

Assessment of the Stability of the Regional Socio-Economic System (on the Example of the Rostov Region)

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ABSTRACT

The authors have substantiated theoretical and methodological approach to a comprehensive assessment of the sustainability of the socio-economic development of the region. What is more, we highlighted the key characteristics inherent in the concept of "sustainable socio-economic development of the region", which are the basis of a set of factors that have a significant impact on it. We propose a system of indicators, which decompose the factors of such stability. The formed theoretical and methodological basis of the study made it possible to propose a comprehensive methodology for diagnosing the sustainable development of the regional economy. The approbation of the methodology was carried out on the basis of materials from the Rostov region, as a result of which we made a comprehensive assessment by the types of indicators for assessing sustainability (economic system, social system, environmental, resource and institutional indicators), and determined an integral indicator of sustainability. Considering the definition of the type of sustainability in the development of the Rostov region, we propose a set of measures to increase the level of sustainable development in the development of the innovative and recreational potential of the Rostov region.

Keywords: *Region, Sustainable development, Factors, Integral indicator, Methods of regulation, Regional development, Potential, Innovation, Resources.*

1. INTRODUCTION

The priority task of the Russian Federation is to ensure a balanced socio-economic development of the regions, since it is the achievement of sustainability that is the platform for the progressive development of the regional economic system. However, the variety of Russian regions is still distinguished by a significant level of differentiation and disproportionality both in the growth rates, structure of the economy and the level of sustainability of socio-economic development.

Ensuring sustainable development of the regional economy is a complex multi-criteria process. Consequently, the assessment of its level at certain stages of the implementation of the sustainable development strategy should be carried out on the basis of a set of indicators, the level and dynamics of development of which affects the formation of directions of state

regulation of this process and the adjustment of measures to achieve sustainable development goals.

In this regard, the urgent task is to form effective methods and tools for measuring the sustainability of the development of the socio-economic system of the region.

2. METHODOLOGY

The issues of sustainable development are disclosed in the works of domestic and foreign authors [3,4,11].

Analysis of the existing definitions of the concept of "sustainable regional development" allows us to highlight its main features:

- sustainable development of a region presupposes a dynamic balance of its socio-economic system under the influence of external and internal environmental factors;

- sustainable development of the region presupposes qualitative changes in its subsystems - economic, social and environmental as a result of the formation of various types of connections;

- the stability of the region is ensured, on the one hand, by the stability of links between the elements of the economic, social and ecological subsystems, and on the other – by the ability to internal restructuring of the structures themselves.

In our opinion, along with the classical components of sustainable development of the economic, social and environmental spheres, we should distinguish such components as the institutional and resource spheres, while the sustainable development of the regional socio-economic system should be considered as a balanced change in quantitative and qualitative indicators in the economic, social and environmental spheres of the regional system, taking into account institutional factors and rational use of the natural resource potential of the region.

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The development of the methodology for identifying factors and assessing the level of sustainable development of regions is enlightened in the works of S. Bird, E. Golovanov, V. Mencshikova, N. Sinopolets, G. Feraru, R. Harris and A. Shahraki.

On the basis of the scientific research of the authors' data [1-8], we determined a set of factors of the internal environment of the regional system and the corresponding indicators, the assessment of which will

make it possible to analyze the sustainability of the development of the region (table 1).

The internal factors of the stability of the economic sphere include production and economic factors, investment factors, factors of scientific and technical potential, factors of foreign economic activity assessed on the basis of 21 indicators. Internal factors of social stability include demographic factors, factors of the standard of living, health of the population, the state of labor resources, criminality, social sphere and infrastructure, which were assessed using 23 indicators. The internal factors of sustainability of the ecological sphere include the natural resource potential of the region, the degree of impact of anthropogenic activities on the environment, the ability of natural systems to heal themselves, assessed on the basis of 11 indicators. The internal factors of the sustainability of the resource sector include natural, recreational, financial, human and innovative resources, the assessment of which is based on 11 indicators. The indicators of the institutional sphere include the regulatory and administrative resources (institutions) of the region, which influence the level of competitiveness of the region and ensure the development of all spheres of public life (9 indicators).

The set of factors for the sustainable development of regions with a decomposition of component indicators is represented in Figure 1.

The assessment of the sustainable development of the regional economy will be carried out by the integral method based on the calculation of normalized coefficients for each of the indicators characterizing various aspects of the sustainable development of the region [10].

To analyze the dynamics, we calculate the normalized coefficients for each indicator value (Y_i).

For indicators reflecting the direct nature of the relationship with the sustainable development of the region, the comparison will be made with the lowest

Table 1. The values of the consolidated indicator of sustainable development of the Rostov region

Nº	Indicators	2013	2014	2015	2016	2017	2018
1.	Indicator of sustainable development of the economic system	6.0141	7.7537	14.153	12.7476	12.0123	7.5657
2.	Indicator of sustainable development of the social system	7.57	9.21	9.93	13	11.88	14.39
3.	Indicator of sustainable development of the ecological system	5.854	5.097	6.53	5.63	3.3	4.693
4.	Indicator of resource factors of the socio-economic system	5.21	5.606	7.011	3.878	4.707	5
5.	Indicator of sustainable development of the institutional system	3.91	3.09	3.195	5.7	4.56	3.645

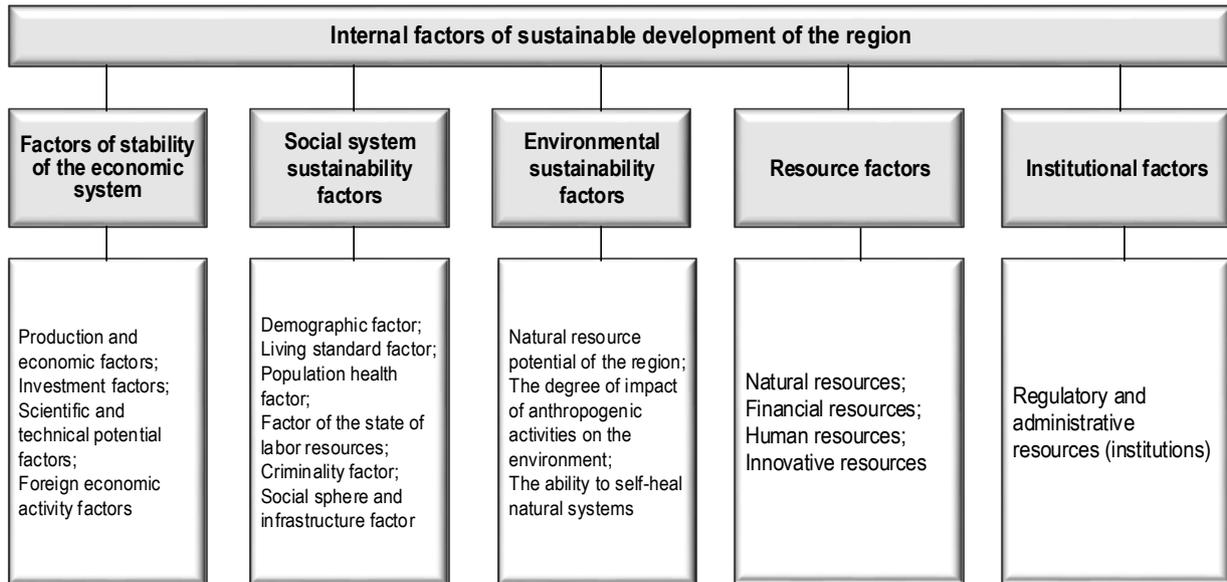


Figure 1 The system of factors of sustainable development of the region.

value for the period ($\min Y_i$), for indicators with feedback, the comparison will be made with the highest value for the period ($\max Y_i$).

The calculation of the normalized coefficients will be carried out according to formulas (1) and (2), accordingly:

$$Y_{ni} = \frac{Y_i - \min Y_i}{\max Y_i - \min Y_i} \quad (1)$$

$$Y_{ni} = \frac{Y_i - \max Y_i}{\min Y_i - \max Y_i} \quad (2)$$

3. RESULTS

Let us assess the indicators of sustainable development of the regional economy of the Rostov region in order to determine its type of sustainability.

Based on the data of the Federal State Statistics Service for the Rostov Region for 2013-2018 [9], we present the numerical values of all indicators for the selected factors characterizing the development of the economic, social, environmental, resource and institutional spheres, further calculating the normalized coefficients and the aggregate indicator for each area development of the region.

Summing up the normalized coefficients obtained on the basis of differentiated statistical indicators, we obtain a new set of indicators, where the highest score characterizes the period of a higher degree of stability, and, accordingly, the minimum score is a decrease in stability in this period (table 1).

In the period from 2013 to 2015, we can see positive dynamics in the development of the economic system of the Rostov region (the value of the composite indicator

increased from 6.0141 to 14.153). Since 2015, the level of economic stability begins to decline in the Rostov region. While in 2016 and 2017 this decline was not particularly significant (the aggregate indicator changed from 14.153 to 12.7476 and 12.0123, respectively), then in 2018 we see a noticeable decrease in the final indicator of the region's economic stability to 7.5657.

There is a positive trend in the development of the social system of the Rostov Region (an increase in the aggregate indicator from 7.57 to 13), however, in 2017, we can see a noticeable decrease in the level of social sustainability to 11.88. In 2018, the aggregate indicator of social sustainability increased to 14.39.

Also, there is a positive trend in the development of the ecological system of the Rostov Region. However, since 2016, the level of environmental sustainability has been decreasing from 6.53 to 5.63. The minimum value was noted in 2017 at 3.3. In 2018, the consolidated indicator increased to the level of 4.693.

There is a positive trend in the development of resource indicators of the socio-economic system of the Rostov Region (the value of the composite indicator increased from 5.21 to 7.011), however, in 2016, the total value of the normalized coefficients of resource indicators decreased to 3.878. Projected growth of the total indicator in 2017-2018 is insignificant and corresponds to values of 4.707 and 5, respectively.

In the period from 2013-2015, we mark a negative dynamics of the aggregate indicator of the level of institutional development of the Rostov region (the value of the aggregate indicator decreased from 3.91 to 3.195), but in 2016 there was a noticeable increase in the composite indicator to the level of 5.7. The planned growth of the total indicator could not be maintained and in 2017-2018 it decreased to 4.56 and 3.645, respectively.

Let us bring all the values of the aggregate indicator to a standard form. For this we calculate the arithmetic mean for each value, taking the number of indicators participating in the construction of the aggregate indicator as a basis (for the economic system - 21, social - 23, environmental - 11, resource - 11, institutional - 9). The results are presented in table 2.

Figure 2 presents the dynamics of the summary indicators of sustainable development for each subsystem of the regional economy of the Rostov region.

We will carry out the formation of the integral indicator with the use of the geometric mean formula (3) on the basis of summary values in a standard form.

$$I_Y = \sqrt[5]{I_{econ} \cdot I_{soc} \cdot I_{ecol} \cdot I_{res} \cdot I_{inst}} \quad (3)$$

I_L –the level of sustainable socio-economic development of the region; I_{econ} – the level of economic development of the region; I_{soc} – the level of social development of the region; I_{ecol} – the level of ecological development of the region; I_{res} – the level of resource development of the region; I_{inst} – the level of institutional development of the region;

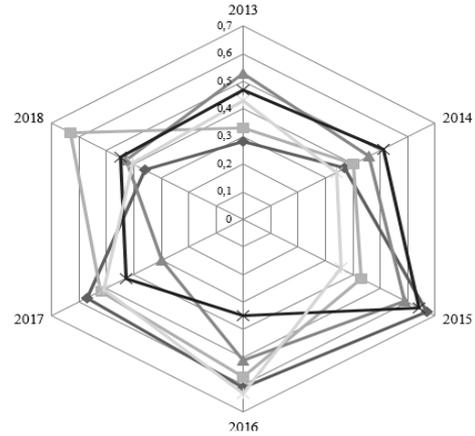
Let us calculate the integral indicator for each period according to the formula (3). As a result, we get the following values:

$$I_{L2013} = 0.397; I_{L2014} = 0.411; I_{L2015} = 0.5216; \\ I_{L2016} = 0.5229; I_{L2017} = 0.4549; I_{L2018} = 0.4463.$$

Fig. 3 illustrates the described dynamics of the integral indicator of sustainable development of the Rostov region.

Interpretation of the integral assessment of the stability of the development of the region will be carried out according to the data of the boundaries of the region.

High level of sustainable development of the region's economy - 0.85-1.00. Sustainable development of the regional economy - 0.70-0.85. The development of the regional economy is close to a steady state - 0.50-0.70. Development of the regional economy with signs of



-  Consolidated indicator of sustainable development of the economic system, I_{econ}
-  Consolidated indicator of sustainable development of the social system, I_{soc}
-  Consolidated indicator of sustainable development of the ecological system, I_{ecol}
-  Consolidated indicator of resource factors of the socio-economic system of the Rostov region, I_{res}
-  Consolidated indicator of sustainable development of the institutional system, I_{inst}

Figure 2 Dynamics of summary indicators of sustainable development of the Rostov region.

instability - 0.25-0.50. Unsustainable development of the regional economy - 0.10-0.25. The crisis state of sustainability of the regional economy - 0.00-0.10.

For the period of 2013-2018 the development of the socio-ecological-economic system of the Rostov region

Table 2. Standard values of the summary indicator of sustainable development of the Rostov region

Nº	Indicators	2013	2014	2015	2016	2017	2018
1.	Indicator of sustainable development of the economic system, I_{econ}	0.28	0.37	0.67	0.61	0.57	0.36
2.	Indicator of sustainable development of the social system, I_{soc}	0.33	0.40	0.43	0.57	0.52	0.63
3.	Indicator of sustainable development of the ecological system, I_{ecol}	0.53	0.46	0.59	0.51	0.3	0.43
4.	Indicator of resource factors of the socio-economic system of the Rostov region, I_{res}	0.47	0.51	0.64	0.35	0.43	0.45
5.	Indicator of sustainable development of the institutional system, I_{inst}	0.43	0.34	0.355	0.63	0.51	0.405

was mainly accompanied by the presence of signs of instability. All values of the integral indicator of sustainable development of the Rostov region in 2013 - 2018 fall into the area of quasi-sustainable development, which reflects the negative tendencies of the processes occurring in the system, and warns of a violation of stability, a threat to economic security.

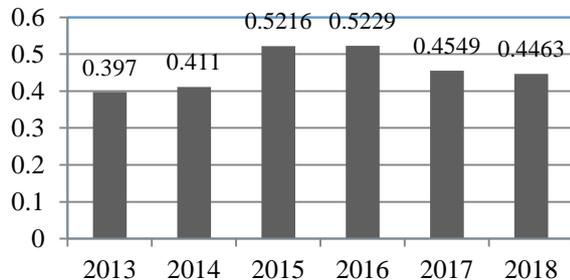


Figure 3 Dynamics of the integral indicator of sustainable development of the Rostov region.

4. CONCLUSION

The obtained values of the integral indicator of the stability of the socio-ecological-economic system of the Rostov region for the reviewed period indicate that the solution of issues related to the possibility of the system's transition to the path of sustainable development is a key one in the socio-economic development of the region.

In the current conditions, the model of sustainable development of the region should imply the achievement of interrelated goals with economic, social, environmental, resource and institutional sustainability in the region, both in the short and long term.

The formation of a new regional policy should base on a mechanism aimed at achieving sustainable development of the socio-ecological-economic system of the region. The purpose of such a mechanism should be to improve the existing methods of regulating regional development by integrating the conceptual principles of sustainable development into it. Elaborate forecasting of the system of indicators of the socio-ecological-economic system will make it possible to more clearly define regional policy in this area, as well as to outline priority areas for their consideration and improvement in the development and financing of regional development programs.

Let us designate the directions, the implementation of which will allow the economy of the Rostov region to quit the zone of quasi-sustainable development and switch to the path of sustainable development. They are: an efficiently functioning innovative mechanism for the greening of the production sector; tourist and recreational resource potential of the region; development of export of digital services; efficient use of the transport and

logistics infrastructure of the region; stimulation of innovative activities of organizations.

The strategic project initiative is the creation of the "Don Valley of Innovative Development" in the Rostov region, which is one of the varieties of the regional innovation cluster. Through the interconnections that unite various actors in innovation, it is possible to achieve the deepest interaction between science, consulting and industry, which is a key condition for the successful promotion of innovations along the innovation chain.

The mechanism for using the potential of recreational resources for the sustainable development of the region should be the creation of conditions for regulated tourism and health-improving recreation within the framework of national and natural parks and reserves of Russia.

The Rostov region has significant recreational opportunities based on a favorable geographical position, unique natural resources and rich historical and cultural heritage. It is necessary to consolidate the dispersed resources into systemic elements, turning them into sources of sustainable development of the recreational territory, giving this territory certain competitive advantages.

The priority areas that can develop the recreational uniqueness of the Rostov region include:

- development of inbound and domestic tourism of various types (cognitive (historical and cultural) tourism; water tourism; ecological tourism of nature conservation orientation; rural, ethnographic, event tourism; archaeological tourism; social tourism);
- implementation of investment projects to create new objects of the tourism industry;
- development of the institutional framework for the development of recreational resources of all public-law formations (municipalities) of the Rostov region;
- formation of new excursion and tourist programs and routes on the territory of the Rostov region.

The combination of recreational resources and tools, knowledge and skills for their transformation using innovative approaches forms the recreational potential of a particular territory, which is the basis for its sustainable development.

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