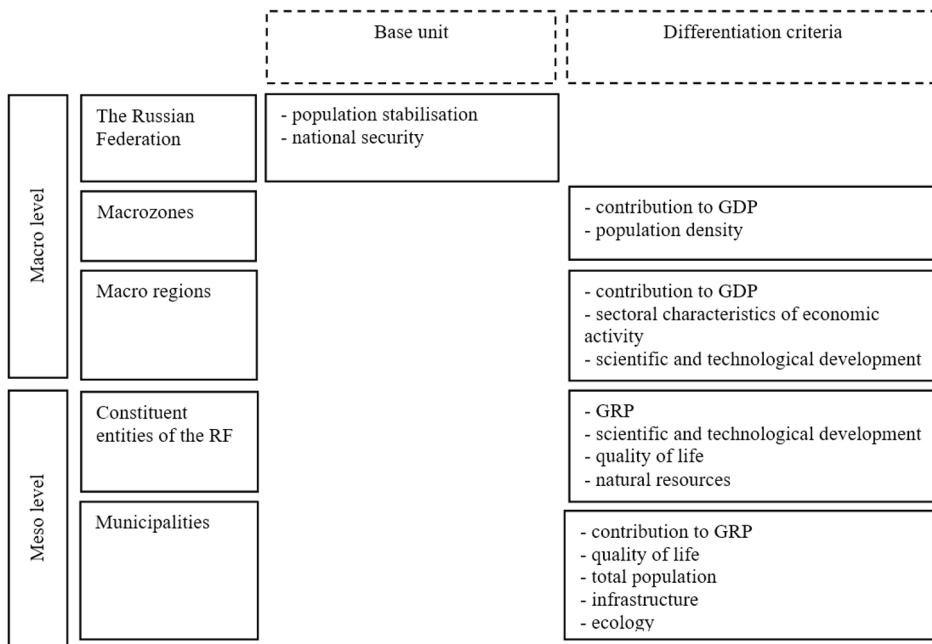


Fig. 2. Spatial development realization model of the Russian Federation.

The differentiation criteria for each level are presented in Figure 2. It is advisable to increase the number the criteria as the level of management decreases, since the lower levels of management reflect the problems of the population to a greater extent.

The proposed model will allow us to identify and solve the problems of spatial development of Russian regions on the basis of in-depth analysis, identification of cause-effect relations and the historical principle of territorial development.

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