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ENVIRONMENTAL ASPECTS OF SUSTAINABLE AGRICULTURAL DEVELOPMENT¹

The aim of the research is to develop the theoretical foundations for implementing the concept of sustainable agricultural development with a focus on environmental aspects.

***Materials and methods:** The theoretical basis for the research consists of the works of scholars in the field of sustainable agricultural development. The systems approach, abstract-logical reasoning, comparative analysis, and monographic methods were applied.*

***Results.** The article analyzes various approaches to the sustainable development of agriculture. The authors highlight the significance of social factors such as fair working conditions, protection of farmers' rights and interests, improvement of the standard and quality of life of the population. The importance of assessing sustainable development in the agro-industrial complex in terms of the balance of environmental, social and economic components is also emphasized.*

***Conclusions.** The factors of sustainable agricultural development at the micro and macro levels have been identified. Micro-level factors primarily influence the production process. Macro-level factors include social, environmental, and economic aspects.*

***Keywords:** factors, social conditions, agricultural production, economy.*

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ЭКОЛОГИЧЕСКИЕ АСПЕКТЫ УСТОЙЧИВОГО РАЗВИТИЯ СЕЛЬСКОГО ХОЗЯЙСТВА

***Цель исследования** – развитие теоретических основ реализации концепции устойчивого развития сельского хозяйства в рамках экологических аспектов.*

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Материалы и методы. Теоретической основой для исследований послужили труды ученых в области устойчивого развития сельского хозяйства. Применены: метод системного подхода, абстрактно-логический, сравнительного анализа, монографический.

Результаты. В статье анализируются подходы к устойчивому развитию сельского хозяйства. Авторы констатируют важность таких социальных факторов, как справедливые условия труда, защита прав и интересов фермеров, повышение уровня и качества жизни населения. Также подчеркивается значимость оценки устойчивого развития агропромышленного комплекса с точки зрения баланса экологической, социальной и экономической составляющих.

Заключение. Выявлены факторы устойчивого развития сельского хозяйства на микро- и макроуровнях. Факторы микроуровня, в первую очередь, влияют на производственный процесс. Факторы макроуровня включают социальные, экологические и экономические аспекты.

Ключевые слова: факторы, социальные условия, сельскохозяйственное производство, экономика.

Introduction. There has been a rapidly increasing number of agricultural sustainability assessment instruments, which reflects the growing global interest in the environmental, social and economic dimensions of agricultural systems. There remains, however, a significant lack of consensus on what constitutes «sustainability» or «sustainable agriculture», particularly when examined from a societal perspective. The reason for this lack of agreement is that sustainability assessment instruments have different backgrounds, priorities and objectives, which leads to different understandings of what the social dimension should encompass and how to operationalize its subject matter. Some instruments, for example, emphasize measurable indicators, such as labor rights, equity and access to resources, and others focus on more subjective criteria, such as farmers' perceptions of their quality of life. As criteria and indicators for assessing social sustainability often vary according to geographical or cultural context, the geographic scope of the instruments has further contributed to this disagreement [1].

Main part. Sustainable agriculture in the UN Sustainable Development Goals (SDGs) will make a significant contribution to achieving «zero hunger», rural development, environmental protection and food security. United Nations SDG 2 aims to achieve «zero hunger», which includes ending hunger, achieving food security, improving nutrition and promoting sustainable agriculture. However, the specific situation varies from region to region, and globally, significant challenges remain. The key to attaining SDG2 is intensifying cooperation; investing in agriculture; enhancing rural infrastructure as well as improvement of farmer's living standards [2].

There are many different agricultural production systems across the globe, influenced by factors such as climate, socio-economic conditions and cultural norms. As a consequence, the objectives of instrument developers often take precedence over a uniform, scientifically agreed definition of social sustainability. This has contributed to the fact that some of these tools often overlook a clear definition of social sustainability or fail to ensure the operational robustness of their assessments. For example, some tools are consistent with international frameworks, including United Nations and International Labor Organization conventions, and prioritize human rights and worker well-being, while other instruments focus on narrower dimensions, such as individual well-being or community-level impacts.

The importance of the social dimension is highlighted by recurring topics such as labor conditions, the quality of life of farmers, and the broad social impacts of agricultural activities. However, there is an immediate need to take a step back and develop a well-rounded, concept-based definition of social sustainability in agriculture. This approach must integrate all relevant social dimensions, including geographic differences and content-specific subtleties, in order to create a more powerful and inclusive instrument for assessing the sustainability of farms. Such clarification would not only increase the effectiveness of the instruments but also ensure that they better respond to the complexity of the global agricultural system.

In the development of agricultural sustainability, social factors are frequently viewed as a key component, which covers many important topics, such as fair labor conditions, protection of farmers' rights and interests, development of

rural areas, and the well-being of agricultural practitioners. While these topics are widely recognized, there is still a lack of a global and systematic theoretical framework to integrate all the elements in order to create a complete understanding of social sustainability.

During our research and analysis of agricultural social sustainability, common themes emerged, including «human rights», «working conditions», «quality of life» and «social impact». They reflect key issues that must be addressed for social sustainability to be effective. For example, the working conditions of agricultural laborers are linked directly to their quality of life, and the production methods of agricultural businesses affect the social fabric of local communities. There are also social equity issues related to the production, allocation and consumption of agricultural products, such as how to compete in a globalized marketplace for smallholder economies, or the impact of agricultural modernization on traditional farming practices. Such issues must take into account the framework of social sustainability to ensure that agricultural development is not only concerned with economic growth, but also with social equity and well-being.

According to scientists V.I. Danilov-Danilyan and K.S. Losev, indicators of sustainable development can be classified into several distinct groups, each addressing different aspects of sustainability [3].

– The first group, **social indicators**, reflects population dynamics and societal well-being. They include income levels, health, education, and poverty rates, which are crucial for assessing well-being and understanding the impact of socio-economic conditions on people's lives. For example, population changes not only indicate growth or decline but also provide insights into age distribution and its implications for future services, employment, and economic productivity. Monitoring health and education levels helps assess human development, which is vital for maintaining a skilled, adaptable workforce.

– The second group, **the group of economic indicators**, focuses on patterns in consumption and production. This includes the adoption of green technologies, which are essential for sustainable industrial practices. They reveal trends in resource efficiency, innovation, and economic diversification. By analyzing these indicators,

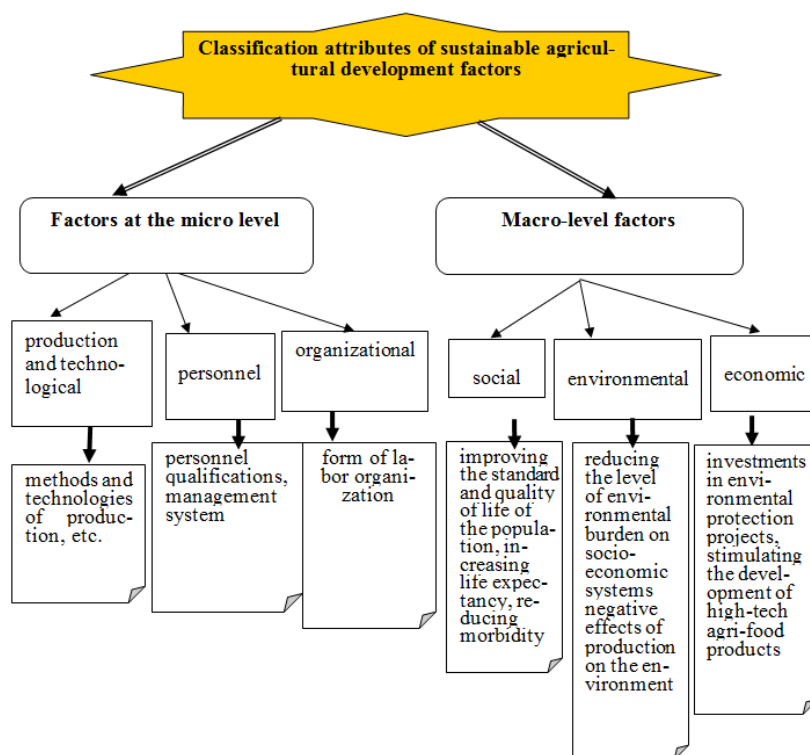
policymakers can identify which sectors are progressing toward sustainability and which require further support.

– **The environmental indicator group** includes measurements about protecting and fixing natural things like forests, water, soil, and living things. Also, it includes efforts to stop land from becoming desert and other types of environment damage. These indicators give important information about the environment and how well conservation plans are working. They are very important not only for knowing how healthy ecosystems are now, but also for helping make policies about managing resources and protecting the environment.

– Finally, **institutional indicator sets** are central to the formulation of laws and regulations that support sustainable development objectives at all levels of government. This includes integrating sustainable development into national economic planning and management systems, and actively participating in international partnership projects to promote sustainable development. Strong regulations and policies are essential not only to ensure the effective implementation of sustainable development plans but also to define responsibilities and ensure that all parties share accountability for achieving the Sustainable Development Goals.

Eventually, the absence of a clear framework for understanding the social aspects of agricultural sustainability presented a key challenge. With the development of this field, researchers, policymakers, and practitioners need to work together to build a methodology that brings ideas from the social sciences into sustainability tools. That will help increase the effectiveness of sustainability efforts, ensure that these efforts are fair and balanced, and meet the needs of agriculturally relevant groups. The only way we can truly achieve sustainable agriculture that respects human rights, improves working and working conditions, and enhances the quality of life of those.

It should be noted that scientific and technological progress, along with an increase in the standard of living, can lead to environmental problems. In this regard, the assessment of sustainable development of the agro-industrial complex with regard to the balance of environmental, social and economic components deserves attention [4].



Picture – Factors of sustainable agricultural development

Source: developed by the author based on his own works

The ecological and economic system, which is a complex and contradictory set of elements, connections and relationships, is in dynamic interaction, taking alternately an equilibrium and non-equilibrium state [4].

Accordingly, we have identified the factors influencing sustainable agricultural development at both the micro and macro levels (Picture).

Micro-level factors primarily affect the production process. These include production and technological factors (methods and technologies of production, etc.), organizational (form of labor organization), personnel factors (personnel qualifications, management system).

At the macro level, we have identified the following factors:

- social (improving the standard and quality of life of the population, increasing life expectancy, reducing morbidity);
- environmental (reducing the level of environmental burden on socio-economic systems);
- economic (investments in environmental protection projects, stimulating the development of high-tech agri-food products).

Consequently, to effectively promote agricultural sustainability, future assessment tools

should place greater emphasis on measuring social sustainability and integrating social science theories into evaluation systems. The goal of sustainable agricultural development can only be achieved by establishing a balance among the three dimensions: economy, environment, and society.

Conclusion. Our research has identified key factors influencing sustainable agricultural development, considering production, technological, organizational, and personnel aspects at the micro level, as well as social, environmental, and economic aspects at the macro level. This analysis contributes to assessing the social sustainability of agriculture within the broader framework of the three dimensions: economy, environment, and society.

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