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Formation of the Adaptive Management System for the Economic Security of Enterprises in the COVID-19 Context

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ABSTRACT

The relevance of this scientific research is justified by the increased attention that the economic community pays to economic security, for the development of microeconomic systems in modern conditions of uncertainty, caused by global challenges, as a result of the COVID-19 pandemic. The purpose of the study is to identify the principles of the formation of an adaptive management system of economic security of enterprises in the conditions of the COVID-19 pandemic. The authors founded the methodological basis for the formation of the adaptive management system of the economic security of companies, based on the identification of the systemic approach and specific principles of compliance, duality and feedback, as well as the functions of adaptive management. The conducted research makes possible to generalize that the formation of a system of adaptive management of the economic security of enterprises in the COVID-19 conditions is a special type of management activity, which involves the use of a wide range of measures and tools for making effective management decisions, which are characterized by timeliness, flexibility, creativity and innovation.

KEY WORDS: Adaptive management, economic security, enterprise, management system, systemic approach, enterprise management.

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Conformación del sistema de gestión adaptativa para la seguridad económica de las empresas en el contexto de la COVID-19

RESUMEN

La relevancia de esta investigación científica se justifica por la mayor atención que la comunidad económica presta a la seguridad económica, para el desarrollo de los sistemas microeconómicos en las condiciones modernas de incertidumbre, provocadas por los desafíos globales, como resultado de la pandemia de COVID-19. El propósito del estudio es identificar los principios de la formación de un sistema de gestión adaptativa de la seguridad económica de las empresas en las condiciones de la pandemia de COVID-19. Los autores fundamentaron la base metodológica de la formación del sistema de gestión adaptativa de la seguridad económica de las empresas, a partir de la identificación del enfoque sistémico y principios específicos de cumplimiento, dualidad y retroalimentación, así como las funciones de la gestión adaptativa. La investigación realizada permite generalizar que la formación de un sistema de gestión adaptativa de la seguridad económica de las empresas en las condiciones de COVID-19 es un tipo especial de actividad de gestión, que implica el uso de una amplia gama de medidas y herramientas para tomar decisiones gerenciales efectivas, que se caractericen por la oportunidad, la flexibilidad, la creatividad y la innovación.

PALABRAS CLAVE: Gestión adaptativa, seguridad económica, empresa, sistema de gestión, enfoque sistémico, gestión empresarial.

Introduction

Adaptive management as a management toolkit is aimed at increasing the efficiency of microeconomic systems in conditions of uncertainty, including the COVID-19 pandemic. Adaptive management has received special attention today because the pandemic, energy threats, military actions on the territory of certain countries, for example, such as Ukraine, the aggravation of the problem of resource sufficiency and changes in logistics flows increase the relevance of this issue. The COVID-19 pandemic has become a global challenge for enterprises around the world and has demonstrated the value of timely management decisions, when the slightest delay in their adoption can be fatal for the enterprise.

The purpose of the study is to identify the principles of the formation of the adaptive management system of the economic security of enterprises in the COVID-19 context. Achieving the set goal became possible thanks to setting and solving the following tasks:

- proven relevance of this research topic and its coverage in scientific publications;

- the methodological foundation of the formation of the system of adaptive management of the economic security of enterprises based on the identification of the system approach and specific principles and functions of adaptive management is substantiated;
- highlighting the essence, features, direction and tasks of adaptive management of the economic security of the enterprise in the COVID-19 conditions;
- substantiation of the phasing of the formation of the system of adaptive management of the economic security of the enterprise in the COVID-19 conditions;
- proving the practical significance of the application of adaptive management of the economic security of enterprises.

1. Literature Review

The issues of adaptive management are extremely relevant, especially in the context of ensuring the economic security of enterprises. Many publications are devoted to innovation and investment provision of economic security and features of using the adaptive management system. Among the scientists who devoted scientific research to the mentioned problem are: Abramova A. et al. (2021); Arboleda Hugo et al. (2016); Arefieva O. et al. (2021); Babenko V. et al. (2017); Butko M. et al. (2019); Cherep A. et al. (2023); Chubaievskiy V. et al. (2022); Deineha O. et al. (2022); Grigoraş-Ichim C.E. et al. (2018); Grosu V. et al. (2021); Ivanova N. et al. (2022); Lehenchuk S. et al. (2021); Samoilenko Yu. et al. (2022); Semenov A. et al. (2022); Shi Yefeng et al. (2021); Teerasoponpong Siravat et al. (2022); Tulchynska S. et al. (2021); Vovk O. et al. (2021); Wang Ping (2018) and other.

The authors of the paper (Teerasoponpong S. et al., 2022) propose a decision support system for inventory sourcing and management to help small and medium-sized enterprises collect and use data and support their decisions in the face of business ambiguity. The researchers developed decision support system based on the use of a modeling and optimization approach by incorporating an artificial neural network and a genetic algorithm to represent the problem and optimize solutions for decision support. The authors believe that their proposals should help decision-makers shape their inventory management policies in the face of uncertain demand for raw materials, taking into account also the level of service, sales promotion, lead times and availability of materials from multiple suppliers.

The scientists' article (Deineha O. et al., 2022) is based on research and development of recommendations for increasing the adaptability of transport logistics management in

agricultural enterprises. The scientists investigated the specifics of logistics processes taking place in agriculture, and also reflected the financial content of cluster development as a tool of competitiveness and innovative activity of agricultural enterprises, which, according to the authors, allows realizing the existing potential for increasing sales.

The purpose of the article (Shi Yefeng et al., 2021) is to study the process of self-organization of a complex system of a production enterprise, as an economic and social entity, naturally occurring according to the basic rules of functioning of a modern enterprise. The authors outlined the hierarchical structure and characteristics of complex systems of production enterprises, and also analyzed the state of management of modern production enterprises. Scientists proposed a system of adaptive management, which, in their opinion, is suitable for self-organization control.

The authors' (Wang Ping, 2018) analysis of the results of modern scientific research on the problems of adaptive management of economic systems and business models demonstrates the further development of methodological approaches taking into account the complications of the information structure of micro-level economic systems, digitalization and intellectualization, their management systems. According to the authors, this led to the integration of mono-approaches to management with modern corporate automated management systems.

Scientists (Babenko V. et al., 2017) have formalized a general model of adaptive management, within which it is proposed to use a deterministic approach for modeling at a given moment in time, taking risks into account. To solve the problem of minimax control under conditions of risks, the authors have developed a method that boils down to the implementation of solutions to a finite number of linear and convex mathematical programming problems, as well as discrete optimization problems.

Within the scope of the article (Arboleda Hugo et al., 2016), the authors have developed a structure that provides means and mechanisms for managing self-adaptive corporate applications using an autonomous infrastructure and automated creation of self-adaptive corporate applications and their corresponding monitoring infrastructure.

Scientists (Cherep A. et al., 2023) investigated the impact of the innovative potential of personnel on strengthening the economic security of Ukrainian enterprises in the post-war period. The authors identified four obstacles to the positive impact of the innovative

potential of personnel on strengthening economic security. The authors are convinced that the developed proposals can be used in the development of joint projects to strengthen economic security in energy, construction, import substitution and other areas.

The article (Samoilenko Yu. et al., 2022) deals with the issue of modernization of economic security of the enterprise, taking into account new risks and possibilities of digitalization. The authors identified the features of preventing internal and external negative threats in order to ensure effective and stable functioning and dynamic social development of the enterprise in conditions of digitalization. Within the framework of the study, the authors developed a methodical approach for assessing the level of digital security of enterprises in the conditions of digitalization.

The authors of the study (Lehenchuk S. et al., 2021) presented a methodical support for assessing the economic security of industrial enterprises of Ukraine. Scientists determined the level of economic security of the studied enterprises and identified destructive and stimulating factors for the development of enterprises. Scientists have outlined the factors that reduce and increase the level of their economic security. Based on the results of the analysis, the authors proposed a conceptual scheme for modeling the economic security of an industrial enterprise.

The result of the research (Chubaievskyi V. et al., 2022) consists in the development of a mathematical model and an optimization algorithm for the formation of information security of the enterprise in the conditions of minimizing costs and losses. According to the authors, the specified model allows not only to analyze threats and determine the weight of the influence of factors, but also to determine effective tactics and strategies for minimizing their consequences.

Within the framework of the study (Semenov A. et al., 2022), the authors have carried out a simulation of a comprehensive assessment of the financial management of the economic security of a modern enterprise in the conditions of an innovative economy. As a result, the authors developed a system of adaptive assessment of the financial management of the enterprise's economic security, taking into account changes in the external and internal environment.

However, despite the significant number of publications on the mentioned topic, the study of the peculiarities of the formation of the system of adaptive management of the

economic security of enterprises in the context of Covid-19 is extremely relevant and important, and requires further study and analysis.

2. Methodology

The methodological basis of this study is a systematic approach, which represents a holistic methodology and provides an opportunity to study the object of any multi-component system, which is the economic security of enterprises as a set of interconnected and interacting components that together give a result greater than the sum of the individual components. That is, the systemic approach makes it possible to take into account the principle of emergence, according to which an object as a certain aggregate has properties and qualities that are not inherent to its individual elements. Such a combination of individual elements with a systemic approach leads to a synergistic effect in adaptive management.

A systematic approach in the process of researching adaptive management makes it possible to take into account direct and inverse relationships, interactions, impacts and changes that occur as a result of decision-making to ensure the economic security of enterprises. The application of the methodology of the system approach makes it possible to take into account the new realities faced by enterprises as a result of the COVID-19 pandemic and to take into account the impact of the pandemic on the functioning of the system in the most complete and comprehensive way.

In order to achieve the effectiveness of economic security, adaptive management decision-making in the COVID-19 conditions should be carried out in compliance with such principles as:

the principle of correspondence of the controlling and controlled subsystems, according to which the complexity and diversity must correspond between the control system of economic security and the object of control;

the principle of dual management, since adaptive management influence is carried out in relation to the object of management, and on the other hand, to analyze the properties of the object of decision-making in order to make further higher quality and effective management decisions to ensure the economic security of enterprises in the COVID-19 conditions;

the principle of feedback, which makes it possible to determine the characteristics of

the object of adaptive management, as a result of which reactions to decision-making are formed, which are reflected in subsequent management influences.

It is precisely such specific principles of adaptive management as compliance, duality and feedback that distinguish its features and ensure the effectiveness of management decision-making on the economic security of enterprises in the COVID-19 conditions and ensure the performance of such functions as:

- joint development of a realistic goal to achieve economic security of the enterprise;
- criterion modeling of adaptive management processes;
- cooperation of actions and self-direction to improve the efficiency of economic security to ensure the development of the enterprise;
- monitoring the process of adaptive management and monitoring the results of its implementation;
- prognostic regulation, implementation of planning and forecasting;
- activation and stimulation of enterprise development;
- coordination and control of activities;
- accounting and analysis of changes in the economic security of the enterprise and its development.

3. Results

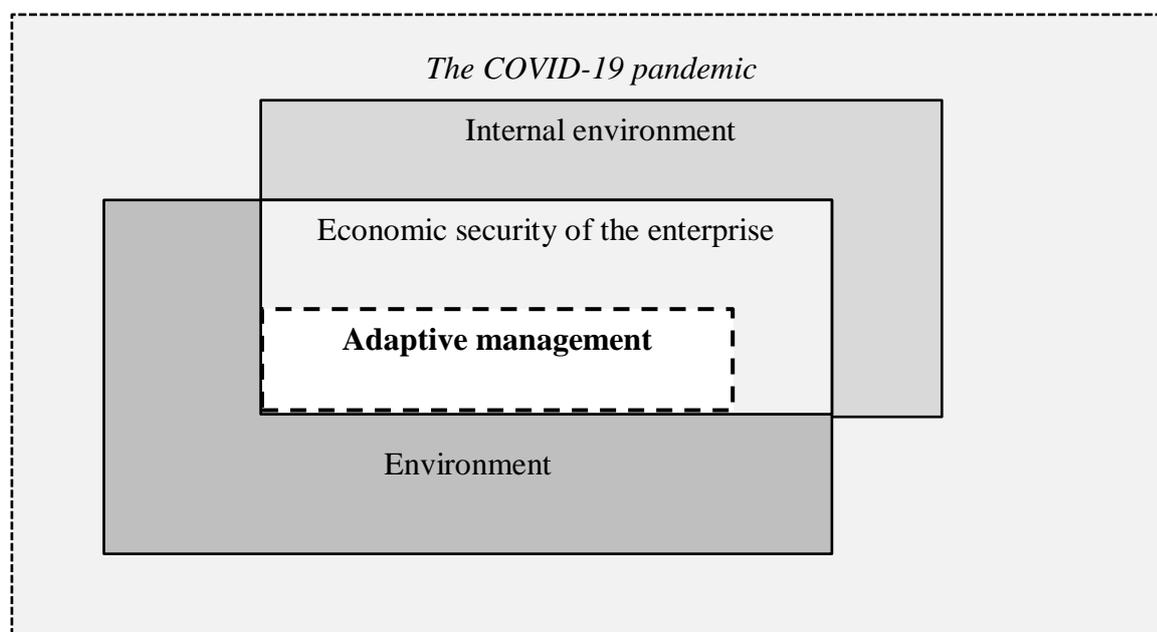
When ensuring the economic security of microeconomic systems, adaptive management is a process of making and implementing management decisions in conditions of uncertainty, which includes the COVID-19 pandemic, which ensures the timeliness of management decisions and the effectiveness of the economic security of the enterprise. The need to apply adaptive management to ensure the economic security of microeconomic systems increases during the exit of the enterprise from the crisis, in the case of organizational changes, or under the conditions of the introduction of innovations. The main difference of adaptive management in the COVID-19 conditions is the search for the most optimal decision-making options for ensuring economic security and their implementation aimed at the sustainable development of enterprises (Fig. 1).

Thus, it can be summarized that the adaptive management of the economic security of the enterprise is (Fig. 2):

firstly, a multi-purpose system for ensuring the impact of the enterprise adaptation in

the COVID-19 conditions;

Figure 1. Presentation of the role and place of adaptive management of the economic security of the enterprise in the COVID-19 conditions



Source: constructed by the authors

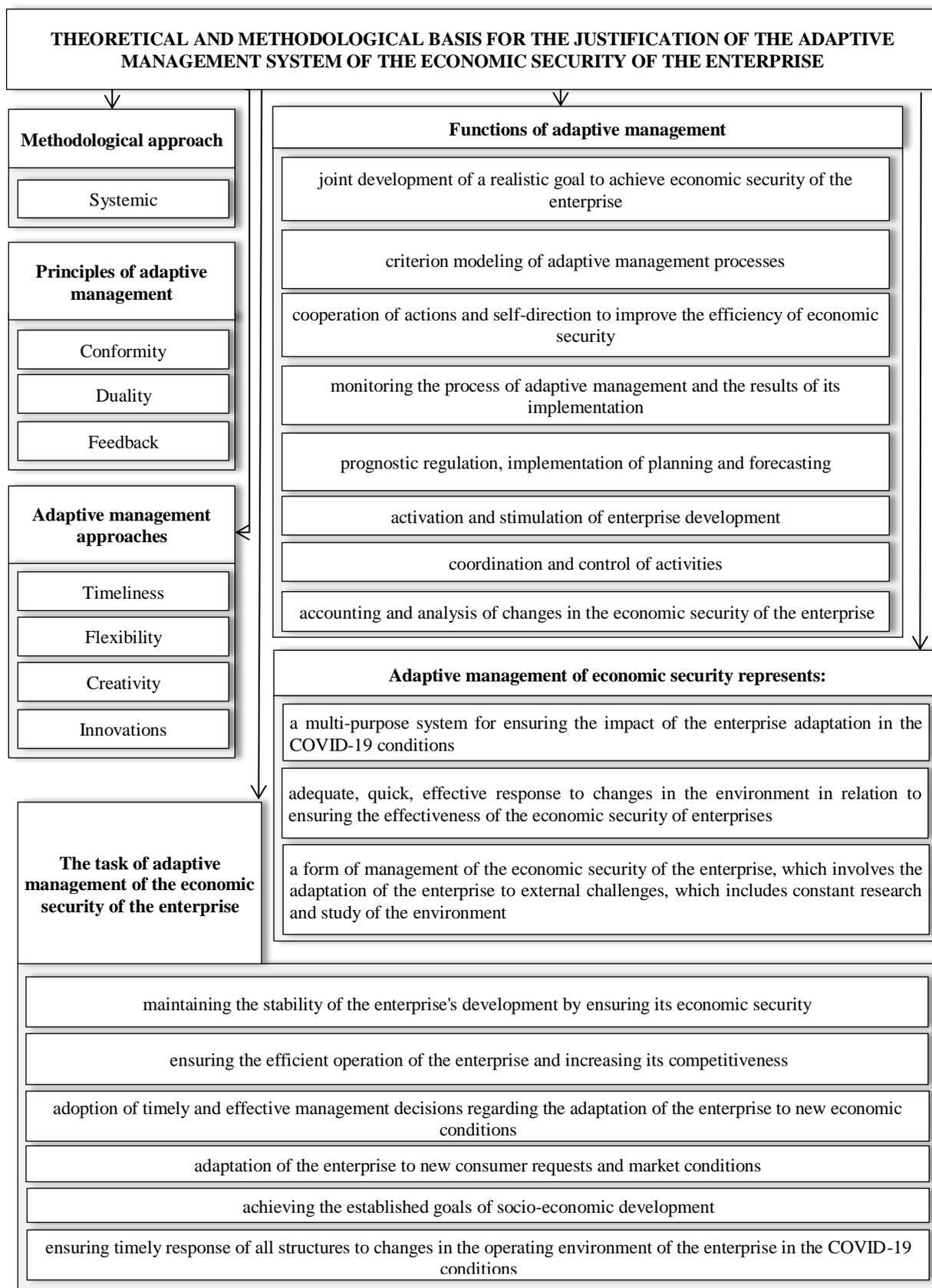
secondly, an adequate, quick, effective response to changes in the environment in terms of ensuring the effectiveness of the economic security of enterprises;

thirdly, a form of management of the economic security of the enterprise, which involves the adaptation of the enterprise to external challenges, which includes constant research and study of the environment.

The main tasks of adaptive management of the economic security of the enterprise in the COVID-19 context are:

- maintaining the stability of the enterprise's development by ensuring its economic security in the conditions of a constantly changing external environment;
- ensuring the efficient operation of the enterprise and increasing its competitiveness;
- adoption of timely and effective management decisions regarding adaptation of the enterprise to new economic conditions;
- adaptation of the enterprise to new consumer requests and market conditions;
- achievement of the established goals of social and economic development of the enterprise;

Figure 2. Theoretical and methodological principles of substantiating the adaptive management system of enterprises in the COVID-19 conditions



Source: suggested by the authors

- ensuring timely response of all structures to changes in the environment of the company's functioning in the COVID-19 conditions.

A special feature of the adaptive management of economic security is the flexibility of responding to changes in the external environment, taking into account creative, innovative management approaches. That is, timeliness, flexibility, creativity and innovation are the main approaches of adaptive management. It is these properties that allow economic security to respond effectively to:

- changes in the external environment under the COVID-19 conditions;
- determine and update the goals of economic security of enterprises in relation to changes in the external environment;
- implement foreside management decisions on the economic security of the enterprise;
- to adjust current plans and budgets, forms and methods of protecting the interests of the enterprise in the COVID-19 conditions;
- to ensure the achievement of the goals of economic security of the enterprise as a whole.

Therefore, the main goal of adaptive management of the economic security of enterprises in the COVID-19 conditions is the adoption of a timely, flexible, creative and innovative management decision, which involves a rational change in the parameters, properties, and structure of the management object to ensure the economic security of enterprises in the COVID-19 conditions. Adaptive management has the character of continuous continuous monitoring throughout the entire period of existence of the management object.

The formation of a system of adaptive management of the economic security of enterprises in the COVID-19 conditions should provide for (Fig. 3):

- firstly, assessment of the possibilities of adaptability of the enterprise's economic security. It consists in determining the conformity of the actually existing level of adaptation with respect to the normative level;
- secondly, determining the purpose and main tasks of adaptive management to ensure the economic security of the enterprise in the COVID-19 conditions;
- thirdly, complex permanent monitoring of the external environment of the

enterprise's functioning, which involves the processing of a significant mass of information and its analytical processing;

- fourthly, analysis of the internal environment and state of economic security of the enterprise. Constant monitoring of qualitative and quantitative indicators of economic security of the enterprise for the possibility of timely response to their deviations. The effectiveness of adaptive management largely depends on the information system, which includes information on production, personnel, innovation-technological, financial-credit, logistics, marketing and other processes and combines it into a single information system that makes it possible to adequately assess the current state economic security of the enterprise and its deviation. Also, the assessment of the internal environment of the enterprise involves the analysis of material, cost, labor balances and production, environmental and other norms and standards;

- fifthly, evaluation of the functioning of the sphere of economic activity in the COVID-19 conditions to isolate the vector of development and changes in the sphere of economic activity under the influence of the external environment. To determine the state and changes in the functioning of the enterprise's sphere of economic activity, it is necessary to apply various tools of economic and statistical analysis - correlation-regression analysis, extrapolation method, time series analysis, calculation of integral indices, construction of matrices, etc.;

- sixthly, the formation of an adaptive management strategy of enterprises taking into account such principles as timeliness, flexibility, creativity and innovation;

- seventhly, conducting a forecast of behavioral changes in the external environment under the COVID-19 conditions and its impact on the enterprise's sphere of activity and the state of its economic security;

- eighthly, the development of a group of generalized alternatives regarding the directions of adaptive management strategies. This makes it possible to single out the most acceptable course of action to ensure the economic security of the enterprise in the COVID-19 conditions;

- ninthly, the selection of the most optimal alternative from among the group of alternatives using analytical models of adaptation of economic security of enterprises, which makes it possible not only to achieve a new balance with the external environment, but also

to use changes in the external environment for the benefit of the development of the enterprise;

- tenth, the development of mechanisms and tools for the practical implementation of the selected model of adaptation of the economic security of the enterprise in the COVID-19 conditions;

- eleventh, the implementation of adaptive management strategy measures taking into account the qualitative characteristics of the adaptation process and the mechanisms of practical implementation of a specific adaptation model for ensuring the economic security of the enterprise in the COVID-19 conditions;

- twelfth, development of criteria for evaluating the effectiveness of the system of adaptive management of economic security;

- thirteenth, evaluating the effectiveness of the system of adaptive management of the economic security of the enterprise in the COVID-19 conditions and making decisions regarding further management decisions.

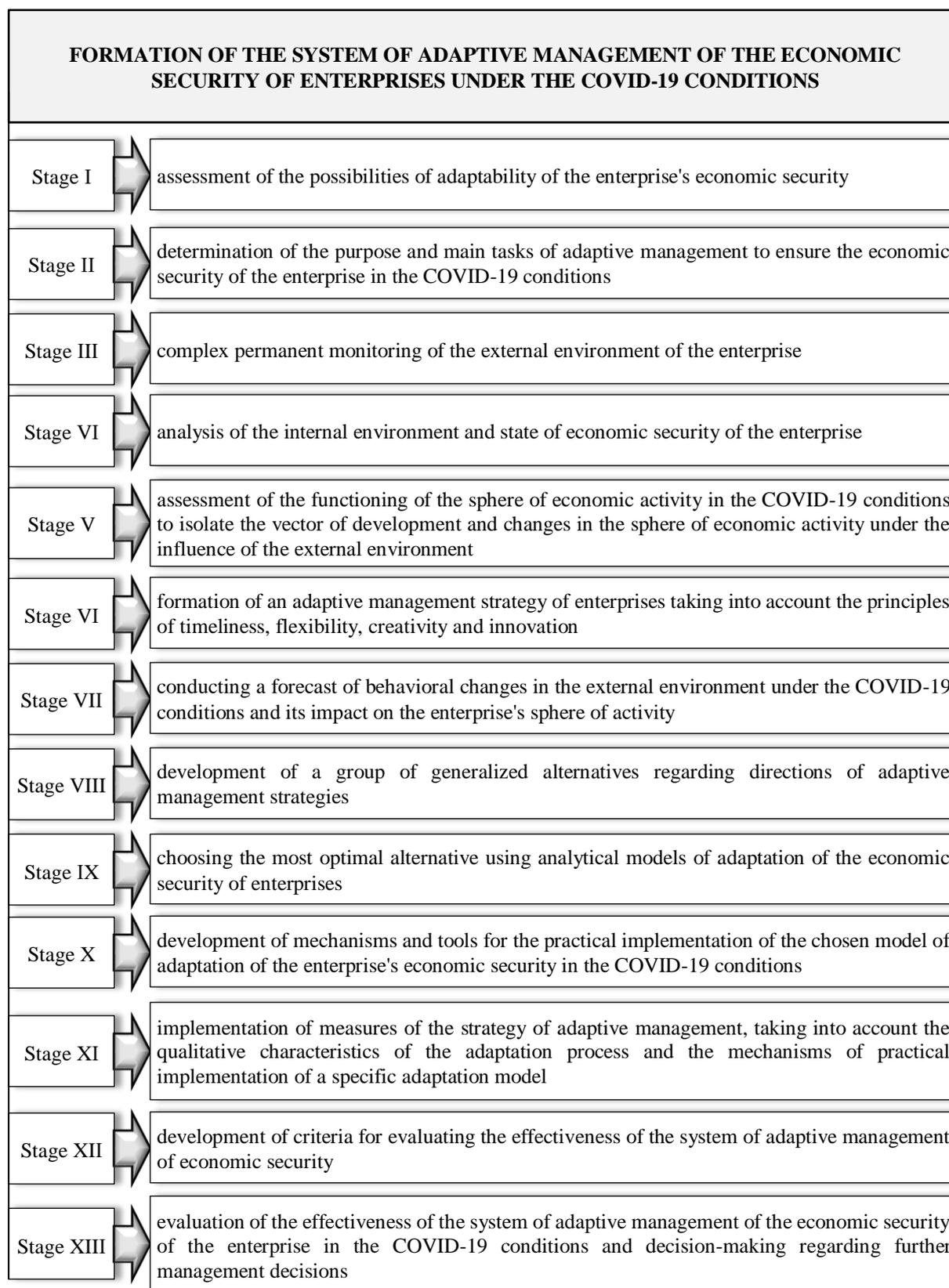
In adaptive management, a wide range of diverse tools is used, including: forecasting, methods that provide feedback, planning and response systems, various marketing studies, as well as continuous monitoring of the external and internal environment of the enterprise's functioning to ensure the introduction of timely management measures to ensure economic enterprise security in the COVID-19 conditions.

Adaptive management is impossible without the introduction of modern digital technologies that make it possible to obtain relevant and effective results of the economic security system of enterprises.

4. Discussion

We consider the author's research (Wang Ping, 2018) to be practically appropriate, which is devoted to the analysis of the problems of adaptive management of economic systems and business models. Also, we support scientists (Babenko V. et al., 2017) who proposed a model of adaptive management, in the framework of which it is proposed to use a deterministic approach for modeling taking risks into account.

Figure 3. The phasing of the formation of the adaptive management system of the economic security of the enterprise in the COVID-19 conditions



Source: constructed by the authors

We share the opinion of the authors of the article (Cherep A. et al., 2023) regarding the relevance of research on the impact of the innovative potential of personnel on strengthening the economic security of enterprises in the post-war period. Also, in our opinion, the study (Y. Samoilenko et al., 2022) is relevant, in which the authors consider the issue of modernization of the economic security of the enterprise, taking into account new risks and possibilities of digitalization. We consider the study relevant and timely (Legenchuk S. et al., 2021), based on the results of which a methodical support for assessing the economic security of industrial enterprises of Ukraine is proposed. Supporting the scientific opinion and practical justification of the study (Semenov A. et al., 2022), we would like to draw attention to the expediency of the implemented modeling of the comprehensive assessment of the financial management of the economic security of modern enterprises in the conditions of the innovative economy.

However, we should not leave aside the issue of the formation of a system of adaptive management of enterprises in the context of ensuring their economic security in the COVID-19 conditions, because the specified direction of research is gaining more and more relevance and requires further research.

Conclusion

The conducted research makes it possible to generalize that the formation of a system of adaptive management of the economic security of enterprises in the COVID-19 conditions is a special type of management activity, which involves the use of a wide range of measures and tools for making effective management decisions, which are characterized by timeliness, flexibility, creativity and innovation and provide an opportunity to comprehensively respond to changes in the external environment in order to ensure effective economic security of the enterprise for its development and sustainability.

The scientific novelty of the obtained results lies in the substantiation of the theoretical and conceptual foundations of the formation of a system of adaptive management of the economic security of enterprises in the COVID-19 conditions, which is built on the application of a systemic approach, involves taking into account such specific principles of adaptive management as compliance, duality and feedback, as well as is based on individualized approaches of adaptive management of timeliness, flexibility, creativity and innovation, which ensure the effectiveness of management decision-making and is based on

the formation of a system of adaptive management of the economic security of enterprises in the COVID-19 conditions.

The applied value of the study consists in the implementation of the proposed stepwise algorithm for the formation of a system of adaptive management of the economic security of enterprises in the COVID-19 conditions.

Questions related to the use of modern information technologies to increase the effectiveness of adaptive management of the economic security of enterprises to increase the effectiveness of their activities in the COVID-19 conditions require further research.

References

Abramova, A., Shaposhnykov, K., Zhavoronok, A., Liutikov, P., Skvirskyi, I., & Lukashev, O. (2021). Ecosystem of VAT Administration in E-Commerce: Case of the Eastern Europe Countries. *Estudios de Economía Aplicada*, 39(5).

Arboleda, Hugo, Paz, Andrés, Jiménez, Miguel, Tamura, Gabriel. (2016). Development and Instrumentation of a Framework for the Generation and Management of Self-Adaptive Enterprise Applications. *Ingeniería y Universidad*, 20(2), 325-357.

Arefieva, O., Tulchynska, S., Popelo, O., Arefiev, S., Tkachenko, T. (2021). The Economic Security System in the Conditions of the Powers Transformation. *IJCSNS International Journal of Computer Science and Network Security*, 21(7), 35-42.

Babenko, V., Romanenkov, Y., Yakymova, L., Nakisko, A. (2017). Development of the model of minimax adaptive management of innovative processes at an enterprise with consideration of risks. *Eastern-European Journal of Enterprise Technologies*, 5(4(89)), 49-56.

Butko, M., Popelo, O., Pishenin, I. (2019). Innovations in Human Resources Management in Conditions: Case for Ukrainian Agro-industrial Complex. *Marketing and Management of Innovations*, 2, 74-82.

Cherep, A., Adamenko, M., Adamenko, M., Cherep, O., Dashko, I., Korolenko, R., Kornukh, O. (2023). The Influence of the Innovation Potential of Personnel on Strengthening Economic Security of Ukrainian Enterprises in the Post-War Period. *WSEAS Transactions on Business and Economics*, 20, 70-79.

Chubaievskyi, V., Blakyyta, H., Bogma, O., Shtuler, I., Batrakova, T. (2022). Protection of information resources as an integral part of economic security of the enterprise. *Scientific Bulletin of National Mining University*, 4, 117-122.

Deineha, O., Chymosh, K., Kobylinska, T., Nazarov, O., Liapa, M., Sapotnitska, N. (2022). Adaptive Management of Transport Logistics in Agricultural Enterprises. *Journal of Agriculture and Crops*, 8(1), 20-26. <https://doi.org/10.32861/jac.81.20.26>.

Grigoraş-Ichim C.E., Cosmulese C.G., Savchuk D., Zhavoronok A. (2018). Shaping the perception and vision of economic operators from the Romania – Ukraine – Moldova border area on interim financial reporting. *Economic Annals-XXI*, 173(9-10), 60-67.

Grosu, V., Kholiavko, N., Zhavoronok, A., Zlati, M.L., Cosmulese, C.G. (2021). Conceptualization of model of financial management in romanian agriculture. *Economic Annals-XXI*, 191(7-8(1)), 54-66.

Ivanova, N., Popelo, O., Avhustyn, R., Rusak, O., Proshchalykina, A. (2022). Marketing Strategy of the Small Business Adaptation to Quarantine Limitations in the Sphere of Trade Entrepreneurship. *IJCSNS International Journal of Computer Science and Network Security*, 22(1), 149-160.

Lehenchuk, S., Valinkevych, N., Hrytsak, O., Vyhivska, I. (2021). The Beneish model as a tool for detecting falsification of financial statements and a tool for economic security of the enterprise: Ukrainian experience. *AIP Conference Proceedings*, 2413(1), 040009.

Samoilenko, Yu., Britchenko, I., Levchenko, Ia., Loşonczi, P., Bilichenko, O., Bodnar O. (2022). Economic Security of the Enterprise Within the Conditions of Digital Transformation. *Economic Affairs*, 67(4), 619-629.

Semenov, A., Orlova-Kurilova, O., Riazanova, N., Oviechkina, O., Burda, N. (2022). Comprehensive assessment of financial management of economic security of an enterprise in the conditions of innovative economy. *Journal of Hygienic Engineering and Design*, 39, 227-235.

Shi, Yefeng, Pu, Guiping, Wang, Dong. (2021). Adaptive self-organization management of complex system in manufacturing enterprise. *Project management. International symposium. (ISPM 2021)* (pp. 862-868).

Teerasoponpong, Siravat, Sopadang, Apichat. (2022). Decision support system for adaptive sourcing and inventory management in small- and medium-sized enterprises. *Robotics and Computer-Integrated Manufacturing*, 73, 102226.

Tulchynska, S., Vovk, O., Popelo, O., Saloid, S., Kostyunik, O. (2021). Innovation and investment strategies to intensify the potential modernization and to increase the competitiveness of microeconomic systems. *IJCSNS International Journal of Computer Science and Network Security*, 21(6), 161-168.

Vovk, O., Tulchynska, S., Popelo, O., Tulchynskiy, R., & Tkachenko, T. (2021). Economic and Mathematical Modeling of the Integration Impact of Modernization on Increasing the Enterprise Competitiveness. *Management Theory and Studies for Rural Business and Infrastructure Development*, 43(3), 383-389.

Wang, Ping. (2018). Application of adaptive algorithm in paper mills enterprise management. *Paper Asia*, 1(8), 160-153.