METHODOLOGICAL SUPPORT OF THE EFFICIENCY DIAGNOSIS OF THE ECONOMIC SECURITY SYSTEM OF INDUSTRIAL ENTERPRISES IN COMPETITIVE ENVIRONMENT

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INTRODUCTION

Modern economic challenges and threats in the activities of industrial enterprises arise under the influence of resource imbalances, potential imbalances formed due to systemic changes in production technologies, technologies of analysis and dissemination of information, tools for diagnosis and forecasting of results. Industrial enterprises face the task of choosing methods for assessing risks, threats and the effectiveness of preventive measures to justify management decisions to develop a system of economic security and maintain the stability of the acquired competitive advantages.

Given these trends and challenges, there is a scientific task to summarize the existing methodological approaches, tools and criteria for diagnosing the effectiveness of the economic security of enterprises.

LITERATURE REVIEW

Many scientific works of leading scientists are devoted to the problems of methodological support for the diagnosis of the economic security system of industrial enterprises, peculiarities of their development in the conditions of digitalization and activation of innovative processes, among which it should be noted: Arefieva O. (2021); Balatskyi I. (2021); Bonyar S., Ivanova N. (2021); Ciekanowski Z. (2020); Cosmulese C. G. (2019); Dergaliuk, M., Pakhota N. (2021); Fedysyny M.F., Abramova A.S. (2019); Forrester S.V. (2021); Grigoraş-Ichim C.E. (2018); Khanin S. (2021), Kholoavko N., Djakona A. (2021); Kovalenko N., Makaliuk I. (2021); Li X., Xue Q. (2021); Mishchuk le. (2021); Popelo O., Tulchynska S. (2021); Pushak Y. (2021); Roiter, L.M. (2021); Samilenko H., Mashnenkov, K. (2021); Shkarlet, S., Dubyna, M. (2016); Shumilo O. (2021), Zhavoronok A. (2021) and others.

The aim of the article (SHUMILO et al., 2021) is to apply the assessment of the effectiveness of economic security management of commercial enterprises in supply chains by assessing the effectiveness of management. Scientists have proposed the use of a matrix method, which allowed to investigate the cross-influence of the levels of economic security of the enterprise and the adaptability of its system. Researchers (FORRESTER et al., 2021) using information from a particular organization investigate threats to the economic security of the construction industry. As a result of the study, the authors developed recommendations for construction companies that provide economic security for efficient operation.

The purpose of the article (MISHCHUK et al., 2021) is to study modern mechanisms for ensuring strategic economic security, the results of which revealed that they are imperfect. Scientists have developed an analytical basis for activating the mechanism of economic security of machine-building enterprises. The article (BALATSKYI et al., 2021) is based on the study of economic security management processes in the foreign economic activity of the enterprise, as a result of which the authors identified the need for the introduction of
optimization models. In the process of research, scientists have developed an integrated structure of the mechanism of economic security management in foreign economic activity.

The study (LI et al., 2021) developed a model for decision-making on investment information security of the enterprise. The proposed model is based on indicators of the impact of the level of substitution of enterprises, the number of enterprises and the probability of hacker intrusion, as well as the analysis of the optimal level of investment among enterprises. In the article the authors [16] investigated and analyzed the relationship between digital technologies and the introduction of modern engineering technologies. As a result of the study, scientists concluded that it is necessary to improve methods for assessing the current economic and information security of the interests of the enterprise.

The purpose of scientific research (MISHCHUK et al., 2021) is to study the problem of economic security of poultry enterprises. The authors analyzed the quantitative indicators of poultry production and proved that their growth is not a criterion for economic security of enterprises in the industry. The purpose of the article (CIEKANOWSKI et al., 2020) is to analyze the factors that determine the competitiveness and assessment of the functioning of enterprises, as well as the degree of their impact on economic security. The study was based on the use of the method of expert evaluation. The article (PUSHAK et al., 2021) presents an algorithm for assessing the level of economic security of an agro-industrial enterprise. It is proved that the effective formation of information support and application of the proposed model will contribute to the effectiveness of anti-crisis measures and ensure the economic security of the agro-industrial enterprise in particular.

RESULTS AND DISCUSSION

Modern interpretations and economic-mathematical tools for diagnosing the system of economic security of enterprises are based on approaches to monitoring bankruptcy indicators, risk assessment, development of integrated coefficients of functional influence of factors on the level of security and more. When studying the essence of economic interpretations of security, its indicators most often include the system of internal and external risks and threats, and the protection of economic potential from them, and the effectiveness of the system of economic protection. The economic system of enterprise security from the standpoint of the process approach is a key area of monitoring involves the assessment of factors and threats in the context of developing organizational measures to make decisions to minimize or avoid them.

We will define the efficiency diagnostics of the economic security system of industrial enterprise as complex and consistent process of the analysis of factors and revealing of threats for a substantiation of directions and cost of preventive measures of maintenance of the strategic purposes of functioning and development of the enterprises in the conditions of competition and distribution of innovative technologies. The basis for effective diagnostics of the economic security system is a qualitative and quantitative analysis of risks and results, based on the completeness, timeliness, critical evaluation of information, as well as the feasibility and dynamics of methodological tools for diagnosis.

Many methodological approaches to assessing the economic security of enterprises in modern methodological publications and research are described on the basis of economic and mathematical modeling of integrated coefficients and risk levels, analysis of functional components of the system, evaluation of cost parameters, and indicator, scenario and forecast criteria (Fig. 1). We propose to identify general, structural, factorial and individual groups of methodological approaches, as the diagnosis of the economic security of the enterprise for them is carried out at different strategic levels and for different purposes of diagnosis.
In summary, we highlight the following general approaches to the diagnosis of economic security:

- **indicator approach**, which consists in the analysis of the dynamics and compliance with industry, reference, or regulatory values of the evaluated performance indicators of the enterprise. As a rule, technical-technological, economic and social indicators of national security are distinguished. This approach is almost not applied to enterprises, because at the macro-, meso-levels of economic systems are insufficiently consistent industry criteria, their benchmarks and margins. Thus, the use of industry indicators in the interpretation of integrated criteria does not take into account the technological and economic features of the management of individual enterprises and, as a consequence, require both the adaptation of mathematical tools and adjustment of reference values;

- **functional-resource approach** is based on the assessment of individual components of the economic security system, which are distinguished either on the basis of functional role or on the basis of resource properties. Despite the large number of publications on the application of this approach, the lack of argumentation in the formalization of both functional and resource components in certain enterprises remains problematic. This complicates the unification and standardization of economic security system diagnostics. However, in some areas of application of the functional-resource approach, there are already generally accepted norms and limits - for example, in the methods of analysis of bankruptcy threats, financial analysis of economic security, diagnosis of environmental and personnel security;

- **economic-mathematical approach** is based on the design of models of behavior of the economic security of the enterprise in terms of the projected influence of external and internal factors. The mathematical tool, as a rule, is the consistency of factors and the establishment of their weight. At the same time, it is difficult to design a model based on real statistical data, which are unified, comparable in a single plane of values, and also correspond to the specifics of the enterprise. However, modern
Information and digital technologies allow to process large arrays of information and design complex functional dependencies, which allows to calculate economic and mathematical models of multilevel subordination and predict the effectiveness of economic security.

In addition to the described basic methodological approaches, it is necessary to systematize the indicators of economic and mathematical diagnostics used in certain approaches. Thus, on the basis of time, short-, medium- and long-term ranges of analysis and forecasting are used. Along with financial and economic parameters and indicators at complex diagnostics personnel and intellectual, technical and technological, industrial, investment, ecological and social indicators are analyzed.

In the strategic analysis of the economic security system, micro-, meso, macro and mega-level management of enterprises and, accordingly, factor diagnostics are distinguished. At the same time, taking into account not only the strategic, but also the tactical and operational levels of influence on the efficiency of the economic security system. Also, in integrated approaches, the gradation of economic security levels is used, distributing the obtained actual values of indicators relative to the forecast limit or allowable or reference parameters, as well as examining the ranges of deviations between design and actual values of indicators.

The selected classification features of the system of indicators of economic security diagnostics in integrated management should be combined, describing the environment and its threats. This allows you to predict and avoid potential negative impacts of certain factors, reducing or minimizing the losses of the enterprise. In addition, the completeness and reliability of diagnostics ensures the efficiency and optimal economic costs of resources for preventive management and the effectiveness of economic security in a competitive environment, while maintaining the existing competitive advantages by forecasting changes and adapting to them.

Investigating the determinants and patterns in the management of the economic security system of industrial enterprises, it is necessary to state the fundamental features of its provision (Fig. 2):

- having the properties of a systemic nature of industrial enterprises, in addition to the integrity and synergy of production and technological elements, have the interdependence between the technical and organizational subsystem and subsystems of quality and competitiveness of products;
- the system of economic security of industrial enterprise will be effective only if the complexity of its functions and processes is ensured;
- diagnostics of the economic security system of industrial enterprise should take into account not only financial, investment, cost criteria and indicators, but also be based on the analysis of spatial, infrastructural, resource-energy, logistics, information, environmental, etc. parameters;
- along with the diagnostic tools it is necessary to substantiate the methodological approaches to the choice of the vector of preventive measures, including their resource and technological support;
- the uniqueness of the economic security system is determined by production technologies and the specifics of industrial products of the enterprise, which provokes the need to adapt diagnostic tools to individual enterprises.
### Features of Ensuring the Management of the Economic Security of Industrial Enterprises

| **Features of Ensuring the Management of the Economic Security of Industrial Enterprises** |
|---|
| Possession, in accordance with the systemic nature of industrial enterprises, the interdependence between the technical and organizational subsystem and the subsystems of product quality and competitiveness |
| ensuring the effectiveness of the economic security system of industrial enterprises in the presence of the complexity of its functions and processes |
| taking into account when diagnosing the system of economic security of an industrial enterprise not only financial, investment, cost criteria and indicators, but also the analysis of spatial, infrastructural, resource-energy, logistical, informational, ecological and other parameters |
| the need to substantiate the methodological approach to the choice of the vector of preventive measures, including their resource and technological support |
| the presence of the uniqueness of the economic security system, taking into account production technologies and the specifics of industrial products of the enterprise, which provokes the need to adapt diagnostic tools to individual enterprises |

**Source:** summarized by the authors.

Adapting the described approaches to the diagnosis of the economic security system of industrial enterprises often use mainly functional approach, interpreting the importance and characteristics of the components of the economic security system through the integrated influence of factors on the level of security, efficiency and cost of the system. At the same time, it should be noted that they apply an integrated approach and analyze a large array of environmental factors and components of the economic security system. Despite the thoroughness and consistency of research, scientists’ attention is insufficiently focused on diagnosing the effectiveness of adaptation of the economic security system of industrial enterprises to competitive conditions and challenges.

To conduct a qualitative diagnosis of the economic security system of industrial enterprises in competitive markets and different competitive status of certain products, it is necessary to distinguish the stages of analysis and functions of individual components of the system (Fig. 3).
Fig. 3. The process of diagnosing the effectiveness of the economic security system of industrial enterprise

Stage 1
Setting goals, diagnostic tasks
- factors and structural elements of the system are determined;
- the purposes and directions of diagnostics of threats and results are described;
- mathematical tools are formalized.

Stage 2
Analysis of factors and their changes
- the information base is formalized;
- the dynamics and completeness of data are investigated;
- the dependence of changes of factors is established;
- the weight of factors is determined;
- provides an economic description of the nature of the impact of factors on the level of security

Stage 3
The choice of a methodical approach to diagnosing the effectiveness of the economic security system
- methodical tools of economic analysis are established;
- the chosen method is adapted to the specifics of the enterprise and its market, institutional environment;
- the final tools for analyzing the effectiveness of the economic security system of an industrial enterprise are formalized

Stage 4
Formalization of standardized results of diagnostics of efficiency of system of economic safety
- levels of admissible values are established;
- the range of deviations of the estimated efficiency of the economic security system from the targets is determined
- describes the nature of individual levels of security of the enterprise;
- a program of preventive measures is formalized for each level of efficiency of the economic security system.

Stage 5
Assessing the level of efficiency of the economic security system of an industrial enterprise
- the information base is analyzed;
- the level of economic security and the factors that formed it are calculated according to the adapted tools;
- the state of security is determined;
- the level of efficiency of the economic security system and achievement of the purposes of its maintenance is estimated

Stage 6
Monitoring the achievement of objectives and adjusting the strategic objectives of ensuring the effectiveness of the economic security system

Source: summarized by the authors.

The first stage of diagnosing the effectiveness of the economic security system of industrial enterprises is to formalize the economic and mathematical tools and the selection of
methodological support for evaluation. At this stage, it is important to determine the specifics of the object of evaluation, which will further affect the information samples and the quality of their analysis.

The second stage contains signs of factor analysis of the environment, as the diagnosis focuses on establishing patterns in the safety of the industrial enterprise, the formalization of the interaction of internal and external factors. In the processes of factor research to establish the dominants and benchmarks in ensuring the effectiveness of the economic security system, an important task is to determine the evaluative characteristics of the competitive status of the enterprise and certain types of its industrial products. This in the further diagnosis will allow to optimize the distribution of resource costs in the priority areas of security.

At the third stage, the most important task is the adaptation and formalization of a unique diagnostic system for an individual industrial enterprise and its compliance with the strategic objectives of economic security management.

Accordingly, at the forth stage, a system of levels of allowable efficiency and risk in the system of economic security for an industrial enterprise is formed. This allows you to formalize and outline the allowable values and deviations in the analysis of the actual values of the diagnosed indicators, to design promising scenarios for changes in the level of safety and the cost of preventive measures.

The last diagnostic stage in assessing the effectiveness of the economic security system of an industrial enterprise is to establish the level of achievement of the goals of protective and preventive measures, as well as to adjust the benchmarks for ensuring the effectiveness of the security system in a competitive environment.

**CONCLUSION**

The study allowed to propose a classification of methodological approaches to assessing the economic security of the enterprise by:

- general (including indicator, functional-resource and economic-mathematical methods);
- structural (corporate, motivational, financial and investment-profitable approaches);
- factor (diagnosis of innovation impact, competitive status, market threats and regulatory impact);
- single (methods of analysis of bankruptcy, personnel and intellectual, technical and technological, social, environmental, information and other components) levels.

Modern interpretations of the applied mathematical tools for diagnosing the level of effectiveness of security measures at enterprises, analysis of their dynamics and the nature of impacts are revealed. The article formalizes the process of diagnosing the effectiveness of the economic security system with an emphasis on strategic management in order to increase the levels of security and competitiveness of the industrial enterprise.

It is substantiated that the process of the efficiency diagnostics of the economic security system of industrial enterprise should provide such sequence: firstly, establishment of the purposes, tasks of diagnostics; secondly, analysis of factors and their changes; thirdly, the choice of a methodological approach to diagnosing the effectiveness of the economic security system; fourthly, the formalization of standardized results of diagnostics of the effectiveness of the economic security system; fifthly, assessing the level of efficiency of the economic security system of an industrial enterprise; sixthly, monitoring the achievement of objectives and adjusting the strategic objectives of ensuring the effectiveness of the economic security system. This sequence of the process of diagnosing the effectiveness of the economic security system of industrial enterprise makes it possible not only to analyze the actual values of diagnosed indicators, to design promising scenarios for changing the level of safety and the cost of preventive measures, and to establish the level of competitive conditions.
Further research in the field of economic diagnostics of the security system of industrial enterprises should be aimed at determining the methodological support, which would consider the already formalized characteristics and properties, the specifics of ensuring competitive security and economic feasibility of resource consumption and achieving security goals.

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Methodological support of the efficiency diagnosis of the economic security system of industrial enterprises in competitive environment

Apoio metodológico do diagnóstico da eficiência do sistema de segurança econômica de empresas industriais em ambiente competitivo

Soporte metodológico de diagnóstico de eficiencia del sistema de seguridad económica de empresas industriales en un entorno competitivo

Resumo
O artigo propõe uma classificação de abordagens metodológicas para o diagnóstico da segurança econômica das empresas de acordo com os princípios de consistência e níveis estratégicos de governo. Os autores formalizam os métodos nos níveis geral, estrutural, fatorial e unitário. Os métodos gerais incluem indicador, recurso funcional e econômico-matemático. Os métodos estruturais se distinguem pela direção do sistema de segurança econômica, que permite formalizar abordagens corporativas, motivacionais, financeiras e rentáveis para investimentos. Destaca-se também o grupo fator de métodos, no qual destacam-se os diagnósticos de influência inovadora, status competitivo, ameaças de mercado e influência normativa-legal. O maior grupo inclui métodos de diagnóstico unitário, entre os quais estão métodos de análise de falência, pessoal e intelectual, técnico e tecnológico, social, ambiental, informação e outros componentes.

Palavras-chave: Sistema de segurança econômica. Empresas industriais. Diagnósticos. Concorrência. Ferramentas metodológicas.

Abstract
The article proposes a classification of methodological approaches to the diagnosis of the economic security of enterprises according to the principles of consistency and strategic levels of government. The authors formalize the methods at the general, structural, factorial and unit levels. The general methods include indicator, functional-resource and economic-mathematical. Structural methods are distinguished by the direction of the economic security system, which allow to formalize corporate, motivational, financial and investment-profitable approaches. The factor group of methods is also formalized, in which the diagnostics of innovative influence, competitive status, market threats and normative-legal influence is distinguished. The largest group include methods of unit diagnostics, among which are methods of analysis of bankruptcy, personnel and intellectual, technical and technological, social, environmental, information and other components.

Keywords: Economic security system. Industrial enterprises. Diagnostics. Competition. Methodical tools.

Resumen
El artículo propone una clasificación de enfoques metodológicos para el diagnóstico de la seguridad económica de las empresas de acuerdo con los principios de consistencia y niveles estratégicos de gobierno. Los autores formalizan los métodos a nivel general, estructural, factorial y unitario. Los métodos generales incluyen indicador, funcional-recurso y económico-matemático. Los métodos estructurales se distinguen por la dirección del sistema de seguridad económica, que permite formalizar enfoques corporativos, motivacionales, financieros y rentables para la inversión. También se formaliza el grupo factorial de métodos, en el que se distinguen los diagnósticos de influencia innovadora, estado competitivo, amenazas de mercado e influencia normativo-legal. El grupo más grande incluye métodos de diagnóstico unitario, entre los que se encuentran los métodos de análisis de quiebras, personal e intelectual, técnico y tecnológico, social, ambiental, información y otros componentes.

Palabras-clave: Sistema de seguridad económica. Empresas industriales. Diagnósticos. Competición. Herramientas metódicas.