DOI: https://doi.org/10.30525/2256-0742/2025-11-3-361-370

FORMATION OF AN EFFECTIVE MANAGEMENT SYSTEM FOR ECONOMIC SECURITY OF THE AGRICULTURAL SECTOR OF THE ECONOMY: THEORETICAL AND METHODOLOGICAL ASPECTS

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Abstract. The relevance of the topic of forming an effective system of management of economic security of the agricultural sector in the system of sustainable development is due to the combination of pragmatic challenges of modernity, scientific and methodological needs and strategic priorities of national development. The development of theoretical and methodological principles in this area is of significant importance for ensuring stability, adaptability and sustainable development of the agricultural sector in conditions of constant changes in the external environment. The subject of the study is the theoretical and methodological aspects of forming a system of management of economic security of the agricultural sector of the economy. The methodological basis is a comprehensive approach that combines general scientific and special research methods: dialectical and scientific-theoretical methods – to determine the essence of the category of economic security and the formation of theoretical generalizations, abstract-logical method – to systematize knowledge and formulate conceptual provisions. In the process of research, a systematic approach was applied to the analysis of the structure of economic security of the agricultural sector, which allows us to consider the system as a single holistic formation taking into account the interrelationships of its components. To determine the relationships between the elements of the system, structural-logical modeling methods were used, which ensure the formalization of complex processes and their systematization. The information base is the scientific works of domestic and foreign authors, as well as the results of our own empirical research. The purpose of the article is to develop theoretical and methodological principles for the formation of an effective system for managing the economic security of the agricultural sector, which ensures the stability and competitiveness of enterprises in dynamic environmental conditions. The formation of an effective system for managing the economic security of the agricultural sector requires a comprehensive approach that integrates organizational, economic, informational and social components. Ensuring the economic security of the agricultural sector in the face of modern challenges, in particular military, economic, climatic and social, is a complex multifactorial process. The prerequisites for this process are formed on the basis of the interaction of state, market and institutional factors that ensure the stability, sustainability and development of the agricultural sector in the long term. According to the author of the article, the economic security of the agricultural sector is an integrated system for ensuring the stable, effective and sustainable functioning of agricultural enterprises and the industry as a whole, based on the balanced use of economic, social, environmental and technological resources, the ability to adapt to internal and external threats, as well as the implementation of sustainable development strategies that guarantee food security, competitiveness and long-term viability of the agricultural sector in the context of global transformations. A systematic and comprehensive approach to determining the economic security of the agricultural sector, which takes into account both internal and external factors, as well as the integration of the principles of sustainable development, is key to the formation of effective management mechanisms and ensuring the stability of agricultural production in modern conditions. The functions of managing the economic security of the agricultural sector include: forecasting and identifying threats; planning security measures; organizing and coordinating management actions; monitoring and controlling the state of security; analyzing the effectiveness of the implemented measures; implementing preventive and reactive actions; information support for management. The implementation of these functions provides a comprehensive, systematic and adaptive approach

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to protecting agricultural enterprises from various risks, which contributes to their stable development and competitiveness. The system of economic security management of the agricultural sector is a multi-level, integrated structure that combines methods, tools, levers and support for achieving sustainable development, stability and protection of agricultural enterprises from various threats. It covers both economic and social, technological, legal and information aspects, which makes it a key element of agricultural sector management in modern conditions.

Keywords: agricultural sector, economic security, sustainable development, management, methodology.

JEL Classification: Q10, G38, O13, A11, B41

1. Introduction

The relevance of the study of the formation of an effective system of management of economic security of the agricultural sector is due to a number of factors that have both theoretical and practical significance in the context of modern global transformations and challenges. First, the agricultural sector today is under the influence of multidimensional threats, among which climate change, geopolitical conflicts, in particular the armed conflict in Ukraine, as well as disruption of logistics chains and energy crises should be highlighted. These factors significantly destabilize production processes, worsen food security and increase the financial risks of agricultural enterprises. In this regard, there is an urgent need to form an economic security management system capable of ensuring the stability and adaptability of the agricultural sector to external and internal challenges. Secondly, the integration of the principles of sustainable development into the management practices of the agricultural sector is becoming a key condition for its long-term functioning. Ensuring a balance between economic sustainability, environmental responsibility and social balance is a necessary prerequisite for the formation of an effective management system. Economic sustainability involves supporting financial stability, investment attractiveness and competitiveness; environmental responsibility – rational use of natural resources and adaptation to climate change; social balance – supporting rural communities, developing human capital and ensuring employment.

Thirdly, the current state of theoretical and methodological principles of managing economic security in the agricultural sector is characterized by certain gaps. In particular, existing methods are often fragmentary, focusing on individual aspects of security, such as financial stability, and do not take into account the complexity of the system and the relationships between its components. In addition, the lack of adaptability of models to dynamic changes in the external environment, as well as the limitations of assessment tools that integrate quantitative and qualitative indicators, complicate the adoption of informed management decisions.

Fourth, the practical need to improve the economic security management systems of the agricultural sector is due to the need to digitize monitoring and forecasting processes, increase the effectiveness of risk management, as well as strengthen institutional support for agricultural enterprises. The use of modern information technologies, in particular artificial intelligence, for analyzing big data, predicting yields and optimizing resources is an important step in this direction. Finally, the agricultural sector plays a strategic role in ensuring national security, in particular food independence and integration with international standards, such as ESG (environmental, social and governance criteria). The formation of an effective economic security management system in the context of sustainable development contributes to the implementation of these strategic objectives and ensures the long-term competitiveness of the industry.

Based on the above, the relevance of scientific solutions is due to the following points: 1) the growth of risks and threats to the agricultural sector associated with global economic, environmental and social challenges necessitates the improvement of the economic security management system; 2) the restoration and development of the agricultural sector of Ukraine in the context of post-war transformation requires the integration of innovative management approaches that ensure the sustainability and competitiveness of the industry; 3) the inadequacy of existing models of assessment and management of economic security, which often do not take into account modern trends in sustainable development, digitalization and greening.

The purpose of the study is to form the conceptual and methodological principles of an effective system of economic security management of the agricultural sector of the economy, integrated into the system of sustainable development, taking into account modern risks, threats and opportunities. In accordance with the purpose, the following tasks were set in the work: to reveal the essence and structure of the economic security management system of the agricultural sector, to determine its key components and functions; to determine the prerequisites for ensuring the economic security of the agricultural sector in the context of sustainable development, taking into account

economic, environmental and social factors; to develop methodological approaches to assessing the effectiveness of the economic security management system, to determine criteria, indicators and monitoring procedures.

The methodological basis is a comprehensive approach that combines general scientific and special research methods: dialectical and scientific-theoretical methods – to determine the essence of the category of economic security and the formation of theoretical generalizations, abstract-logical method – to systematize knowledge and formulate conceptual provisions. In the process of research, a systematic approach was applied to the analysis of the structure of the economic security of the agricultural sector, which allows us to consider the system as a single holistic entity taking into account the relationships of its components. To determine the relationships between the elements of the system, structural-logical modeling methods were used, which ensure the formalization of complex processes and their systematization.

The logic of presenting the researched material:

1. Theoretical substantiation of the essence and components of the system of economic security management of the agrarian sector, which allows to determine the basic conceptual principles of the study.
2. Determination of the prerequisites for ensuring economic security in the context of sustainable development, which forms the basis for the development of adaptive management strategies.
3. Development of methodological approaches to assessing the effectiveness of the economic security management system, which are based on the integration of quantitative and qualitative methods.

The novelty of the study lies in the development of an integrated, multi-level and adaptive system of economic security management of the agrarian sector, which takes into account the modern challenges of sustainable development. Methodological tools are proposed for assessing the effectiveness of such a system and its implementation in management practice, which will contribute to increasing the stability of the agrarian sector in conditions of dynamic external and internal changes.

2. The Essence and Components of Managing the Economic Security of the Agricultural Sector

Economic security of the agricultural sector is a fundamental aspect of the sustainable development of agricultural enterprises, which determines their ability to withstand internal and external threats, maintain competitiveness and ensure the country's food security. Economic security management in the agricultural sector is a complex process that includes systematic monitoring, risk assessment, development and implementation of protection and development strategies.

The concept of economic security of the agricultural sector is the subject of active research by both Ukrainian and foreign scientists. An analysis of the works of scientists allows us to identify the following main approaches to interpreting the essence of this category and its structural components.

Obydenko H. O., Kredisov V. A., Kalchenko S. V., Petrenko V. A., Bocharova N. O. (2021) consider the economic security of agricultural enterprises as a state of stable equilibrium of the system components in conditions of changes in the external environment, which ensures long-term progressive development, maintaining the synchronicity and rhythm of resource flows. They emphasize the need for a synergistic approach to balancing the functional components of enterprise security, which forms a kind of "security corridor" (Obydenko et al., 2021). Li H., Huang J., Wang X. (2024) define the economic security of the agricultural sector as the ability of the system to withstand risks through the integration of industry chains, which includes risk management, regulation and minimization of negative effects, in particular through the development of innovative management models. Zhang Y., Liu S. (2022) focus on risk management in agricultural supply chains, considering economic security as the ability of the system to ensure the continuity and sustainability of agricultural production and supply, which is key to food security. Kim J. and Kim S. (2024) interpret the economic security of the agricultural sector as a comprehensive system that includes digital technologies (e.g., blockchain) to increase transparency, protect against fraud, and optimize processes, which contributes to risk reduction and efficiency improvement. Rahman M. and Alam K. (2025) consider economic security through the lens of the relationship between food security, agriculture, and sustainable development goals, emphasizing the importance of a systemic approach to ensuring the stability and development of the agricultural sector.

In accordance with the above, most scientific studies identify the following key components of the economic security of the agricultural sector:

– financial security – the ability of agricultural enterprises to ensure the stability of financial flows, effective risk management, access to financing (Obydenko et al., 2021; Sidorchuk & Kucher, 2023);
– production security – ensuring the stability and efficiency of production processes, the introduction of innovations and resource-saving technologies (Li et al., 2024; Zhang & Liu, 2022);
– information security – protection of information systems, data transparency, the use of digital

technologies for monitoring and management (Kim & Kim, 2024);
– market security – the ability to adapt to changing market conditions, diversification of sales markets, price stability (Rahman & Alam, 2025; Zhang & Liu, 2022);
– environmental security – compliance with environmental standards, conservation of natural resources, minimizing negative impact on the environment (Gao, Lin & Hu, 2023);
– social security – ensuring employment, social protection of workers, support for local communities (Rahman & Alam, 2025);
– legal security – compliance with legislative norms, protection of property rights, regulatory support (Obydenko et al., 2021).

Thus, in the above studies, the economic security of the agricultural sector is considered as a multi-component system that ensures the stability and adaptability of agricultural enterprises to external and internal threats. It includes financial, production, information, market, environmental, social and legal components that interact to support the sustainable development and competitiveness of the agricultural sector.

In our opinion, the economic security of the agricultural sector is an integrated system for ensuring the stable, effective and sustainable functioning of agricultural enterprises and the industry as a whole, based on the balanced use of economic, social, environmental and technological resources, the ability to adapt to internal and external threats, as well as the implementation of sustainable development strategies that guarantee food security, competitiveness and long-term viability of the agricultural sector in the context of global transformations. A systematic and comprehensive approach to determining the economic security of the agricultural sector, which takes into account both internal and external factors, as well as the integration of the principles of sustainable development, is key to forming effective management mechanisms and ensuring the stability of agricultural production in modern conditions.

The agricultural sector economic security management system is a comprehensive mechanism organized to ensure the stability, resilience and development of agricultural enterprises and the industry as a whole by identifying, assessing, neutralizing threats and risks, as well as implementing preventive and reactive measures. It integrates various methods, tools, levers and resources aimed at achieving the strategic goals of the agricultural sector economic security.

The following main characteristics of the agricultural sector economic security management system can be distinguished:

1. Goals and objectives. The system is aimed at ensuring an adequate level of economic security, which includes financial stability, protection from internal and external threats, maintaining competitiveness, as well as sustainable development of the agricultural sector. The main tasks are to identify threats, develop preventive and reactive measures, monitor and evaluate management effectiveness.

2. Structural elements. The system includes methods (economic, administrative, legal, socio-psychological), tools (financial-economic, organizational-technological, analytical), levers (profit, investment, price, salary, etc.), as well as support (scientific-methodological, information, personnel, regulatory and legal).

3. Functional components. Management covers the following functional areas: financial security, personnel-intellectual, production-technological, political-legal, information security, environmental, investment-innovative, social, marketing, resource-technical, energy, food, transport, foreign economic security.

4. Management processes. Include planning, organization, motivation, control and adjustment of measures that ensure economic security. Special attention is paid to monitoring the state of security, assessing threats, making operational decisions in non-standard situations, as well as monitoring the effectiveness of implemented measures.

5. Organizational support. Provides for the creation of an appropriate management structure, for example, an economic security service, which coordinates the activities of all divisions of the enterprise, as well as the development of internal regulatory documents (regulations, instructions, orders).

6. Information and scientific and methodological support. Provides for the collection, processing, analysis of data on internal and external threats, the development of methodologies, development scenarios, forecasts that allow making informed management decisions.

The formation of an effective economic security management system is an extremely important task, since such a system allows the agricultural sector to:
– ensure sustainable economic development and competitiveness;
– protect itself from crisis phenomena and risks of both internal and external nature;
– carry out constant monitoring and timely respond to threats;
– form reliable information flows for management;
– localize and eliminate dangers that may negatively affect the activities of enterprises.

Thus, the agricultural sector economic security management system is a multi-level, integrated structure that combines methods, tools, levers and provisions to achieve sustainable development, stability and protection of agricultural enterprises from various threats. It covers both economic and social, technological, legal and informational aspects,

which makes it a key element of agricultural sector management in modern conditions.

It is worth noting that in recent years there has been a significant development of conceptual approaches to defining and ensuring the economic security of the agricultural sector, which is due to the increasing complexity of global risks, climate change and socio-economic transformations. Analysis of foreign approaches (World Bank, 2025; Caribbean Development Bank, 2020–2025; European Commission, 2025) indicates an emphasis on the integration of innovations, institutional support, financial mechanisms and sustainable development. In particular, the World Bank reports (2025) emphasize that the economic security of the agricultural sector is closely linked to food security, the stability of farmers' incomes and resilience to global risks through the introduction of modern technologies, infrastructure development and effective risk management.

The Caribbean Development Bank (2020–2025) emphasizes three key components: competitiveness, sustainable development and social inclusion, which are implemented through institutional strengthening, access to financial services and innovative technologies. The European Commission (2025) emphasizes digitalization, environmental standards and diversification of production as the basis for adaptability to climate and market challenges. The example of Lebanon (FAO, 2020–2025) demonstrates the integration of the economic security of the agricultural sector into the national food security strategy, which includes macroeconomic policy coordination, institutional capacity development and support for innovation. A comparative analysis of approaches shows that foreign researchers emphasize the importance of integrating global challenges, innovation, institutional mechanisms and adaptability to external changes (World Bank, 2025; European Commission, 2025; FAO, 2020-2025). From the above it follows that foreign researchers consider the economic security of the agricultural sector as a multidimensional phenomenon, which includes not only the internal mechanisms of enterprises, but also the broader context of food security, climate challenges, global market trends and political factors. They emphasize the need for an integrated approach that combines technological innovations, institutional support, financial mechanisms and sustainable development.

The following main components of the economic security management system of agricultural enterprises can be distinguished:

1. Security objects are economic resources, production facilities, intellectual potential, investments, information systems that are subject to protection from threats.

2. Management entities are management bodies of enterprises, state institutions that carry out control, regulation and coordination of measures to ensure economic security.

3. Management goals and objectives are ensuring the stable functioning of agricultural enterprises, maintaining their competitiveness, minimizing the risks of financial losses, supporting innovative development and environmental responsibility.

4. Management functions – planning, organization, motivation, control, analysis and adjustment of security measures implemented at different levels of management.

5. Management principles – systematicity, comprehensiveness, adaptability, prevention, legality, ensuring the effectiveness of the system.

6. Management methods and mechanisms – these are tools that include financial control, insurance, legal regulation, investment management, personnel policy, technological development, as well as monitoring and risk analysis.

7. Information support – collection, processing and analysis of data on internal and external threats, which allows making informed management decisions.

At the same time, the system of management of economic security of the agricultural sector includes a complex of interrelated components that ensure effective functioning and protection from internal and external threats. Accordingly, the main components of the system of management of economic security of the agricultural sector include: financial and economic, resource and technical, investment and innovation, personnel and intellectual, political and legal, information, environmental, marketing, social components. In particular, the financial and economic component – management of profits, expenses, capital, financial analysis, insurance; resource and technical component – provision of necessary material, technical resources, innovative technologies; investment and innovation component – attraction of investments, introduction of innovations to increase competitiveness; personnel and intellectual component – personnel management, development of competencies, motivation; political and legal component – compliance with legislation, legal protection, regulatory mechanisms; information component – collection, processing and protection of information for making management decisions; environmental component – ensuring environmental safety, sustainable use of natural resources; social component – social stability, support for rural communities; marketing component – market analysis, demand formation, product sales.

Additionally, scientists also distinguish such functional components as energy, food, transport, foreign economic security, which reflect the specifics of the agricultural sector.

The system of managing the economic security of agricultural enterprises is based on three key principles:

– efficiency – the ability to quickly respond to threats to the internal and external environment;
– continuity – constant protection from negative factors;
– reasonableness of costs – rational resource provision of effects.

The main functions of managing the economic security of the agricultural sector can be formulated as follows:

1. Forecasting and identifying threats – systematic identification of potential internal and external threats, analysis of their causes and consequences for the agricultural sector, as well as the formation of forecasts for the development of the situation.

2. Planning security measures – development of strategic and tactical plans to neutralize threats, optimize resources and ensure the stability of agricultural enterprises.

3. Organization and coordination of management actions – creation of an effective management structure, distribution of powers and coordination of actions between units and external partners to implement security measures

4. Monitoring and control of the security situation – constant tracking of key indicators, assessment of the effectiveness of measures, identification of deviations and prompt correction of management decisions.

5. Analysis and assessment of the effectiveness of measures – systematic analysis of management results, assessment of the impact of measures on the level of security, formation of recommendations for improving the system.

6. Implementation of preventive and reactive measures – implementation of measures aimed at preventing threats and eliminating their consequences to minimize risks.

7. Information management support – ensuring the collection, processing and analysis of information for making informed management decisions and timely response to changes.

The prerequisites for ensuring the economic security of the agricultural sector are closely related to the principles of sustainable development, which include economic efficiency, social justice and environmental responsibility. Ensuring these prerequisites creates conditions for:
– long-term stability of the agricultural sector;
– increasing the country's food security;
– preserving natural resources for future generations;
– social development of rural areas;
– adaptation to global challenges, such as climate change and geopolitical risks.

The main prerequisites for ensuring the economic security of the agricultural sector, based on best international practice, are as follows:

1. State strategic regulation and support. The government plays a key role in creating conditions for economic security through the development and implementation of strategic programs for the development of the agricultural sector, ensuring access to credit resources, investments, and regulating the agricultural product market. Legislative support for stability, protection of producers' rights and creation of a predictable business environment are important.

2. Financial support and stabilization. The provision of state subsidies, grants, preferential loans, and agricultural risk insurance helps stabilize the financial condition of agricultural enterprises. This reduces vulnerability to market fluctuations and natural disasters.

3. Infrastructure development. Investments in transport, energy, and irrigation infrastructure increase production efficiency, reduce logistics costs, and help increase the competitiveness of the agricultural sector.

4. Innovative activities and technological development. The introduction of modern technologies, digitalization, and the development of research and development are necessary to increase productivity, adapt to climate change, and reduce environmental burden.

5. Stability of pricing policy and market regulation. State regulation of prices for the main types of products, the creation of reserves, and control of export-import operations help avoid sharp fluctuations that negatively affect producers' incomes.

6. Social support for rural communities. Maintaining social stability in rural areas, developing human capital, ensuring employment and improving living standards are important prerequisites for the sustainable development of the agricultural sector.

7. Environmental safety and sustainable development of natural resources. Ensuring balanced use of land, water resources, environmental protection are fundamental for the long-term viability of agricultural production.

8. Monitoring, analysis and risk management. Systematic collection of information, assessment of threats (macroeconomic, political, natural, technological), development of response scenarios allow for rapid adaptation to changes in the external environment.

3. Methodological Approaches to Assessing the Effectiveness of the Economic Security Management System

Assessment of the effectiveness of the economic security management system of the agricultural sector is a complex multifactorial process that requires the use of various methodological approaches. In scientific research, several main methodological approaches are distinguished, which differ in their content, tools and scope (Kukhar, 2024).

1. The quantitative-analytical approach is based on the use of quantitative indicators and statistical methods to assess the level of economic security and the effectiveness of its management. The methods of financial analysis, index assessment, correlation and regression analysis, and the construction of integral indices are used. Its advantages: objectivity and accuracy of assessment based on numerical data; the ability to compare results over time and between enterprises; convenience for automation and systematic monitoring. Among the disadvantages of this approach: limited consideration of qualitative factors (for example, human resources, legal framework); vulnerability to incompleteness or inaccuracy of data; does not always reflect dynamic changes and the complexity of the system.

2. A comprehensive (systemic) approach involves assessing the economic security management system as a holistic complex, including various components (financial, production, investment, personnel, legal, information, etc.). Methods of expert assessments, matrix models, SWOT analysis, as well as integration of qualitative and quantitative indicators are used. The advantages of this approach: provides a comprehensive analysis, takes into account the relationships between the elements of the system; flexibility in adapting to the specifics of the agricultural sector; improves the quality of management decisions due to a comprehensive vision. Disadvantages of the approach: the subjectivity of expert assessments can affect the results; requires significant resources and time to collect and process information; complexity in formalization and standardization.

3. The method of indicators and criteria – the assessment is based on determining a set of key indicators (indicators) that characterize various aspects of economic security (financial stability, investment attractiveness, personnel potential, technological development, etc.). Each indicator has established normative values or threshold levels. Advantages of the method: clarity and clarity of assessment criteria; possibility of operational control and early detection of problems; ease of application in practice. However, this method has certain disadvantages: indicators may not fully reflect the complexity of the system; determination of norms may be difficult due to the diversity of agricultural enterprises; insufficient flexibility in case of changes in the external environment.

4. The monitoring approach involves continuous collection, analysis and assessment of information on the state of economic security in real time. Early warning systems, information technologies, analytical panels are used. Advantages of the approach: prompt response to threats; increased adaptability of the management system; possibility of forecasting and planning. Disadvantages of the approach: high requirements for information infrastructure; need for qualified personnel for data analysis; possibility of information overload.

5. The strategic approach focuses on assessing the effectiveness of the management system through the prism of achieving strategic goals of economic security, such as ensuring sustainable development, competitiveness, and innovative development. The methods of strategic analysis, scenario planning, benchmarking are used. The advantages of this approach: focus on long-term results; taking into account external and internal development factors; contributes to the formation of adaptive strategies. The disadvantages of the strategic approach: difficulty in quantitatively measuring efficiency; high dependence on the accuracy of forecasts and scenarios; the need for constant updating of strategic plans. Based on the above, for a comprehensive assessment of the effectiveness of the economic security management system of the agricultural sector, it is advisable to use a combination of methodological approaches that allows taking into account both quantitative and qualitative aspects, the speed of response, as well as strategic development prospects. Each of the described approaches has its own advantages and disadvantages, so the choice depends on the specific goals, resources and characteristics of the agricultural enterprise or industry.

At the same time, foreign scientists, studying issues of economic security, especially in the context of the agricultural sector, often integrate specific approaches that take into account global challenges, innovations and inter-sectoral connections. Among such approaches are the following (Kukhar, 2024):

1. Resource-Functional Approach – this approach focuses on the efficiency of using all types of resources (financial, material and technical, labor, information, natural) and their functional relationships to ensure the stability and development of an agricultural enterprise. Scientists consider this through the prism of the sustainability of supply chains, the efficiency of resource allocation in response to global challenges (for example, disruptions due to pandemics or conflicts). The assessment of efficiency here is based on the analysis of resource productivity, their availability and optimal functioning. The advantages of this approach: allows for a comprehensive assessment of the efficiency of resource use; identifies bottlenecks in production and management processes; contributes to cost optimization and increased profitability. Disadvantages of this approach: difficulty in taking into account all the relationships between different types of resources; the need for significant amounts of detailed information about each resource; may underestimate the impact of external, non-resource factors.

2. Income-Resource/Investment Approach focuses on the ability of the agricultural sector to generate

sufficient income to cover costs, ensure expanded reproduction and attract investment, which is critically important for its economic security. This approach has the following advantages: it is directly related to financial stability and attractiveness for investors; allows you to assess the potential for growth and development; focuses on profitability as a key security criterion. Among the disadvantages of the approach are the following: short-term orientation to income can lead to ignoring long-term environmental or social problems; difficulty in predicting future income due to the high dependence of the agricultural sector on natural and market conditions; does not always take into account non-monetary aspects of security (e.g. social stability).

3. The Bankruptcy Assessment Approach focuses on identifying and assessing the risks of financial insolvency and bankruptcy of agricultural enterprises. It uses bankruptcy prediction models (e.g. Altman Z-Score model or its adaptations) and financial ratios to assess the likelihood of crisis situations. This approach has the following advantages: provides clear quantitative indicators of financial condition; allows timely identification of enterprises at risk; is important for creditors and investors. Its disadvantages: mainly focuses on financial aspects, ignoring other threats; models may not always be adapted to the specifics of the agricultural sector (e.g. seasonality, high risks); is usually based on historical data, which does not always reflect the current state or future risks.

4. Scenario Approach involves the development of several possible scenarios (scenarios) and an assessment of the impact of each of them on the economic security of the agricultural sector. Foreign studies actively use this approach to analyze the impact of climate change, geopolitical conflicts, global economic crises on agricultural markets and food security. This allows you to develop flexible strategies for responding to various challenges. Among the advantages of the scenario approach: it allows you to take into account the high uncertainty of the external environment; helps develop adaptive strategies and action plans; increases preparedness for crisis situations. Disadvantages: difficulty in building realistic and comprehensive scenarios; requires significant analytical resources and expert knowledge; the results are hypothetical and depend on the quality of forecasts.

These approaches allow for a deeper analysis of the economic security of the agricultural sector through the prism of resource efficiency, financial sustainability, and the ability to adapt to a wide range of potential threats and uncertainties. The integration of these approaches provides a more complete and reliable assessment of the effectiveness of the economic security management system in the agricultural sector.

Based on the generalization of modern scientific research, it is possible to provide a set of indicators and criteria that allow for a comprehensive assessment of the effectiveness of the management system for the economic security of the agricultural sector. Key indicators of effectiveness:

1. Financial indicators (financial stability ratio; profitability of activities; solvency; asset liquidity; dynamics of investment attraction; level of credit debt).

2. Technical and technological indicators (degree of technical equipment; innovativeness of production processes; energy efficiency of production; costs of implementing resource-saving technologies).

3. Resource security (supply of basic resources; rational use of resources; availability and quality of raw materials).

4. Food and foreign economic security (volume of production of basic types of agricultural products; export potential; diversification of sales markets; stability of foreign exchange earnings, level of debt burden).

5. Social indicators (employment level in the agricultural sector; average wage level; social protection of employees; investments in human capital development).

6. Environmental indicators (compliance with environmental standards; volume of pollutant emissions; costs of environmental measures; implementation of environmental monitoring systems).

7. Organizational and management indicators (availability and effectiveness of anti-crisis programs; quality of information support for management decisions; promptness of response to internal and external threats; degree of integration of digital technologies into management).

In this case, the following criteria for assessing effectiveness can be distinguished:

– compliance of the achieved indicators with established standards and threshold values, in particular financial stability indices, profitability level, environmental standards, etc.;
– positive dynamics of key indicators, indicating an increase in the efficiency of the system;
– an integral indicator of economic security, which is calculated as a weighted sum of the main indicators and allows determining the overall level of security (critical, acceptable, optimal);
– the system's resistance to external and internal threats, assessed by the ability to quickly adapt to changes and neutralize negative impacts;
– the level of implementation of strategic goals of sustainable development, assessed by achieving target indicators in the spheres of economy, society and ecology.

The proposed system of indicators and criteria provides comprehensive monitoring of the effectiveness of management of economic security of the agricultural sector, allows for timely identification of threats and making informed management decisions

aimed at ensuring the sustainable development of the industry. However, for the agricultural sector in conditions of instability, the combination of technological tools (IoT, AI) with flexible organizational procedures is critical. Key elements of the combination of technological tools: operational detection of external threats through two-level monitoring; automated mechanisms for responding to deviations of indicators; regular updating of the strategy based on scenario analysis. Such a system will allow not only to record risks, but also to proactively adapt business models to the dynamics of the external environment.

Taking into account the dynamics of the external environment in the agrarian security monitoring system is ensured through a multi-level, cyclical process of observation, assessment, forecasting and adaptive management using modern digital technologies and scientifically based criteria. This approach allows you to quickly respond to changes, minimize risks and ensure sustainable development of the agrarian sector in conditions of instability.

Effective management of the economic security of the agrarian sector is based on a comprehensive approach that covers structural-functional, organizational-legal, methodological and instrumental aspects. The concept of managing the economic security of the agrarian sector involves the integration of various mechanisms and procedures aimed at ensuring the stability, competitiveness and adaptability of agricultural enterprises to modern challenges and threats.

4. Conclusions

Thus, the concept of effective management of economic security of the agricultural sector involves the systematic integration of organizational, financial, production, environmental, social and information components into a single dynamic model that ensures the stability, competitiveness and adaptability of agricultural enterprises to modern challenges and threats. The prerequisites for ensuring economic security of the agricultural sector are complex and include state regulation, financial support, development of infrastructure and innovations, social and environmental components, as well as effective risk management. They form the basis for sustainable development of the agricultural sector, which is a key factor in economic stability and security of the state.

In addition to systemic, indicator, monitoring and strategic approaches, scientists also use resource-functional, income-resource, bankruptcy assessment-based and scenario approaches to assess the effectiveness of the economic security management system of the agricultural sector. These approaches allow for a deeper analysis of the economic security of the agricultural sector through the prism of resource efficiency, financial sustainability, and the ability to adapt to a wide range of potential threats and uncertainties. The integration of these approaches provides a more complete and reliable assessment of the effectiveness of the economic security management system in the agricultural sector. Prospects for further research will be related to the formation of scientific and practical tools for building an effective economic security management system in the agricultural sector, which will be based on the synthesis of innovative mechanisms, state regulation, and principles of sustainable development. This will ensure the sustainability of agricultural production in the long term.

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Received on: 21th of June, 2025
Accepted on: 02th of August, 2025
Published on: 20th of August, 2025