

An integrated approach to assessing the economic and ecological potential of the agricultural industry of the region

*Alexey Kuzubov*¹, *Aleksandr Maksimenko*¹, *Ekaterina Marchenko*^{1*}, and *Victoria Chistova*¹

¹ Don State Technical University, 344003 Rostov-on-Don, Russia

Abstract. The article is devoted to topical issues of developing the economic and environmental potential of the region's agricultural industry. The opinions of domestic scientists regarding the formation of a system of indicators for assessing economic and environmental potential, as well as their main components, were studied. Based on the analysis, it is proposed to divide the indicators into four blocks. The first will include indicators of economic potential, the second will include aspects related to environmental potential, and when forming the third block, regional characteristics will be taken into account: climatic, social, natural, etc. The last, fourth block will include parameters reflecting the external impact on the economic and environmental potential of the region's agricultural industry. An integrated approach to assessing the economic and environmental potential of the region's agricultural industry has been formed, taking into account all possible external and internal factors.

1 Introduction

The impact of economics on the environment plays an extremely important role in modern conditions. Considering the current situation in the country, the dire consequences of a special military operation in new regions of Russia, there is a need to search for new opportunities for development and rapid recovery that would not only ensure the effective functioning of economic processes, but also minimize the impact on the environment, which is already under threat in better condition. Consideration of the assessment of the economic and environmental potential of the agricultural industry of the region is important for determining the balance between the economic and environmental aspects of development.

This provides an opportunity to understand the impact of agricultural activities on the natural environment, ensuring responsible use of resources and conservation of biodiversity. Assessing potential helps formulate effective strategies for the development of the agricultural industry, promoting sustainable production, increasing competitiveness and improving the quality of life of the population, balancing economic goals with preserving the environment for existing generations.

When considering methodological approaches to assessing the economic and environmental potential of regional development, it is important to note that in the scientific

* Corresponding author: kat_m@mail.ru

literature, scientists approach this issue in completely different ways. Some researchers focus on the analysis of economic potential at different levels of management (at the level of an enterprise, region, country), others - on environmental aspects.

Thus, Pashtetsky V.S. classifies performance indicators for assessing the economic potential of a region in the following areas: strategic planning for the development of the region, operational management of the region, innovation and investment development, socio-economic development, recreational and tourism development and the formation of a positive image of the region [1].

The approach proposed by the author involves taking into account a significant number of quantitative and qualitative parameters.

However, it is important to note that a mechanism for assessing some indicators, such as the local business climate or the quality and structure of medical and educational institutions, is not yet available.

There is a point of view according to which the potential of the region is formed as a result of the synergistic interaction of such components as scientific, personnel, financial, industrial, natural resources, investment, innovation, consumer and labor [2]. It is worth noting that the studies of methodological approaches to assessing the economic potential of a region were devoted to the work of Dabiev D. F., who proposed an integral assessment of the effectiveness of using the economic potential of the region, taking into account the influence of its constituent elements. The author suggests taking into account the following components: investment, innovation, natural resources and labor.

The scientist pays special attention to the methods of taxonomic analysis and the elasticity model [3].

It is worth noting that this method is quite labor-intensive, as it requires a large number of mathematical calculations.

From a similar point of view, the assessment of economic potential is also considered by other scientists [4], who identify such key components as natural resources (taking into account mineral reserves, soil characteristics and climatic conditions of the region), labor (related to the socio-economic conditions of the region, demographic, educational, qualification and ethnocultural indicators of the population of the region, as well as equalization of the level of labor productivity) and production (related to the economic power of the region, the availability of means of production, the level of labor productivity, the quality and capacity of infrastructure, the development of transport networks, telecommunications, etc.).

It should be emphasized that assessments of the environmental potential of a region are sometimes increasingly found in the scientific literature. This is due to growing attention to environmental issues.

Considering the impact of the economy on the environment, some researchers consider it advisable to introduce a system of quality indicators. These indicators cover such aspects as the level of air and drinking water pollution, the condition of the territory, the efficiency of waste disposal, acceptable noise levels, availability of drinking water, etc. [5].

Therefore, much attention is paid to society's satisfaction with existing living conditions.

It is worth paying attention to the study of Pykhov P. A. [6], who uses the indicative analysis method to assess environmental potential. The author proposes to consider the system of indicators together with established threshold values. Among these indicators we can highlight: air pollution index, environmental sustainability coefficient, cultivated area, share of protected areas and objects in the total area, surface water pollution index, volume of waste generated per capita, etc. To obtain a more detailed and approximate assessment, the scientist recommends making calculations by analyzing individual aspects of natural, man-made and environmental safety, taking into account the influence of such socio-economic factors as population size, environmental protection costs, etc.

A slightly different opinion is shared by Dyakonova S.N., Gusev M.V., Bragina I.N., who developed an integral indicator of the environmental friendliness of an enterprise, including: indicators of economic initiative; environmental efficiency; environmental friendliness of the enterprise, as well as the stages of conducting quantitative and qualitative analysis of the environmental responsibility of a business entity [7]. This approach deserves attention, since against the backdrop of significant harmful emissions into the environment, there is a need to take responsibility for one's actions when carrying out business activities.

Based on the foregoing, it can be understood that a significant number of authors consider both economic and environmental properties, the combination of which ensures the effective functioning of a country, region or enterprise without significant harm to the environment. Taking into account economic growth, it is advisable to note that in modern climatic conditions and limited resources, the vector of sustainable development, combined with the rapid development of scientific and technological progress, requires more detailed study and analysis.

At the same time, despite the presence of scientific works, many aspects remain insufficiently researched and substantiated both in the theoretical aspect and in practical application. Separately, it is necessary to create a system of indicators for assessing the economic potential of the agricultural industry of the region. These indicators must be specific and adequately reflect the relationship between economic and environmental aspects. It is important to take into account the diversity of regional characteristics, as well as trends in social, environmental and economic development.

2 Results and discussion

Having analyzed existing approaches to assessing the economic and environmental potential of the agricultural industry of a region, we can come to the conclusion that the views of scientists on assessing economic, environmental and eco-economic development are diverse, representing a wide range of approaches and interpretations. Moreover, due to a significant number of qualitative and quantitative indicators, there is a need for a deeper understanding and analysis of the economic and environmental potential of the agricultural industry of the region. In this context, relying on the achievements of scientists in this field and revealing our own research positions, it is worth forming a system of key qualitative and quantitative assessment parameters. Such a system will help assess the economic potential of the region, taking into account the capabilities of the industry under study.

The proposed parameters for assessing economic and environmental potential should be divided into four separate blocks. The first block will display indicators related to economic potential, the second block will include aspects related to environmental potential. Considering that research is carried out at the regional level, due attention should be paid to the formation of a third block that will take into account regional characteristics: climatic, social, natural, etc.

Taking into account external influences is important for assessing economic and environmental potential, since no territorial unit can function in isolation from external factors. Therefore, the last, fourth block will include parameters that will reflect external impacts on the economic and environmental potential of the agricultural industry of the region. Using this approach allows us to consistently analyze the economic and environmental potential of the region, taking into account its internal and external features.

Based on this, it is worthwhile to dwell in more detail on the economic block (Fig. 1).

ECONOMIC BLOCK	Share of agricultural products in the total structure of exports of the region
	Share of agricultural products in gross regional product
	Agricultural production volume per 100 hectares of agricultural land
	Profitability of agricultural production
	Share of investments in the agricultural industry from the total volume of investments in the regional economy
	Share of eco-products in total sales of agricultural products
	Share of agricultural land in the total area of the region
	Level of provision with material and technical means
	Labor productivity of agricultural workers
	Level of knowledge and professional skills
	Production seasonality index
	Area of agricultural land in the region
Share of innovatively active agro-industrial enterprises in the total number of agro-industrial enterprises in the region	

Fig. 1. Parameters for assessing the level of economic and environmental potential of the agro-industrial complex of the region (Economic block)

The economic block of development of economic and economic potential includes parameters characterizing the economic side of the agricultural industry and its contribution to the development of the region.

The environmental block for the development of the economic and environmental potential of the agricultural industry of the region involves taking into account factors related to environmental sustainability and balanced use of resources. An important goal of this block is to ensure the environmental development of the agricultural industry, preserve the natural environment and improve the quality of life of the population. The development of the environmental potential of the region's agro-industrial complex plays an important role in ensuring sustainable and balanced functioning. Its importance lies in conserving natural resources, reducing the negative impact of economic activities on the environment, maintaining environmental sustainability and ensuring the quality of life of the population.

This block helps to increase the competitiveness of the region in the international market, the formation of environmentally responsible government practices and the development of a healthy and sustainable society (Fig. 2).

The interaction of economic and environmental blocks makes it possible to achieve optimal use of natural resources and ensure the efficiency of economic activities, minimizing the negative impact on the environment. Considering the importance of preserving biodiversity and natural ecosystems, this combination helps ensure the environmental sustainability of the region's agricultural industry in the face of climate change, which contributes to the development of innovative approaches, in particular green technological reorientation, reducing pollutant emissions, which in turn increases the competitiveness of products in the market, ensures sustainable growth in production and income, and also contributes to improving the quality of life of the local population. This approach contributes to the creation of a balanced and responsible development model for the agricultural industry,

ensuring harmony between the economic, environmental and socio-cultural aspects of the region.

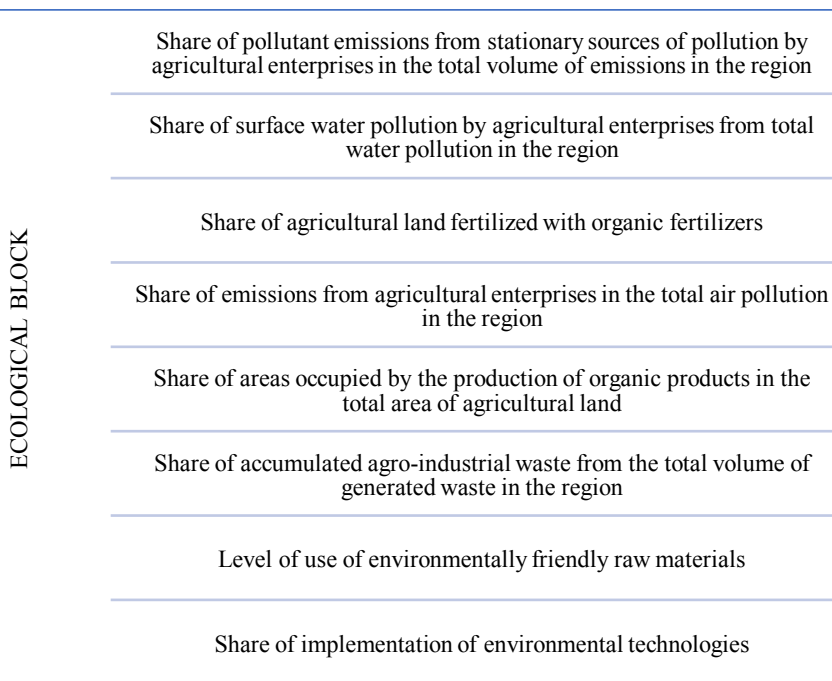


Fig. 2. Parameters for assessing the level of economic and environmental potential of the region's agro-industrial complex. (Ecological block)

The next, no less important assessment indicator is the block of regional factors and factors of external influence.

The regional block should include the following indicators: the level of depletion of natural resources (the degree to which the use of natural resources exceeds their restoration capacity or the possibility of renewal at a natural rate); the level of environmental consciousness of the population (awareness and understanding of environmental issues, natural resources and environmental problems by citizens); share of expenses on environmental protection in the region (indicates the share of expenses going on measures for environmental protection and conservation of natural resources); sectoral connections (economic connections between various sectors of production and services in the economy); natural conditions of the region (affects the collection and yield of vegetables, fruits and berries); soil fertility (the ability of the soil to support plant growth and provide them with the necessary nutrients for normal growth and development); climate of the region (determined by the climatic conditions prevailing in the territory and characterizing its average weather and typical weather conditions of the phenomenon); water supply of the region (access to water resources in a certain region).

These indicators become necessary elements of assessment, complementing the already defined economic and environmental aspects.

The last, fourth block of assessing the economic and environmental potential of the agricultural industry of the region is external factors that directly affect the existence of the region. Such indicators for analysis can be: the state of the labor market (the state of employment and employment dynamics in a particular region, as well as the level of susceptibility of the labor market to economic and social changes); level of institutional and

information support for the agricultural industry (quality, accessibility and efficiency of the institutional framework and information resources ensuring the development and functioning of agriculture); economic and political situation in the country (the current economic and political state of the state and its impact on the economic and environmental potential); purchasing power of the population (the ability of the population to buy goods and services based on their income level); demand for agricultural products (the quantity of goods or services that buyers are willing to buy at a certain price and in a certain period of time).

The proposed integrated approach to assessing economic and environmental potential can be further confirmed by the method of expert assessments (conclusions are drawn based on the assessments of highly qualified specialists on a specific problem), which are formed according to certain rules for solving forecast problems; conclusions were also made about the ways of development of the forecasting object based on the application of the theory of fuzzy logic.

3 Conclusions

Therefore, it is advisable to note that an integrated approach to assessing the economic and environmental potential of the agricultural industry of the region allows for a deep and comprehensive analysis of the relationship between the economic and environmental aspects of development. This approach helps not only to assess the impact of economic activity on the environment, but also to find optimal solutions that contribute to the efficient use of resources, reducing the negative impact on nature and achieving sustainable development. A comprehensive analysis of economic, environmental, technical and sociocultural factors allows us to ensure harmony between preserving the economic needs of society and preserving the environment, making the development of the agricultural industry more sustainable and helping to improve the quality of life in the region.

References

1. V.S. Pashtetsky et.al, *Agrarian Bulletin of the Urals* **5(234)**, 108-120 (2023)
<https://doi.org/10.32417/1997-4868-2023-234-05-108-120>
2. State and prospects for the development of the agro-industrial complex: a collection of scientific papers of the XVI International Scientific and Practical Conference within the framework of the XXVI Agro-Industrial Forum of the South of Russia and the exhibition "Interagromash" and "Agrotechnologies", Rostov-on-Don, March 01–03, 2023 / Don State Technical University (Rostov-on-Don, Limited Liability Company "DSTU-PRINT", 2023)
3. D.F. Dabiev, *Fundamental Research* **12-2**, 258-262 (2019)
<https://doi.org/10.17513/fr.42657>
4. E.A. Umerov, *Scientific notes of the Crimean Engineering and Pedagogical University* **2(64)**, 213-217 (2019)
5. T.N. Kadzhametova, *Scientific notes of the Crimean Engineering and Pedagogical University* **3(73)**, 78-82 (2021) <https://doi.org/10.34771/UZTsEPU.2021.73.3.013>
6. P.A. Pykhov, *Regional economics and management: electronic scientific journal* **4(60)**, 19 (2019)
7. S.N. Dyakonova, M.V. Gusev, I.N. Bragina, *Innovation, technology and business* **2(14)**, 5-10 (2023)