

## ADAPTIVE MANAGEMENT OF THE INNOVATIVE DEVELOPMENT OF ENTERPRISES IN THE CONDITIONS OF THE NATIONAL ECONOMY DIGITALIZATION

*Volodymyr Filippov<sup>1</sup>, Viktoria Kyfyak<sup>2</sup>, Kateryna Tanashchuk<sup>3</sup>, Denys Krylov<sup>4</sup>, Volodymyr Mandra<sup>5</sup>, Andrii Skomorovskyi<sup>6</sup>*

<sup>1</sup> Dr. Prof., Odessa Polytechnic National University, Odesa, Ukraine, E-mail address: [filippov@opu.ua](mailto:filippov@opu.ua)

<sup>2</sup> Assoc. Prof., Yuriy Fedkovych Chernivtsi National University, Chernivtsi, Ukraine, E-mail address: [v.kyfyak@chnu.edu.ua](mailto:v.kyfyak@chnu.edu.ua)

<sup>3</sup> Assoc. Prof., State University of Intelligent Technologies and Telecommunications, Odesa, Ukraine, E-mail address: [science\\_prorektor@suitt.edu.ua](mailto:science_prorektor@suitt.edu.ua)

<sup>4</sup> Assoc. Prof., Zaporizhzhia National University, Zaporizhzhia, Ukraine, E-mail address: [krylov.denys2021@gmail.com](mailto:krylov.denys2021@gmail.com)

<sup>5</sup> PhD. Prof., Odessa Polytechnic National University, Odesa, Ukraine, E-mail address: [v.v.mandra@op.edu.ua](mailto:v.v.mandra@op.edu.ua)

<sup>6</sup> Resources, Project administration, Academy of Management and Administration in Opole, Opole, Poland, E-mail address: [andrii.skomorovskyi@gmail.com](mailto:andrii.skomorovskyi@gmail.com)

Received 11 04 2023; Accepted 25 04 2023

---

### Abstract

The article is devoted to the adaptive management of the innovative development of enterprises in the conditions of the national economy digitalization. The research used such methods as induction and deduction, scientific abstraction, dialectic, systematization, analysis and synthesis, abstract-logical generalization and graphic. The study proved the dependence between the speed at which enterprises achieve sustainability in relation to permanent changes in the external environment and the level of efficiency and effectiveness of their activities, in connection with which the factors influencing the innovative development of enterprises and the adaptation of their management system were analyzed. The authors attributed the following factors to the mentioned factors: digitalization of the national economy; processes of globalization in relation to the economic system; increasing the level of competition, scientific and technical progress and its leading trends; permanent complications of the operating system of enterprises and its processes; repurposing enterprises and their business processes taking into account the constant development of digital and information technologies to meet the needs of customers, the effectiveness and efficiency of the results of the companies' activities. It has been proven that adaptive management is the basis for the formation of an enterprise's adaptation strategy at all levels of management. A system of adaptive management of the innovative development of enterprises in the conditions of the national economy digitalization has been formed.

**Keywords:** *adaptive management, digitalization, information and communication technologies, business processes, innovative development of enterprises, national economy.*

**JEL Codes:** *O30, L86.*

---

### Introduction

In today's conditions of strengthening globalization processes, digitalization of the national economy, enterprises need to adapt to new challenges and implement digital innovative technologies in order to

preserve competitive advantages. The basic component of the innovative development of the enterprise is the definition of "innovation", which means the introduction of a certain innovation in various spheres of its functioning, which contributes to increasing the effectiveness and efficiency of the enterprise. In order to

ensure the innovative development of the enterprise in the conditions of the national economy digitalization, an effective management system is needed, the formation of which should currently be determined by the specifics of the enterprise's activity and the nature of innovative processes. The modern methodological base for managing the innovative development of the enterprise in the conditions of digital transformation provides for the mandatory division of the innovation process into such stages as: development of innovations and their mastery, their distribution. Adaptive management should be noted among the main principles of managing the innovative development of enterprises. At the same time, adaptation issues arise that are directly related to the introduction of innovations, as well as permanent changes and transformations in the environment, which the company cannot influence. The above determined the need to research the processes of adaptive management of innovative development of enterprises in current conditions of the national economy digitalization, formulated the purpose and relevance of this article.

The purpose of the article is to study the features of adaptive management application of enterprises' innovative development in the conditions of the national economy digitalization. Based on the purpose of the research, the following tasks were set:

- outline the essence and content of adaptive management of the innovative development of enterprises in the conditions of the national economy digitalization;
- to determine the factors influencing the innovative development of enterprises and the adaptation of their management system;
- to present the adaptive management of the innovative development of the enterprise in the conditions of the national economy digitalization from the position of a systemic approach.

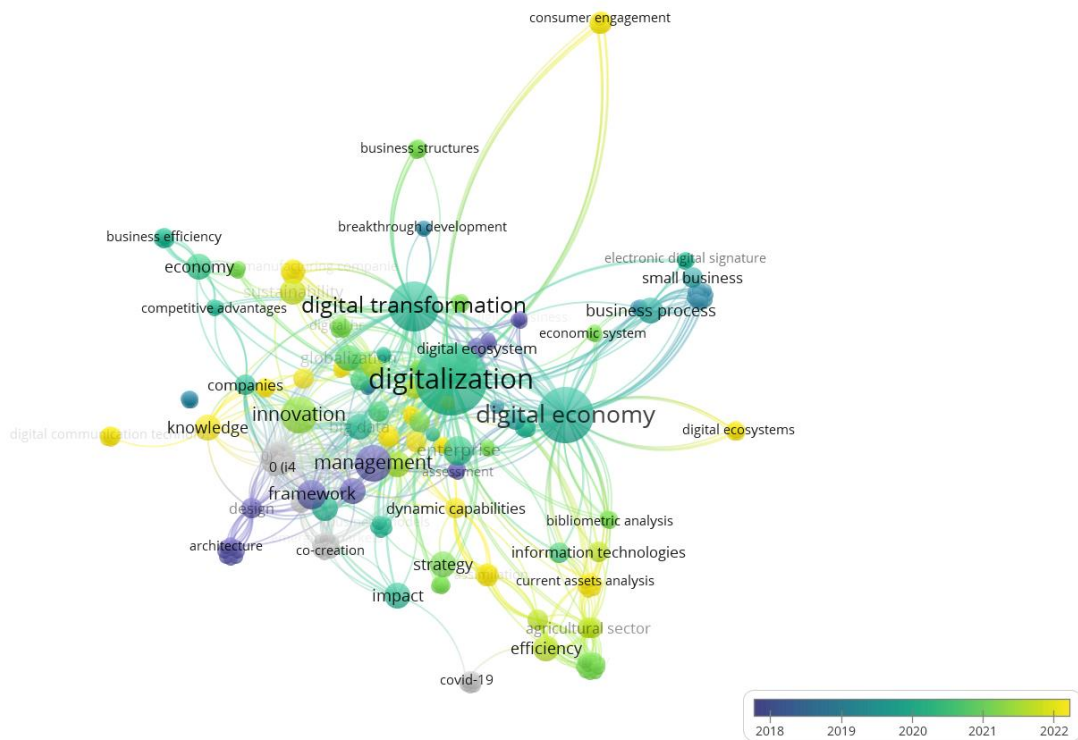
## **Literature review**

Many scientific publications of domestic and foreign scientists are devoted to the multifaceted issues of innovative development (Abramova et al. (2021); Grosu et al. (2021); Zhavoronok et al. (2022)), the features of the formation of the innovative strategy of the enterprise (Ivanova et al. (2022); Tulchynska et al. (2021); Grigoraş-Ichim et al. (2018)), the effective use of innovative potential (Nikiforov et al. (2022)), the involvement of digital technologies in the innovative activities of modern enterprises (Popelo et al. (2022)).

However, in the current conditions of globalization, the study of the processes of adaptive management of enterprises becomes extremely important. Thus, scientists (Babenko et al., (2017)) proposed a model of minimax adaptive management of innovative processes at the enterprise, which takes into account current risks. Within articles (Deineha et al. (2022); Shi Yefeng et al. (2021)), adaptive management of transport logistics at enterprises and adaptive management of self-organization of a complex system of a production enterprise are considered. The result of the research by scientists (Teerasoponpong Siravat et al. (2022); Djakona et al. (2021)) is the development of a decision support system for adaptive search and inventory management in small and medium-sized enterprises.

Despite the research of a large number of scientific works on the specified subject, the issues of adaptive management of innovative development of enterprises in the conditions of the national economy digitalization have not been given due attention, and therefore, they require further study and analysis.

In confirmation of the relevance of this topic and available scientific research by the world community, we would like to provide statistical information and demonstrate the results of the meta analysis of adaptive management of innovative development of enterprises in the conditions of the national economy digitalization in Web of Science database (Fig. 1).



**Figure 1. Visualization map of the context-time dimension of enterprise management research in the conditions of digitalization of the national economy in 2009–2023 in the Web of Science database**

*\*Source: authors' elaboration using the VOSviewer program.*

First of all, we would like to note that for this area of research in one of the most rated Web of Science database to date, there are only 48 scientific works related to this issue (1 - 2009, 4 - 2018, 9 - 2019, 20 - 2020, 16 - 2022 and 1 - 2023), which confirms the necessity and importance of this topic. World centers of scientific research are: Ukraine, China, Poland, Finland, USA and Canada. Also, the analysis of publication activity in the Web of Science database proves the absence of a multi-sectoral orientation of this issue, since almost all scientific works are classified as “Business Economics”.

### Methodical approach

The methodological basis of this study is a systematic approach, which makes it possible to obtain a synergistic effect during the adaptive management of the innovative development of enterprises. The specified approach takes into

account the interrelationships and changes characteristic of the enterprise under the influence of external and internal factors. During the writing of the article, both special and general scientific research methods were used. Based on the use of methods of induction and deduction, scientific abstraction, systematization, the existing approaches to issues of adaptive management of enterprises were investigated. The methods of analysis and synthesis, abstract-logical generalization, as well as the dialectical method were used to determine the factors influencing the innovative development of enterprises and the adaptation of the management system in the conditions of the national economy digitalization. A graphic method was used to depict the system of adaptive management of innovative development of enterprises in the conditions of the national economy digitalization and the main indicators of innovative activity of enterprises.

## **Results**

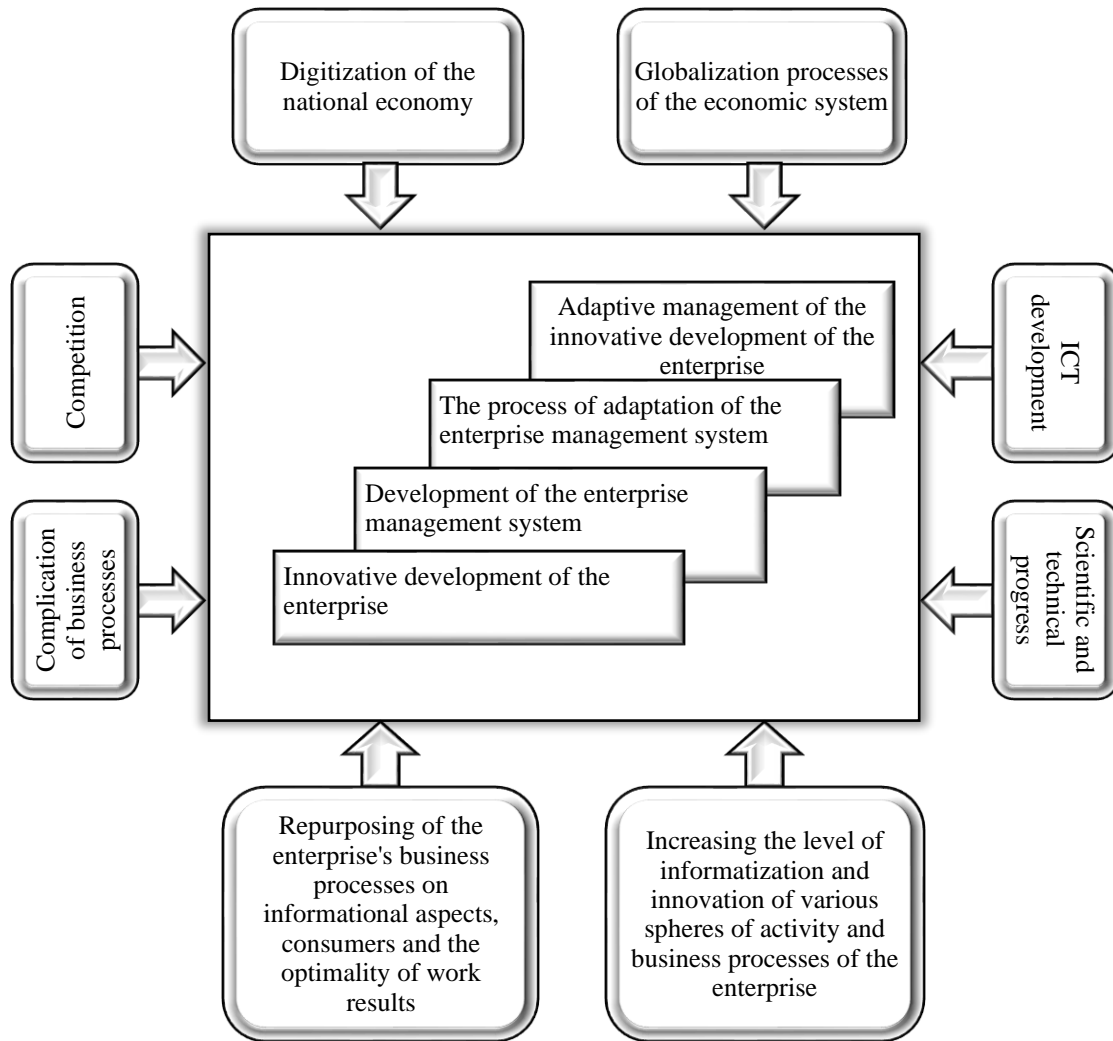
The current period of the global information space development is characterized by the formation of a new socio-economic formation - a digital one, which is associated with the total digitalization of economic processes and the introduction of information and computer technologies into all spheres of life. In connection with this, new requirements appear for the formation of sources of competitive advantages of enterprises, the level of their innovativeness, effective functioning and management. Questions related to the adaptive management of innovative development of enterprises in the conditions of the national economy digitalization and informatization are becoming more and more relevant. There is a need to organize the functioning of enterprises, taking into account the transition to the latest conditions of the digital economy, predicting the risks and problems associated with this process, as well as formulating proposals for their reduction and solutions in order to increase the efficiency of the functioning of enterprises. A strong competitive advantage should also include an effective system of managing the company's resource base and business processes, which are based on innovative technologies and optimization methods that become important

management tools, based on a permanent increase in their level.

Adaptive management of the innovative development of enterprises is based on a systemic approach. Factors influencing the innovative development of enterprises and adaptation of their management system should include the following (Fig. 2):

- digitization of the national economy;
- processes of globalization in relation to the economic system;
- increasing the level of competition,
- scientific and technical progress and its leading trends;
- permanent complications of the operating system of enterprises and its processes;
- repurposing of enterprises and their business processes taking into account the constant development of digital and information technologies for the needs of customers, the effectiveness and efficiency of the results of the companies' activities.

In our opinion, the adaptive management of innovative development of enterprises is a set of principles, methods, technologies, tools for the formation and practical implementation of decisions through significant changes in activities and increasing the level of adaptability in order to achieve competitiveness and effectiveness.



**Figure 2. Factors influencing the innovative development of enterprises and adaptation of their management system in the conditions of the national economy digitalization**

*\*Source: generated by the authors.*

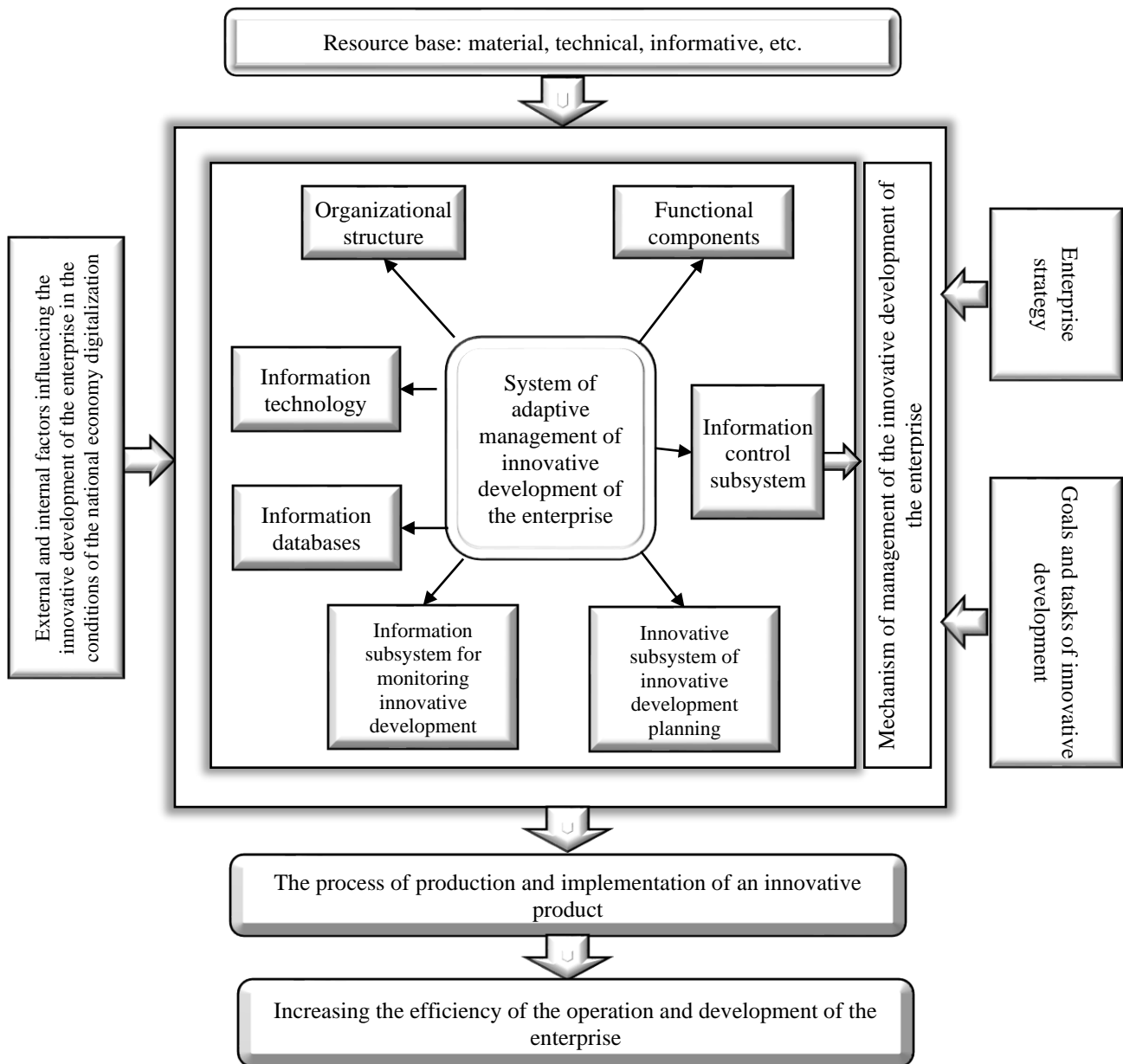
That is, it can be argued that adaptive management is the basis for the formation of an enterprise adaptation strategy at all levels of management, as well as a system of management processes and actions aimed at strengthening its competitive position on the market under conditions of permanent changes in the factors of the external environment based on the implementation of the mechanism for managing innovative processes.

The level of effectiveness of adaptive management of innovative development of enterprises in the conditions of the national economy digitalization depends on the speed of identification of existing and potential

problems, which will help to find the best way to solve them and direct the object of management in the right direction.

The main components of the system of adaptive management of the innovative development of the enterprise in the conditions of the national economy digitalization should include (Fig. 3):

- organizational management structure;
- information and its databases;
- information and digital technologies;
- functional components;
- information subsystems;
- the mechanism for managing the innovative development of the enterprise.



**Figure 3. The system of adaptive management of the innovative development of the enterprise in the conditions of the national economy digitalization**

*\*Source: generated by the authors.*

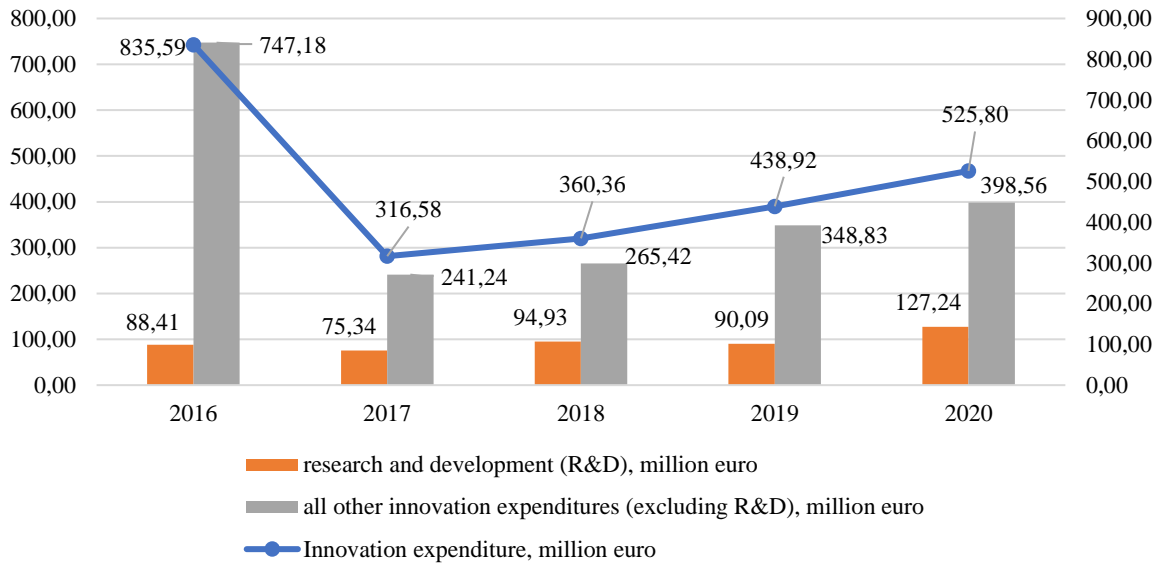
At the input of the system there are various resources, and at the output there is an innovative product and its manufacturing process, which in general will lead to an increase in the level of efficiency, effectiveness and optimal functioning of the enterprise.

According to the results of the analysis of innovation expenditure of industrial enterprises of Ukraine, the following should be noted. During the period 2016-2020, the dynamics of spending on innovations became more or less the same. Thus, in 2016,

innovation expenditure amounted to 835.59 million euros, of which scientific research and development expenditure accounted for 10.6%, and other innovation expenditure - 89.4%. In 2017, the distribution of innovation expenditure was as follows: total expenditure amounted to 316.57 million euros, of which 23.8% were for scientific R&D, and 76.2% for other innovation expenditure. In 2020, innovation expenditure amounted to 525.9 million euros, of which R&D and other innovation expenditure accounted for 24.2%

and 75.8%, respectively. If we consider the dynamics of the share of the number of innovatively active enterprises in the total

number of industrial enterprises, in 2016 it was 18.9%, in 2017 - 16.2%, in 2018 - 16.4%, in 2019 - 15.8%, in 2020 - 16.8% (Fig. 4).



**Figure 4. Innovation expenditure of industrial enterprises**

\*Source: generated by the authors.

Results of the analysis of sources of innovative activities' financing of industrial enterprises shows the following distribution of costs in 2016: at the expense of own funds – 94.9%, at the expense of state budget funds – 0.8%, at the expense of non-resident investors' funds – 0.1%, at the expense of other sources – 4.3%. After 5 years, the situation with the distribution of funding sources has changed and in 2020 it looked like: at the expense of own funds – 85.4%, at the expense of state budget funds – 1.9%, at the expense of non-resident investors' funds – 0.9%, account of other sources – 11.8%.

**Conclusions**

The article offers the author's vision of the components of adaptive management of the innovative development of enterprises in the conditions of the national economy digitalization, and also identifies the factors influencing the innovative development of enterprises and the adaptation of their management system. The author's vision of the definition of “adaptive management of the

innovative development” is given, which is defined as a set of principles, methods, technologies, tools for the formation and practical implementation of decisions through significant changes in activities and increasing the level of adaptability in order to achieve competitiveness and effectiveness.

Adaptive management of the innovative development of enterprises in the conditions of the national economy digitalization under the influence of external environmental factors is a rather complex and multifaceted process that requires certain transformations in the middle of the management system and coordinated interaction of both the management and personnel of the enterprise. Adaptive management of the innovative development of enterprises requires the acquisition of new digital skills and competencies by personnel, which contribute to the acceleration of the process of introduction and use of information and communication technologies at the enterprise and inclusion in the information space in the context of the national economy digitalization.

The perspective of further research is the analysis of the European experience regarding the adaptive management of innovative

development of enterprises and the possibilities of implementation of best practices in Ukraine.

## 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). <http://dx.doi.org/10.25115/eea.v39i5.4909>
- 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.
- 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>
- Djakona, A., Kholiavko, N., Dubyna, M., Zhavoronok, A., Fedyshyn, M. (2021). Educational dominant of the information economy development: a case of Latvia for Ukraine. *Economic Annals-XXI*, 192(7-8(2)), 108-124. <https://doi.org/10.21003/ea.V192-09>
- 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. <https://doi.org/10.21003/ea.V191-05>
- 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. *International Journal of Computer Science and Network Security*, 22(1), 149-160. <https://doi.org/10.22937/IJCSNS.2022.22.1.21>
- Nikiforov, P., Zhavoronok, A., Marych, M., Bak, N., Marusiak, N. (2022). State policy regulation conceptual principles of public-private partnership development. *Cuestiones Políticas*, 40(73), 417-434. <https://doi.org/10.46398/cuestpol.4073.22>
- Popelo, O., Tulchynska, S., Revko, A., Butko, M., Derhaliuk, M. (2022). Methodological Approaches to the Evaluation of Innovation in Polish and Ukrainian Regions, Taking into Account Digitalization. *Comparative Economic Research. Central and Eastern Europe*, 25(1), 55-74.
- 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., Kostiumik, 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. <https://doi.org/10.22937/IJCSNS.2021.21.6.22>
- Zhavoronok, A., Chub, A., Yakushko, I., Kotelevets, D., Lozychenko, O., Kupchyshyna, O. (2022). Regulatory Policy: Bibliometric Analysis Using the VOSviewer Program. *International Journal of Computer Science and Network Security*, 22(1), 39-48.