



METHODOLOGICAL FOUNDATIONS OF THE ANALYSIS OF THE SUSTAINABILITY OF THE DEVELOPMENT OF REGIONAL SOCIO- ECONOMIC SYSTEMS

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Annotation: The article considers the main methodological approaches to the analysis of the sustainability of the development of regional socio-economic systems. A methodological approach to the analysis of the sustainability of the region's development is proposed based on the construction of typologies of municipalities as socio-economic subsystems on its territory and the assessment of generalizing indicators characterizing the completeness of the implementation of their external and internal functions.

Key words: development, regional socio-economic system, external and internal functions, construction of typologies, socio-economic subsystems, territory, assessment, generalizing indicators.

Improving the methodological foundations and methods of analyzing the state and sustainability of regional systems is a necessary condition for improving the quality of management decisions based on a more reliable analysis, forecast and objective justification of strategic directions for the development of the economic complex, social and environmental spheres of territories. Different authors propose various methodological foundations and methods for assessing the sustainability of the development of regional socio-economic systems at different levels.

In various concepts of regional research, attention is focused on certain functions of regional systems. In the concept of "region-society", social and demographic functions are brought to the fore, since the reproduction of social life is considered as the main goal of regional development. The concept of considering the region as a "quasi-corporation" focuses on the economic (economic) function, through the implementation of which economic and financial resources are accumulated and used to meet the internal and external needs of the population in manufactured goods and services.

In modern conditions, such new directions of scientific and technological progress as complex mechanization, automation, informatization, active innovation, etc. have a particularly favorable impact on regional development. Today, resource-saving technologies are especially relevant, which are able to meet the needs of the country and regions in production resources. But it should be noted that so far advanced high-tech technologies are not used in all regions, mainly in the largest centers of the military-industrial complex, in the central and Volga-Ural regions.

It should also be noted the influence of the agglomeration factor, which contributes to an increase in the scale of production, concentration of labor resources, enterprises and non-industrial facilities. This concentration of forces contributes to the emergence of new types of production, an increase in individual labor productivity, etc.

Among all the factors, there are also factors that have a negative impact on the development of the region. One of the most significant factors having a negative impact is the presence of a shadow economy in the region. The actions of corrupt officials and the presence of crime reduce the revenues of the region, which come in the form of taxes and fees, which, in turn, negatively affects the regional budget.

Another representative of this type of factor is the deterioration of production assets, which occurs as a result of transitional processes in the economy, which entails additional costs for the restoration and modernization of production.

If the following main groups of factors are traditionally distinguished in Russian economic theory: natural, demographic, economic, geographical, economic, then in foreign literature there are two large groups of factors - these are "hard" and "soft". "Hard" factors are understood to be factors that are quantified. Factors can be attributed to this type:

- a) production-oriented resources (land, labor, capital);
- b) focused on the production and marketing of products (proximity of cooperation partners, infrastructure, population and consumption structure);
- c) established by the state (taxes, management system, subsidies and support programs).

Soft factors are those factors that are very difficult to quantify, namely:

- stability of the political situation;
- stability of the public climate;
- the qualifications of the employed;
- the regional structure of the economy and individual enterprises;
- the quality of the education and professional training system;
- equipping the region with universities, technology centers, and research organizations.

Of course, the factors influencing the socio-economic development of the region are not limited to the above set. According to many researchers, the set of such factors is very diverse. Identifies groups of factors that characterize:

- production and resource potential of the region;
- the structure of the regional market;
- human resources potential of the region;
- regional budget;
- the development strategy of the region.

The external environment of the direct impact region includes relationships with partners: external suppliers of goods and services; external consumers; regions-competitors; financial organizations; transport enterprises.

The environment of indirect impact on the region may include groups of factors of influence:

- general economic;
- general political;
- scientific and technical;
- natural and ecological;
- demographic.

Based on the analysis of the factors influencing the socio-economic development of the region, they can be grouped into five main groups: natural resources, population, enterprises, innovations and investments.

The function of regional governance is one of the most common functions of the region as a socio-economic system. It consists in creating conditions for its self-preservation and self-



development based on the rational use of the natural, industrial, scientific, labor, demographic, social and cultural potentials of the territory and increasing business activity. Through the implementation of this function, the achievement of internal and external goals of territorial development is ensured, namely, direct life support and improvement of the quality of life of the population, increasing the role of the territory in the social division of labor based on the formation of rational economic specialization. This general function is implemented through private functions, which include the following:

- an economic function, which consists in meeting the needs of the population of a given territory and other regions for necessary goods and services;
- financial function, which consists in ensuring financial stability and the formation of financial sources of self-development of the territory (increasing the level of budgetary self-sufficiency);
- demographic function that ensures the creation of conditions for the preservation and expanded reproduction of the population and labor potential in the territory;
- a social function, through the implementation of which conditions are created to meet the social and social and cultural needs of the population, on this basis improving the level and quality of life, preserving cultural and national traditions, ensuring socio-political stability in the territory;
- an ecological function aimed at creating economic and institutional conditions for the preservation and improvement of the environment, greening production and improving the quality of life of the population on this basis.

In reality, these functions are interconnected. The implementation of one of the functions creates conditions for the implementation of others, and this process can be contradictory. The most important characteristic of the state of the regional system is the socio-economic and environmental well-being of the territory in which it operates. The definition of this concept, in our opinion, is important for the development of methodological foundations for assessing the state and sustainability of regional systems. The socio-economic and environmental well-being of the territory reflects the completeness of the implementation of the main functions of the regional system, ensuring the achievement of external and internal goals of regional development. The sustainability of the region's development reflects the dynamics of the socio-economic and environmental well-being of its territory, characterizing the ability of regional socio-economic systems for a long time to fully and balanced implement the main functions to preserve their integrity and create conditions for progressive development.

The most important methodological principle of the study of regional socio-economic systems is an integrated approach to the analysis of their condition and development, which is provided by the study of the functions and properties of specific territorial objects (subsystems) within this system, their orderly description, which allows us to identify the key problems of the development of each territorial object and the territory of the region as a whole. The analysis of the state and sustainability of the region's development as a complex socio-economic system involves the use of non-traditional methodological approaches and tools, the use of which would make it possible to assess the completeness of the implementation of the functions of socio-economic subsystems operating on its territory, and to obtain a holistic picture of the key problems and priority areas of development of the region as a whole. The methodology of such analysis is based on the general principles of analysis of regional systems (geosystems). These methodological principles include:

- 1) an ordered description of territorial objects based on their classification;



- 2) functional analysis (the study of territorial objects based on the functions they perform within the framework of the regional system under study);
- 3) a causal analysis explaining the relative location of territorial objects in an ordered set by the influence of certain factors;
- 4) system analysis, which allows to obtain a holistic view of the state and development of the regional system as a whole while preserving the properties of specific territorial objects (socio-economic subsystems).

The considered methodological principles were implemented by us in a methodical approach to the analysis of the state and sustainability of the development of the region – subject and socio-economic subsystems operating on its territory. Based on this approach, a methodology was developed based on the calculation of a system of indicators of socio-economic well-being and sustainability of territorial development and the construction of a typology of these subsystems using the methodology of artificial neural networks. Municipalities can be considered as socio-economic subsystems operating in the region. They possess the main features of regional socio-economic systems, such as territorial and reproductive integrity, and perform the functions inherent in these systems. At the same time, they are part of the regional territorial organization of the economy and society and in this regard can be considered as territorial socio-economic subsystems within. The municipality, as a territorial socio-economic subsystem, mobilizes labor, material and financial resources to realize the external and internal goals of its development.

The proposed methodology, based on the systematization and generalization of the experience of practical application of existing methodological approaches to assessing the socio-economic situation in the territories of regions at various levels, includes a number of stages:

- 1) determination of the list of baseline indicators and selection of the most significant indicators based on their qualitative and quantitative analysis;
- 2) calculation of private, summary and integral indicators, as well as dynamic assessments of socio-economic and environmental well-being of territories in the analyzed period;
- 3) building typologies of socio-economic subsystems in the region on the basis of self-organizing maps;
- 4) assessment of the state and sustainability of regional development based on the analysis of indicators of socio-economic and environmental well-being, dynamic integrated assessments and typologies of socio-economic sub-systems operating in the region, according to the years of the analyzed period;
- 5) identification of the main problems and justification of priority directions of sustainable socio-economic development of the region. When building the indicator system, the methodological principles underlying the existing methods were taken into account, which were adjusted taking into account the target orientation and characteristics of the object of this study. Among these principles are:
 - 1) complexity – the choice of indicators should comprehensively characterize the development of regional socio-economic systems;
 - 2) consistency – the selected indicators should characterize the object of research as a system and have an ordered structure (indicators of socio-economic well-being should reflect the degree of implementation of the functions of socio-economic subsystems in the region and be structured according to blocks according to these functions);



3) representativeness (sufficiency of a set of indicators in the absence of overlapping indicators);

4) reliability provided by the use of reliable sources and methods of obtaining information, as well as taking into account the heterogeneity of the compared territorial systems and the variety of external conditions of their functioning;

5) the possibility of obtaining the necessary information for calculating baseline indicators from existing state and departmental statistical reports. The system of indicators used in the methodology includes:

- private indicators reflecting certain aspects of socio-economic and environmental well-being of territories;
- Summary indicators reflecting the degree of implementation of each of the functions of the regional systems discussed above;
- integral indicators reflecting the degree of implementation of all considered functions in the aggregate;
- dynamic integral assessments reflecting changes in the socio-economic well-being of territories during the analyzed period, summary and integral indicators can be used for a comparative assessment of the socio-economic well-being of territories by ranking the latter, as well as to determine the relative degree of implementation of the functions of socio-economic subsystems in the region. To obtain relative estimates, the real state of each specific subsystem is compared with the ideal state or the state of the "reference subsystem". Methods of comparison with the "standard" are used in a number of methods for comparative assessment of the socio-economic situation of territories.

Thus, summary and integral indicators for specific territorial systems, expressed as a percentage, reflect the relative (in comparison with the "standard") degree of implementation, respectively, of each of the functions and the entire set of functions under consideration. Integral indicators reflecting the completeness of the implementation of economic, financial, demographic, social and environmental functions characterize the level of socio-economic and environmental well-being of the territory.

The following indicators can be used as such indicators:

- for municipalities as territorial socio-economic subsystems of the region, specific indicators of industrial and agricultural production volumes, indicators of per capita turnover of trade and public catering characterizing the activities of the leading sectors of the region's economy, as well as indicators of small business development can be used to assess the relative degree of realization of their economic function;
- to assess the relative degree of implementation of the financial function, indicators such as the volume of budget revenues and expenditures per capita, the coefficient of budget self-sufficiency, calculated as the ratio of own budget revenues to expenditures, the balance of overdue accounts receivable and accounts payable.
- to assess the completeness of the implementation of the social function, it is proposed to use a number of indicators of the level and quality of life: indicators of the provision of social services, transport and communications, housing and services, indicators of per capita income of the population and indicators of social stability in the territory (crime rate);
- to assess the relative degree of realization of the ecological function, it is possible to use a number of private indicators characterizing the environmental situation in the territories of municipalities – specific indicators of the volume of discharge of contaminated wastewater and



release of pollutants into the atmosphere (minus captured and neutralized) per unit area of the territory and others.

The most important tool for assessing the sustainability of the economic and social development of the region is a typological analysis of socio-economic subsystems on its territory. Our proposed methodology involves the construction of typological groupings of these subsystems based on integral indicators of socio-economic well-being of territories, consideration of the structure of these groupings (for example, identification of groups of leading territories and territories with a relatively low level of socio-economic well-being or groups of territories characterized by common problems of socio-economic development), research of changes in the composition and ratio of typological groups of territories for the selected time period.

The analysis of typologies based on consolidated and integral indicators of socio-economic well-being makes it possible to assess the completeness of the implementation of the functions of socio-economic subsystems, to identify contradictions in the implementation of these functions in the region. In our opinion, artificial neural network methods are an effective analytical tool for constructing typologies of socio-economic subsystems operating in the region based on the above-described indicators, which allow us to track complex relationships between various parameters characterizing the state and development of territories.

In the process of implementing local government reform, their territorial boundaries and status characteristics may change, and it is difficult to obtain comparable data over a long period of time. Supplementing the results of the typological analysis with an assessment of dynamic integral indicators of socio-economic well-being of territories calculated using the algorithms given allows us to obtain a more complete picture of the state and sustainability of regional development. The proposed method is universal. It can be used to analyze the development of any region and the socio-economic subsystems operating on its territory. Taking into account the adjustment of the set of baseline indicators, it is also applicable for a comparative analysis of the state and sustainability of development of macro-regions located in the territories and the country as a whole, and the results of the analysis can be used in the development of monitoring, scenarios and strategies for sustainable socio-economic development of regions at various levels.

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