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Stanislav Vasylishyn[1], Oleksandr Ulyanchenko[1], Tetiana Bochulia[2], Yuliia Herasymenko[1], Oleksandr Gorokh[1]

[1]Kharkiv National Agrarian University named after V. V. Dokuchayev
[2]Kharkiv State University of Food Technology and Trade
Ukraine

IMPROVEMENT OF ANALYTICAL SUPPORT OF ECONOMIC SECURITY MANAGEMENT OF THE AGRICULTURAL ENTERPRISES

Purpose. *Under the conditions of strengthening of the destructive effects of the global economic crisis and the growing number of risks of agribusiness, there is a problem in finding the ways to improve accounting and analytical support as the only reliable source of the relevant and accurate information needed for economic security management. The purpose of the article is to substantiate the directions to improve the analytical basis as a component of accounting and analytical support of economic security management of the agricultural enterprises.*

Methodology / approach. *The methodological basis of the research is a dialectical method of cognition of the complex economic phenomena. Consideration of the analytical support of complex management processes took place using a systematic approach, analysis and synthesis. Using an integral approach, a methodology for assessing and analyzing economic security of the agricultural enterprises is developed. This methodology approach includes the parameters of financial, social, resource and environmental security.*

Results. *The analysis of the theoretical and methodological foundations of accounting and analytical support of economic security management showed a variety of the approaches to the choice of the indicators that describe the level of economic security. The situation is complicated by the need to analyze the information that may be relevant for management decisions in conditions of uncertainty. Under these conditions, it is proposed to implement a model of analytical support for economic security management under conditions of uncertainty and growing risks and threats to the business environment of the agricultural enterprises, which should be based on the use of general economic, statistical, integral and econometric approaches. It is determined that in the process of counteracting the risks and threats of the external and internal environment of the agrarian business the use of the integral methods of assessing economic security of the agricultural enterprises becomes crucial. It is substantiated that the most expedient in terms of achieving strategic goals of the enterprise, maintaining its competitive advantages and ensuring sustainable development is the use of integral assessment of economic security, which should be based on a synergistic approach to analysis of 25 indicators of financial, social, resource and environmental components. The approach was tested on the example of 24 agricultural enterprises of Kharkiv region (Ukraine) of crop specialization (2019). The model is also used to analyze the dynamics of the level of economic security under conditions of individual agricultural enterprises of different organizational and legal forms of management (2014–2019).*

Originality / scientific novelty. *According to the results of the research, a methodological approach to determination of the integral level of economic security of the agricultural enterprises has been improved, based on the impact of the indicators of its individual components, which, at the same time, improves the analytical support of economic security management and strengthens verification, forecasting, preventive, planning and control functions of accounting and analytical support of management mechanisms.*

Practical value / implications. *The practical significance of the proposed approaches consists of the possibility of positioning the enterprises in terms of optimal, satisfactory, shaky and crisis economic security zones, as well as analyzing the dynamics of the integral level of economic security, which takes into consideration the causal relations of the key areas of the agrarian business under conditions of uncertainty.*

Key words: *economic security, accounting and analytical support, analytical support, integral assessment, management, risks and threats.*

Introduction and review of literature. The growing number of risks to the business environment of the enterprises due to economic crises, in particular the global crisis associated with the COVID-19 pandemic, makes new challenges for the scientific support of effective management of economic security of the countries, regions, enterprises and households. The economic crises and their repercussions occurring in an increasingly integrated global economy have spurred renewed interest in economic security and created initiatives to redefine it. This revised definition in turn has encouraged a search for policy prescriptions that will increase economic security in the new environment (Stankevičiene et al., 2013).

Due to the specifics of the industry and the limited own financial resources, the enterprises of the agricultural sector of the economy are particularly vulnerable to the impact of risks, on the level of economic security of which the food security of the state as a whole depends. Progressive effective development of the agricultural enterprises and, as a consequence, the agricultural sector of Ukraine is possible only if accounting and analytical support of economic security management is improved on the basis of the improved methodology of its assessment, which will allow making effective management decisions and satisfying the interests of all stakeholders. Only a clear and consistent organization of accounting, analysis and control at all stages of the production process will help to form a proper state of economic security and eliminate threats to the environment of the agricultural enterprise and its information shell. Economic security is one of the most studied categories of modern economics.

Scientific articles of some researchers (Shumilo, 2016; Avanesova & Chuprin, 2017; Tytenko, 2018; Alekneviciene et al., 2019; Živković & Petrović, 2019; Iershova et al., 2019; Illjashenko, 2016; Pravdjuk et al., 2019; Stankevičienė et al., 2013) indicate the relevance of issues related to the management of enterprise economic security.

Business, as well as life itself, is risky and therefore it is quite logical that risk management is a key factor in integrated management systems. In order for the organization to be successful, it is forced to manage the existing risks in the best possible way in order to achieve its business goals (Živković & Petrović, 2019).

Therefore, the processes of economic security management and assessment of its level are associated with the identification of the nature of risks and threats of the environment of the enterprise and the improvement of approaches to risk management under conditions of uncertainty.

Currently, there is a wide range of theoretical and methodological approaches to establishing the essence of economic security as an economic category. Among them

are protective, mobilization, resource, financial and commercial concepts of the definition of economic security. In our research, the economic security of the enterprise we consider as a system of interdependent and mutually agreed ways, tools and management decisions, which, synthesizing with the available resource potential and the inclusion of economic security in the objects of accounting and analytical support, allow counteracting timely to risks, threats and fluctuations functioning of the enterprise, ensuring its financial stability, promoting the development of economic potential, increasing competitive advantage and improving the quality of information support of management processes.

From the standpoint of strategic management, the accounting and analytical system of economic security should include information on prediction of consequences of management decisions and provide current, retrospective, and preventive control, including monitoring of the current and forecasting of the future economic security in general for the company and in terms of the main functional components; analysis, search, and provision of more effective ways to use existing resources; analysis and study of changes in the level of economic security under the influence of challenges, risks, and threats (Tytenko, 2018).

The methodology of the analysis should take into account the specifics of functioning of the agricultural enterprises and the importance of ensuring a reliable assessment of the level of economic security, which requires thorough and well-grounded scientific research. The agricultural sector of the economy is an important budget-forming link that allows determining the efficiency of the country's economy, the level of food security and well-being of every citizen. Modern transformation processes taking place in the economic environment require the agricultural enterprises to organize an effective system of accounting and analytical support in order to provide external and internal users with reliable information for effective management decisions.

The agricultural sector of the economy determines the possibility of the existence of the state, as it is the basis of the full cycle of reproduction of ecological balance, social welfare, material goods, and capital (Lemishko, 2020). Studying the specifics of assessing the level of economic security of the agricultural enterprises, it is necessary to take into account the study of V. Andriychuk, who refers to the peculiarities of agriculture, which have an impact on the economy of the enterprises of the agro-industrial complex the following: relative immobility of the resources; use of four resources – fixed and working capital, living labor and land (the main means of production); dependence of the activity of the agricultural enterprises on the natural factor and unpredictable adverse changes in the external environment; production in different soil and climatic conditions; seasonality of production; the need to attract from the outside (banks, other credit institutions) additional financial resources; predominance in the structure of costs for production of agricultural products of fixed costs (Andriichuk, 2013). Simultaneously, scientists O. Krasnorutskiy and S. Rudenko consider peculiarities of the reproductive process in agricultural production, the distinctiveness of the core activities of agricultural

enterprises, the inertia of the socio-economic systems of agricultural areas, situational and indeterminate in the information aspect (Krasnorutskiy & Rudenko, 2016).

The effectiveness of risk minimization depends on making sound management decisions that must be made on the basis of the calculations received, in expert, analytical and other ways (Samorodov et al., 2020).

Review of the literature allows us to make a conclusion as to the special importance of the analytical component of accounting and analytical support of economic security management of the agricultural enterprises, which takes into account the comprehensive nature of factors, risks and threats. One of the most universal tools for considering the comprehensive nature of the individual indicators, factors and results of the enterprises activity is the methodology of integral assessment of the socio-economic processes. According to C. Dutra et al., there is a need for an approach that integrates economic analysis, risks and environmental and social impacts to the analysis and prioritization of the portfolio of business projects (Dutra et al., 2016). Numerous scientists propose models for integral assessment of sustainable development (Bond et al., 2001; Hudáková Stašová, 2020), risks (Alekneviciene et al., 2019), business projects (Dutra et al., 2016), financial security (Samorodov et al., 2020), etc.

Despite the powerful theoretical, methodological and practical developments of the scientists, the issues of improving approaches to the analysis of economic security of agricultural enterprises, taking into account the comprehensive nature of its components under conditions of uncertainty remain unresolved.

The purpose of the article is to substantiate the directions of improvement of the analytical support of economic security management of the agricultural enterprises.

Methodology. The theoretical and methodological basis of the research is the basic provisions of the dialectical method of knowledge, in particular induction and deduction. Different methods and techniques were used to achieve the defined purpose: systematic approach (developing a structural and logical model of formation of an analytical basis for managing economic security of the agricultural enterprises); analysis and synthesis (determination of the subject, object of the research and detection of the components of economic security of the agricultural enterprises); integral method (determination of the level of economic security on the basis of consideration the nature of the influence of its individual indicators).

In our research the methodology of integral assessment provides identification and economic justification for the inclusion of individual components of integral assessment; mathematical formalization of the integral efficiency indicators in the context of individual components of economic security; construction of a descriptive matrix of the indicators; giving the matrix indices to a numerical dimensionless integral range [0; 1]; determination of vector standards and their distribution into stimulators and destimulators; determining the distance between the individual observations and the vector-standard; calculation of the normalized indicators of integral assessment of the individual components of economic security; determination

of the integral index of economic security of the enterprise and setting the interval scale of values of the integral index.

The peculiarity of the research methodology is taking into account the influence of residual variation, which the authors consider as the sum of squares of deviations of the actual values of the resultant characteristic from the theoretically expected values.

The information base of the research is the annual financial statements and data of synthetic and analytical accounting of separate agricultural enterprises of Kharkiv region (Ukraine); scientific works of the economists; the authors' own observations, etc.

The findings of this research have to be seen in light of some limitations, which the authors consider in three directions.

1. Limitations on research methodology.

It consists in the use of an integral assessment of the level of economic security, which is a complex multifaceted category and is influenced by a number of macro-, meso- and micro-environmental factors. In this regard, the included indicators of financial, resource, social and environmental security can not fully reflect the level of economic security of the surveyed enterprises, as it may be affected by other factors not included in the integral model, as well as residual variation.

2. Limitations on the surveyed enterprises.

The proposed methodological approach is tested on the materials of 24 agricultural enterprises of Kharkiv region (Ukraine) with the plant growing specialization, which are large or medium in size and have an average level of specialization. Therefore, the obtained results cannot be fully used by small enterprises or highly specialized ones.

3. Limited access to data.

Economic security is a fairly new object of accounting, so its disclosure in reporting is limited to the reflection of individual indicators of financial condition or risk management policy in the Management Report of the enterprise as a whole or individual assets and sources of their formation. Most information about economic security indicators is generated by the management accounting system, which has the character of a trade secret. The basis of the information base were indicators of annual financial and non-financial reporting, as well as indicators of internal reporting of individual enterprises, which has no signs of internal trade secrets.

Results and discussion. Accounting and analytical support as a concept of economic security management should be based on the transformation of both theoretical and methodological accounting and analysis platform, which should be considered as separate closely interconnected subsystems of information support of management processes.

In the process of economic security management of the enterprises, the analytical subsystem becomes an essential element of the accounting and analytical support mechanism. Therefore, it becomes possible to implement the methodological approaches to assessing the state and tendencies of economic security in the system of the economic indicators based on the processing of the reliable accounting

information contained in the financial statements.

Economic security is a particular science discipline, which researches essentials, forms and methods of national economy functions, which is ready to fulfill the national security task and it analyses and evaluate the economic security level of the country. It concerns effectiveness of economic resources during peace, crisis and war times (Kurek & Płaczek, 2009).

In the process of managing economic security of the agricultural enterprises, the analytical subsystem becomes an excessive element of the accounting and analytical mechanism, since it is based on the implementation of the methodological approaches of assessing the state and economic security trends in the system of the economic indicators based on the processing of the reliable accounting information contained in the financial statements of the enterprises. Enterprise economic security support of the enterprises is inevitably connected to uncertainty of the future financial events. This uncertainty is overcome by timely identification and accounting of the risk factors to form the future financial events (Ershova et al., 2019).

The methods of the research, measuring relationships are an important part of the methodology of the scientific research because it is impossible to manage the phenomena, forecast their development without studying the nature, direction, strength and other peculiarities of relationships. The methods which are inherent in solving the tactical tasks with minimal support for implementation of the strategic goals prevail in modern accounting and analysis systems. A similar situation is caused by the monodimensional nature of accounting reporting, and overcoming this methodological inconsistency in the context of the organization of an effective management system is possible only with the implementation of a balanced system of indicators (Grinko et al., 2016).

The indicators help agrarian formation management of the agricultural enterprises in identifying the problems, analyzing the variants and substantiating the choice of the relevant alternative to the decisions, increasing motivation to implement them and further assessment, exchange of information with other business entities (Kaminska et al., 2016).

Determination of the indicators of economic security is a discussion issue. Most methodological approaches to the analysis of economic security are limited to identification indicators of financial and economic activity, including liquidity, financial stability, profitability, probability of bankruptcy, etc., which are not identical to indicators of economic security, but are important in the process of risk management and should be analyzed first.

The most important groups of the indicators (Blank, 2004; Savitskaya, 2004; Ulianchenko et al., 2018), which, in our opinion, are closely connected to the level of economic security, are as follows:

1) the indicators of the analysis of financial results (gross profit, net profit);
2) the indicators of the analysis of fixed assets (renewal coefficient, elimination coefficient, growth coefficient, coefficient of depreciation, economic efficiency of fixed assets using, profitability of fixed assets);

3) the indicators of the analysis of current assets (return on material costs, material intensity, share of material costs in total costs, profitability of current assets);

4) the indicators of the analysis of the sources of asset formation (coefficient of autonomy, financial independence coefficient, financing coefficient);

5) the indicators of the liquidity analysis and solvency (solvency coefficient, absolute liquidity coefficient, rapid (intermediate) liquidity coefficient, current liquidity coefficient, general liquidity coefficient);

6) the indicators of the analysis of financial stability (the coefficient of financial stability, the coefficient of the ratio of mobile and immobilized assets, the coefficient of maneuverability of equity, the coefficient of provision of material stocks by its own funds, the coefficient of maneuverability of working capital, the index of permanent capital);

7) the indicators of the analysis of business activity (the coefficient of turnover of current assets, duration of the turnover of current assets, the coefficient of turnover of the receivable, duration of the turnover of the receivable, the turnover coefficient of accounts payable, duration of the turnover of accounts payable, the coefficient of stock turnover, duration of the stock turnover, duration of the operating cycle, duration of the financial cycle);

8) the indicators of profitability analysis (profitability of realization, profitability of capital (assets), profitability of activity);

9) the indicators of bankruptcy probability analysis (models of Altman, Taffler & Tisshaw, Springate, Lis, Chesser, etc.);

10) the indicators of marginal analysis (marginal income, break-even point, critical volume of production and sales etc.).

The analysis of the indicators at most agricultural enterprises is separated and does not have a systematic nature. This, in turn, makes impossible a comprehensive economic analysis of economic security as a multi-purpose system, which is affected by numerous risks and threats of macro, meso- and micro- environment of the agrarian business. At the same time, these indicators characterize only the financial nature of economic security, which does not allow maximum considering the influence of social, environmental, resource and other important indicators that reflect the processes connected with the leading spheres of activity of the agricultural enterprises.

Some researchers (Illjashenko, 2016; Krutova et al., 2016; Pravdjuk, 2019), propose the definition of a separate group of specific indicators of economic security, which depend on the industry specifics of enterprises and the purpose of the analysis.

In our opinion, economic security as a comprehensive phenomenon covers all the aspects of economic life; therefore, it should include assessment of real and potential risks associated with management of assets and sources of its formation. In the process of such management, the interconnection of the accounting and economic analysis should be inextricable, because formation of conclusions and recommendations for strengthening economic security is possible exactly on the basis of the relevant and reliable information. Modern scientific discourse contains a

number of the methodological approaches to the formation of an analytical basis for economic security management, but their universal character does not always bring the desired effect precisely for the agricultural enterprises. In our opinion, the construction of an analytical support of economic security management should be based on the principles of assets and sources of their formation management through classical techniques for economic analysis and the use of additional methodological techniques of research of economic phenomena and processes. Among such techniques, the model of deterministic and stochastic factor analysis of the resources use, production and sales of products, cost, marketing activities, financial results, profits; marginal analysis etc.

At the same time, among partial methodological approaches related to economic security management, the most important ones, from our point of view, is the analysis of influence of the share of own working capital on financial stability of the agricultural enterprises; the analysis of interconnection between the ratio of fixed and current assets; model of Economic Order Quantity (EOQ); factor analysis of material intensity; ABC and XYZ analysis; Baumol's models of cash management; assessment of the parameters of effectiveness of the agricultural enterprise in the context of sustainable development; deterministic analysis of financial independence and maneuverability of capital; analysis of financial leverage effect; parametering of the impact of the social indicators on economic security, etc.

However, existing methodological approaches of economic security analysis at the agricultural enterprises are unsystematic and do not allow its comprehensive manifestations under conditions of uncertainty. The situation is complicated by the confidential nature of economic security, which is an obstacle to sectoral statistics and public administration in the process of developing strategies for its strengthening. It increases the labor intensity of the process of accounting and analytical support for economic security management at the national, regional levels and the levels of economic entities.

An analytical research nature of the complex economic phenomena and processes is under the influence of changes in the nature of management, role and place of the enterprises, their interregional relations and depends on external business environment. The initial methodological positions of analytical research of economic security, in our opinion, are as follows:

1. Generality of research. Statistical regulations are detected only in a large range of data due to the law of large numbers – in general statistical indicators calculated on the basis of mass observation, mutually eliminating the consequences caused by accidental reasons, and there are consequences due to general reasons for all facts.

2. Collection of primary statistical material, scientifically organized registration of all essential facts relating to the subject that is investigated.

3. Classification, systematization and grouping of the collected facts on certain features, transition from single facts to the characteristics of the data joined to the group. Due to this, the requirement of a qualitative homogeneity of the data on

certain features is achieved.

4. Detection of interconnections and scales of the phenomena, generalization of the laws of their development, forecasting of the development trends, calculation of forecast ratings.

At the same time, a special methodological significance becomes a prognostic nature of accounting and analytical support for economic security management and possible consequences of its conjuncture, which can be implemented on the basis of widespread using of methods of analytical research.

Based on these positions, we consider that the economic security management in conditions of uncertainty should be based on the gradual implementation of certain stages and improvement of economic analysis based on changes in approaches to diagnosis and forecasting of economic security through general economic, statistical, integral and econometric methods (Fig. 1).

From Fig. 1 it is obvious that the proposed structural and logical model is based on the functional interconnection of the preparatory, monitoring, diagnostic, forecast and management stages and allows quantifying the parameters of economic security and its individual components, taking into account a number of the external and internal factors. Also, the proposed model enhances the statistical base forecasting the parameters of the level of economic security and development of the ways of its strengthening under the conditions of uncertainty and limited information base of statistical and economic research.

At the same time, use of the integral methods for assessing economic security of the agricultural enterprises is decisive during the process of counteracting the risks and threats of the external and internal environment of the agrarian business.

One way of developing a useable methodology for conducting integrated impact assessments, is to build separate case studies, each of which has significant economic, environmental and social dimensions (Bond et al., 2001). According to V. Alekneviciene et al., integrated risk assessment index includes the following variables: sales revenue from crop and livestock production, variable costs of crop and livestock production, fixed costs, including depreciation expenses, taxes (excluding income tax) and subsidies related to income. Sales revenue from crop and livestock production is decomposed into crop yield and area, animal productivity and number, produced and sold quantities, and selling price. Production risk is related to variation of crop yield and area, animal productivity and number (Alekneviciene et al., 2019).

The integral efficiency indicators of enterprise management allow taking into account many factors and elements of production and economic activity that affect the level and dynamics of the overall efficiency of the enterprise in the most complete and interrelated way. Formation of the integral indicators of economic efficiency is based on correlation of the final financial result of the activity with the total amount of costs or resources (Jarkyna, 2014).

Today, there are a number of methodological approaches to assessing the level of economic security, which scientists conditionally divide into (1) indicator;

(2) analytical and mathematical; (3) profitable; (4) integral.

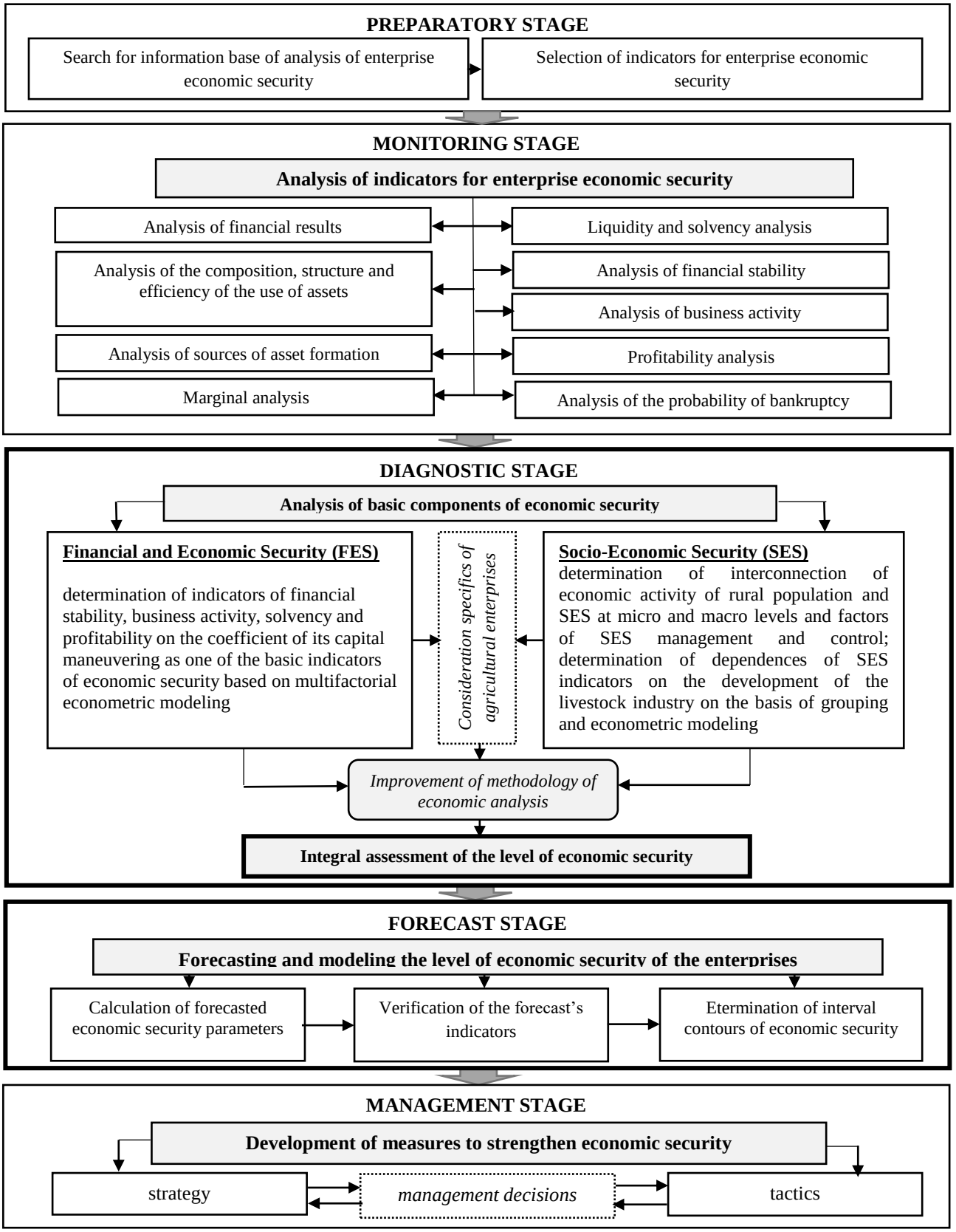

Fig. 1. Structural and logical model of an analytical support of economic security management at the agricultural enterprises

Source: own contribution.

The main disadvantages of the 1–3 approaches are the significant dependence of the obtained results on the accuracy and completeness of the inclusion of certain economic security indicators when using a methodological approach, which is often subjective; oversaturation of economic calculations by mathematical apparatus; profit is not always a measure of economic security, especially under the condition of inflation.

We believe that the decisive advantage of calculating an integral indicator should be the ability to compare its level in dynamics, which will help to make strategic management decisions and compare both the economic security indicators of the same enterprise and different enterprises inside the branch.

According to the authors, from the point of view of achieving the strategic goals of the enterprise, maintaining its competitive advantages and ensuring sustainable development, the most appropriate one is the application of integral assessment of economic security, which should be based on a synergistic approach to the analysis of individual components of economic security:

$$I_{ES} = \sum_{j=1}^{k} w_j \frac{\sum_{j=1}^{n_j} c_{ij}}{n_j}, \quad (1)$$

where I_{ES} is the integral indicator of economic security of the enterprise; c_{ij} is the normalized index of i in the aggregate with j; n_j is the number of the aggregate indicators of j; w_j is a weight fraction of j component of economic security; k is the number of economic security components included in the integral assessment.

At the same time, among the components of the integral index of economic security we propose to distinguish the integral indicators of financial (I_{FS}), social (I_{SS}), resource (I_{RS}) and ecological (I_{EcS}) components and to set their weight proportions in proportion to their functional impact on economic security, determined by expert means:

$$I_{ES} = (0{,}35 \cdot I_{FS}) + (0{,}25 \cdot I_{SS}) + (0{,}25 \cdot I_{RS}) + (0{,}1 \cdot I_{EcS}) + \varepsilon. \quad (2)$$

The residual variation of the studied indicator is expressed in terms of the indicator ε.

Let us represent the sequence of integral assessment of economic security in the following stages:

1. Search and economic justification for the inclusion of the individual components of integral assessment. According to our proposals financial, social, resource and ecological components of economic security are distinguished.

2. Mathematical formalization of the integral efficiency indicators in the context of individual components of economic security.

3. Construction of a descriptive matrix of the economic security indicators by its individual components (Table 1).

4. Giving the matrix indices to a numerical dimensionless integral range [0; 1]. In this case, the standardization of the features in their dimensionless expression (z_{ij})

occurs with the help of the formula:

$$z_{ij} = \frac{x_{ij} - m_j}{\sigma_j}, \qquad i = 1,\ldots,m; \qquad j = 1,\ldots,n, \tag{3}$$

where x_{ij} is the value of the sign by the number j for the unit by the number i; $m_j = x_j$ is estimation of mathematical expectation of the sign x_{ij}; σ_j is estimate of the root-mean-square deviation of the sign x_{ij}:

$$\overline{x_j} = m_j = \frac{1}{m}\sum_{i=1}^{m} x_{ij}; \tag{4}$$

$$\sigma_j = \sqrt{\frac{1}{m}\sum_{i=1}^{m}(x_{ij} - m_j)^2}. \tag{5}$$

5. Definition of vector-standards and their division into stimulators (I_s) and destimulators (I_d) (Table 1).

Table 1

Descriptive model of the matrix of integral economic security assessment

No	Name of the indicator	Symbol	Direction of influence
1.FINANCIAL SECURITY			
1.1	Absolute liquidity coefficient	x_1	stimulator
1.2	Coefficient of fast (intermediate) liquidity	x_2	stimulator
1.3	Current liquidity coefficient (Coverage)	x_3	stimulator
1.4	Autonomy coefficient	x_4	stimulator
1.5	Financial risk coefficient	x_5	destimulator
1.6	Coefficient of own capital maneuverability	x_6	stimulator
1.7	Coefficient of working capital maneuverability	x_7	stimulator
1.8	Coefficient of financial stability	x_8	stimulator
1.9	Coefficient of current assets turnover	x_9	stimulator
1.10	Duration of receivables turnover	x_{10}	destimulator
1.11	Duration of accounts payable turnover	x_{11}	destimulator
1.12	Duration of inventory turnover	x_{12}	destimulator
2. SOCIAL SECURITY			
2.1	Average monthly salary of employees	x_{13}	stimulator
2.2	Share of labor costs in production costs	x_{14}	stimulator
2.3	Annual work productivity	x_{15}	stimulator
2.4	Staff turnover indicator	x_{16}	destimulator
2.5	Indicator of age structure of staff	x_{17}	stimulator
3. RESOURCE SECURITY			
3.1	Capital productivity	x_{18}	stimulator
3.2	Wear coefficient of fixed assets	x_{19}	destimulator
3.3	Coefficient of current and fixed assets	x_{20}	stimulator
3.4	Rate of return	x_{21}	stimulator
3.5	Material consumption	x_{22}	destimulator
4. ECOLOGICAL SECURITY			
4.1	Share of environmental expenditures in aggregate expenditure	x_{23}	stimulator
4.2	Rate of change in environmental expenditures	x_{24}	stimulator
4.3	Share of reclaimed land	x_{25}	stimulator

Source: own contribution.

That is, for each *j*-sign the best values of the sign z_{0j} are found among all *m* units, which are the coordinates of the vector-standard:

$$z_{0j} = \begin{cases} \max\limits_{i} z_{ij} \, (j \in I_c), \\ \min\limits_{i} z_{ij} \, (j \in I_o). \end{cases} \quad (6)$$

6. Determining the distance between the individual observations and the vector-standard by estimating the root-mean-square deviation (σ_0) of the Euclidean distance (c_{i0}):

$$\sigma_0 = \sqrt{\frac{1}{m}\sum_{i=1}^{m}(c_{i0} - \overline{c_0})^2}, \quad (7)$$

$$c_{i0} = \sqrt{\sum_{j=1}^{n}(z_{ij} - z_{0j})^2}, (i = 1,2,\ldots m), \quad (8)$$

$$\overline{c_0} = \frac{1}{m}\sum_{i=1}^{m} c_{i0}. \quad (9)$$

Moreover, to normalize the distances of each unit of the aggregate to the vector-standard we use the value c_0:

$$c_0 = \overline{c_0} + 2\sigma_0. \quad (10)$$

7. Calculation of the normalized indicators of integral assessment (*I*) of the individual *i* components of economic security:

$$I_i = \frac{c_{i0}}{c_0}; \qquad 0 \le I_i \le 1. \quad (11)$$

8. Determination of the integral index of economic security of the enterprise taking into account the weight fraction of financial (0.35), social (0.25), resource (0.25) and ecological (0.1) components.

9. Setting the interval scale of values of the integral index. In our view, it is advisable to implement the economic security assessment of Harrington's most universal scale (Harrington, 1965) (Table 2).

Table 2

Adaptation of Harrington's scale to integral assessment of the enterprises' economic security

Description of graduation	Value intervals *	Integral level of economic security **	Economic security zone **
High	1,000 – 0,810	Strong economic security	Optimal zone
Average	0,800 – 0,631	Sustainable economic security	Satisfactory zone
Satisfactory	0,630 – 0,371		
Low	0,370 – 0,210	Shaky economic security	Shaky zone
Unsatisfactory	0,200 – 0	Economic danger and the threat of bankruptcy	Critical zone

Note. **authors' approach.

Source: source-based (Harrington, 1965).

In our opinion, this analytical approach is the most applicable to the agricultural enterprises, since the level of their economic security directly depends on the stability of the national economy, increasing export potential and ensuring the proper level of food security of the state.

The approbation of the proposed approach developed on an example of 24 agricultural enterprises of Kharkiv region (Ukraine) with the plant growing specialization. Annual financial statements and indicators of these agricultural enterprises are used during the educational process and scientific research at Kharkiv National Agrarian University named after V. V. Dokuchayev. Determination of integral indicators of economic security (Fig. 2) demonstrates the highest share of enterprises (54.2 %) in the economic security zone. At the same time, 2 enterprises have shaky economic safety, and one enterprise has signs of the economic crisis and the threat of bankruptcy.

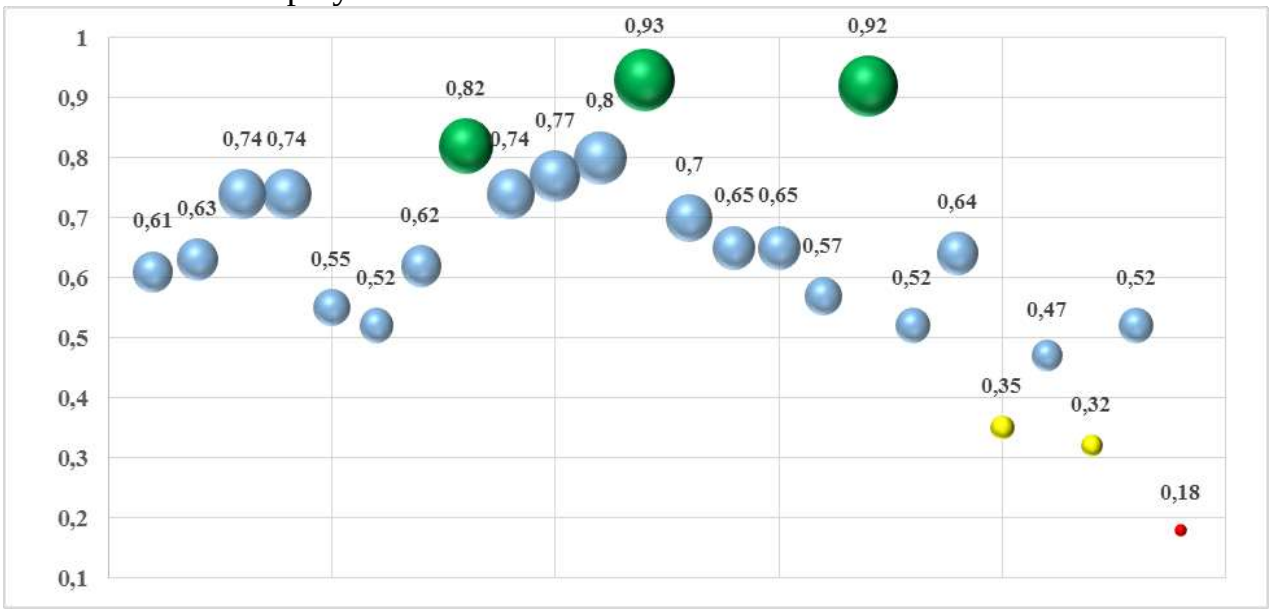

Fig. 2. Integral level of economic security of several agricultural enterprises of Kharkiv region of plant growing specialization, 2019

Source: own calculations.

Particular practical value the proposed approach has to assess the dynamics of economic security at the individual level of the agricultural enterprises. We have analyzed such dynamics on the example of the state enterprise "Research Farm "Elitne" of Plant Production Institute named after V. Ya. Yuriev of the National Academy of Agrarian Sciences of Ukraine and "Agroexpert LTD" (Ukraine, Kharkiv region). The choice of these enterprises is due to different organizational and legal forms of management, which allows establishing the practical value of the proposed approach for the enterprises with different institutional environment of factor influence on their economic security. As a result of analytical and mathematical data processing, there are obtained integral economic security indicators, calculated by 25 indicators (Fig. 2).

The indicators of Fig. 2 lead to the conclusion that in 2014–2019 the "Research Farm "Elitne" under study had stable economic security, but further there is a need to

develop specific measures and make appropriate managerial decisions that will ensure a high level of economic security and reach the limit of its integral value 0,8. At the same time, for "Agroexpert LTD", due to the rapid increase in the tax burden and, as a consequence, the "laundering" of working capital, the integral indicator of economic security, starting in 2016, is gradually declining, although at a level capable of normal operation and continuity of the technological cycle.

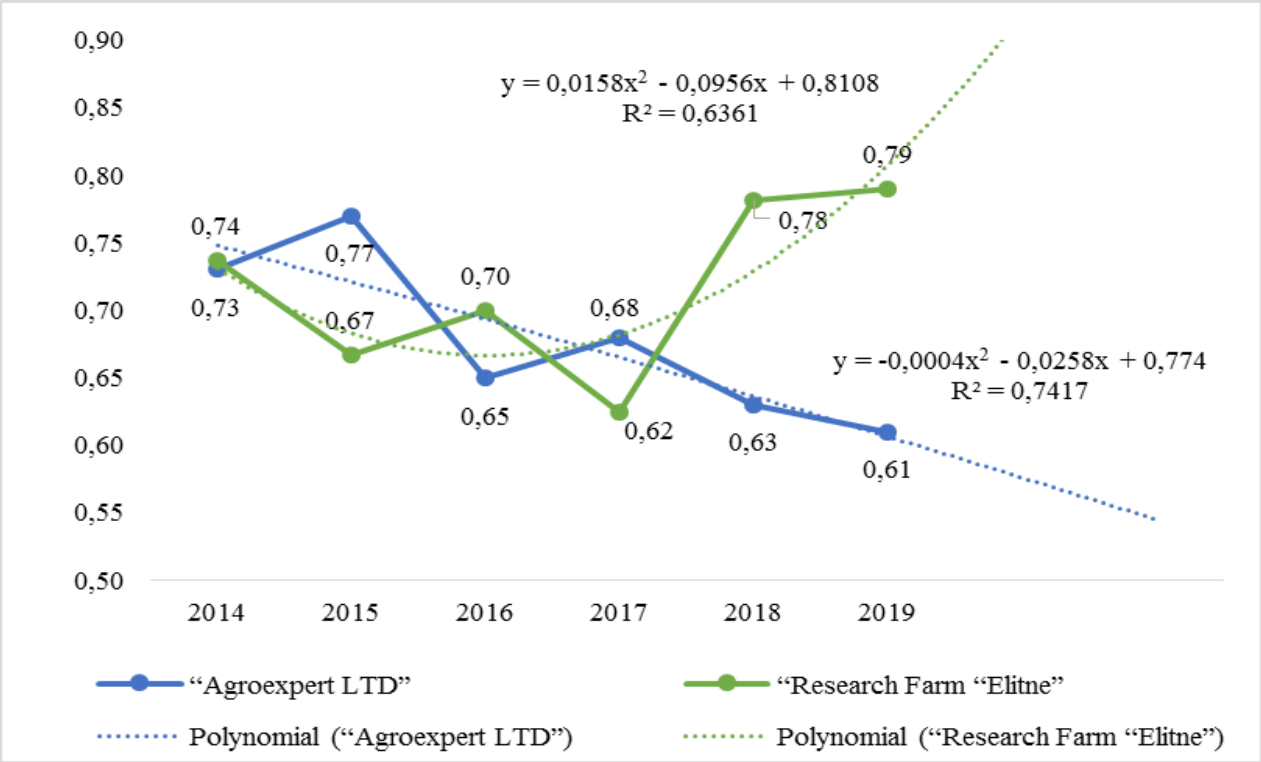

Fig. 2. Dynamics of the integral indicator of the state enterprise "Research Farm "Elitne" and "Agroexpert LTD" in 2014–2019

Source: own calculations.

The conducted integral assessment allows determining the security zones of the enterprises (Table 3).

Table 3

Analysis of security zones of basic agricultural enterprises based on the results of integral assessment of the level of their economic security

Enterprise	Components of integral assessment of economic security				Integral economic security zone
	Financial	Social	Resource	Ecological	
Research Farm "Elitne"	Optimal	Satisfactory	Optimal	Shaky	Satisfactory
Agroexpert LTD	Satisfactory	Satisfactory	Optimal	Critical	Satisfactory

Source: own calculations.

In particular, for "Research Farm "Elitne" the greatest risk is ecological security indicators, classified as a dangerous security zone. For "Agroexpert LTD", significant reserves for strengthening economic security are contained in financial and social security indicators, and environmental security indicators generally require urgent measures (in particular, the share of environmental expenditures in aggregate

expenditure and share of reclaimed land), as they are in a critical security zone.

In order to deepen the analysis, it is advisable to expand the number of the components and indicators of economic security, calculation of which should be based on the reliable information, which is synthesized at the stage of preparation and submission of financial statements. At the same time, one of the drawbacks of the approach is the certain probabilistic nature of the indicators due to the errors and statistical mistakes.

Conclusions. The transformation of accounting and analytical support as a concept of economic security management should take place on the basis of improving the methodology of economic security analysis as an integral object of management and developing a strategy and tactics of its strengthening under conditions of uncertainty. The proposals presented in the article are based on the use of a sequence of analysis of comprehensive manifestations of economic security at the preparatory, monitoring, diagnostic, forecasting and management stages based on the widespread use of general economic, statistical, integral and econometric methods.

It is proved that economic security, as a complex phenomenon affected by various spheres of economic life, under conditions of uncertainty is most appropriate to analyze using the integral method. The approach developed by the authors involves the use of 25 basic indicators taking into account the weight share of financial (0.35), social (0.25), resource (0.25) and environmental (0.1) components of economic security of enterprises. The result of the integral approach is the proposed adapted scale, which provides for the analysis of economic security with its positioning in the optimal ($I_{ES} > 0{,}8$); satisfactory ($0{,}37 < I_{ES} < 0{,}8$); shaky ($0{,}2 < I_{ES} < 0{,}37$) and critical ($I_{ES} < 0{,}2$) security zones.

The practical application of the proposed integral assessment on the example of 24 agricultural enterprises of Kharkiv region with the plant growing specialization allowed the grouping them by the level of their economic security, and as a consequence – strengthening the accounting and analytical support of its level. At the same time, the use of the approach at the level of individual agricultural enterprises in the dynamics allowed the positioning of their security zones. In particular, for the Research Farm "Elitne" and Agroexpert LTD the levels of integral security in 2019 were 0.79 and 0.61 respectively, which allowed including them in the zone of satisfactory economic security and establishing reserves for its strengthening in certain areas production and economic activities.

The application of the proposed analytical approach to establishing an integral level of economic security, which should be based on reliable accounting information, will allow us to form the basis for making relevant effective managerial decisions to strengthen economic security in view of the economic impact of threats and risks from the business environment, most of which are systemic in nature.

We believe that these proposals, both at the level of regions and at the level of the specific agricultural enterprises, will help to strengthen their economic security,

minimize costs, increase the investment attractiveness of the business entities, the level of their competitiveness and the formation of the bases for their sustainable development.

The main directions for our further research are the determination of the impact of certain factors on the level of economic security of the agricultural enterprises, forecasting its level using the methodology of econometric analysis.

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