

DEPÓSITO LEGAL ZU2020000153

ISSN 0041-8811

E-ISSN 2665-0428

# Revista de la Universidad del Zulia

Fundada en 1947  
por el Dr. Jesús Enrique Lossada



**Ciencias del**  
**Agro,**  
**Ingeniería**  
**y Tecnología**

**Año 14 N° 39**

**Enero - Abril 2023**

**Tercera Época**

**Maracaibo-Venezuela**

## The role of information technologies in the innovation development management of enterprises of the national economy

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### ABSTRACT

The purpose of the article is to clarify the role of information technologies in the management of innovative development of enterprises of the national economy. Within the article, the authors used both general scientific and special research methods. The article is based on the application of the general theory of systems, economic theory, theory of information and innovations. Among the special methods, the following should be mentioned: analysis and synthesis, systematic, induction and deduction, scientific generalization and abstraction, graphic method. The ratio of the number of active innovative enterprises of Ukraine to the total number of enterprises by type of economic activity for the period 2018-2020 was analyzed. An algorithm for the use of information technologies in the management of innovative development of enterprises of the national economy is defined, which consists of eight consecutive stages, two of which have alternative options for actions, the choice of which depends on further implementation.

**KEYWORDS:** Information technologies, innovative development, innovative management, information support, innovation, national economy.

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Recibido: 17/10/2022

Acceptado: 07/12/2022

# El papel de las tecnologías de la información en la gestión del desarrollo innovador de las empresas de la economía nacional

## RESUMEN

El propósito del artículo es aclarar el papel de las tecnologías de la información en la gestión del desarrollo innovador de las empresas de la economía nacional. Para escribir el artículo, los autores utilizaron métodos de investigación tanto científicos generales como especiales. El artículo se basa en la aplicación de la teoría general de sistemas, teoría económica, teoría de la información e innovaciones. Entre los métodos especiales utilizados, cabe destacar los siguientes: análisis y síntesis, sistemático, inducción y deducción, generalización científica y abstracción, y método gráfico. Se analizó la proporción del número de empresas innovadoras activas de Ucrania con respecto al número total de empresas por tipo de actividad económica para el período 2018-2020. Se define un algoritmo para el uso de las tecnologías de la información en la gestión del desarrollo innovador de las empresas de la economía nacional, el cual consta de ocho etapas consecutivas, dos de las cuales tienen opciones alternativas de acción, cuya elección depende de su posterior implementación.

**PALABRAS CLAVE:** Tecnologías de la información, desarrollo innovador, gestión innovadora, soporte de información, innovación, economía nacional.

## Introduction

In modern economic realities, which are characterized by the influence of globalization processes, the central place of management processes is the decision-making about the use of information technologies by enterprises, on which the efficiency of their activities depends. Information technologies at the enterprises of the national economy contribute to their integration and adaptation to the environment, establishing a relationship between them, improving the quality of products and (or) services, increasing the speed of processing and transmitting a large amount of information, as well as serving consumers and clients, allowing to take into account their peculiarities and the individuality of their needs. The introduction of information technologies in their functioning by enterprises of the national economy leads to real changes in activity, which lead to the need for training of all personnel.

At the same time, the trends of the world economy indicate a real need for enterprises to introduce innovations as a factor and prerequisite for their survival and further achievement of effective functioning in the global competitive space. Innovative development

for domestic enterprises of the national economy is today the only way of their existence and the possibility of entering the world global markets. In view of this, it is necessary to talk not only about technological innovations, which require the accumulation of significant resource potential, with the availability of which there are significant problems, but also innovations of a managerial and organizational nature, which are related to information technologies. They can become a factor in the sustainable development of enterprises, the accumulation of elements of innovative potential, which in the future will positively affect the innovative development of enterprises of the national economy.

The purpose of the article is to study the essence and reveal the role, place and significance of information technologies in the management of innovative development of enterprises of the national economy.

## 1. Literature Review

Ways of improving the functioning and further development of information technologies, their meaning, role, place and impact on the activities of enterprises in various fields are considered in the scientific works of domestic and foreign researchers. Analyzing the publication activity on this topic, it should be noted that the first article was published in 1993 and the total number of articles to date is 967, which confirms the relevance of the research direction (Fig. 1).

The dynamics of indexing articles in the database Web of Science over the past 10 years was as follows: 2013 – 34 articles, 2014 – 32 articles, 2015 – 50 articles, 2016 – 65 articles, 2017 – 114 articles, 2018 – 94 articles, 2019 - 118 articles, 2020 – 98 articles, 2021 – 75 articles, 2022 – 64 articles. The world centers of scientific research in the field of innovative development of enterprises taking into account the processes of using digital technologies are: China, Ukraine, USA, England, Italy, Poland, Spain, Germany, France, etc.

According to the results of the analysis of publication activity by fields of knowledge, the following results should be presented: Management (215 articles), Business (162 articles), Economics (151 articles), Computer Science and Information Systems (146 articles), Computer Science and Interdisciplinary Applications (102 articles), Education and Educational Research (91 articles) and other.

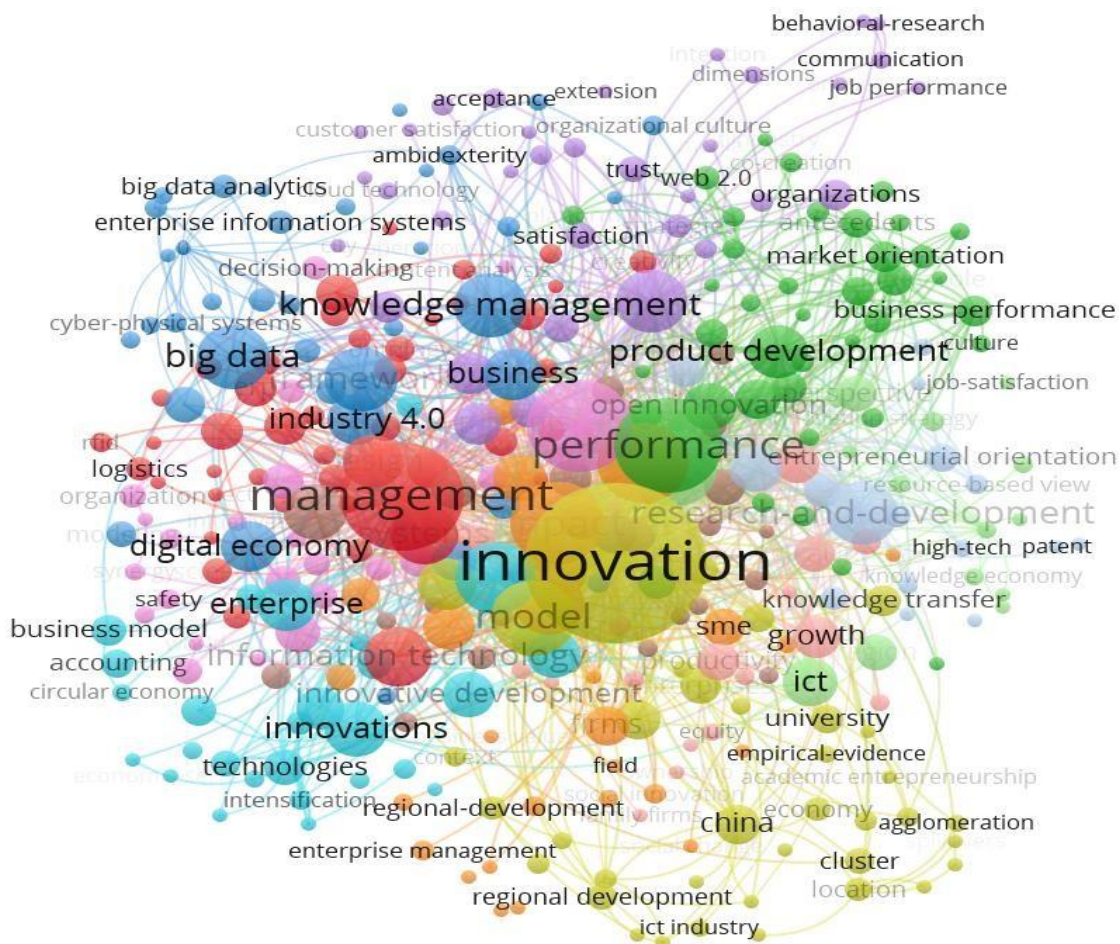


Figure 1. Graphic map of keywords in publications, in which titles the word “information technologies”, “innovative development of enterprises”, is met

Source: compiled by the author based on the analysis of the Web of Science database and using the tools of the VOSviewer program

A review of the scientific literature (Abramova et al., 2022; Hilton, 2001; Kosach et al., 2022; Nikiforov et al., 2022; Popelo, 2022; Zhavoronok et al., 2022) in historical retrospect allows to form an understanding that the economy developed throughout the existence of mankind at a rapid pace and with the introduction of innovations:

- the very first simplest economic relations appeared in ancient times, when it was necessary to distribute functions among members of the community;
- the next stage is the agrarian economy;
- industrial economy, characterized by the appearance of industrial machines, which allowed to produce much larger volumes of products;
- the industrial stage was replaced by the post-industrial stage, with the use of a large



number of information, communication and digital technologies, which is why it is also called the digital economy.

In the information society, the production, consumption and processing of information is the most important activity, and information is the most important strategic resource (Cosmulese et al., 2019; Djakona et al., 2021; Ivanova et al., 2022). That is why information and communication technologies (ICT) are becoming extremely widespread in the economy and are gaining enormous importance for society. ICT plays an important role for the country's economy (Asaul et al., 2019; Derii et al., 2022; Sipior, 2011; Tarasenko et al., 2017).

With the development of information technologies, the country develops from within, its economic indicators grow, with proper support of the information technology industry, the country can reach a new level of its development, because it is information technologies that are ready to innovate, compete with each other and develop.

The ICT sector is the main driver of the economy of developed and developing countries. IT plays an important role in the development of the national economy (Kychko et al., 2021; Marich et al., 2018; Shaposhnykov et al., 2017; Shkarlet et al., 2017), as information technologies contribute to the growth of economic efficiency in the long term, countries in which the ICT sector is the most developed, are also more competitive.

In the conditions of the information society and digital economy, information and communication technologies are also becoming a key factor in the development of society in general, and enterprises in particular (Arefieva et al., 2021; Grigashkina et al., 2018; Grigoraş-Ichim et al., 2018; Fedyshyn et al., 2022; Grosu et al., 2021; Lagodiienko et al., 2022; Tulchynska, et al., 2022; Vovk et al., 2021; Del Carpio & Millares, 2021).

However, despite the existing publications on the issues under consideration, the question of researching the role of information technologies in the management of innovative development of enterprises is extremely relevant and requires further research.

## 2. Methodology

Within the article, the authors used both general scientific and special research methods. The article is based on the application of the general theory of systems, economic theory, theory of information and innovations. Among the special methods used, the following should be singled out: analysis and synthesis, systematic, induction and deduction

for the purpose of highlighting and considering the essence of the concept of "information technologies" and approaches to its understanding, as well as presenting the sequence of the process of applying information technologies at enterprises of the national economy; scientific generalization and abstraction to represent the relationship of the information system and its components; a graphic method for a visual representation of approaches to understanding the essence of the definition of "information technologies", the share of the number of innovatively active enterprises of Ukraine in the total number of enterprises by types of economic activity, and the algorithm for the use of information technologies in the management of the innovative development of enterprises of the national economy.

### 3. Results

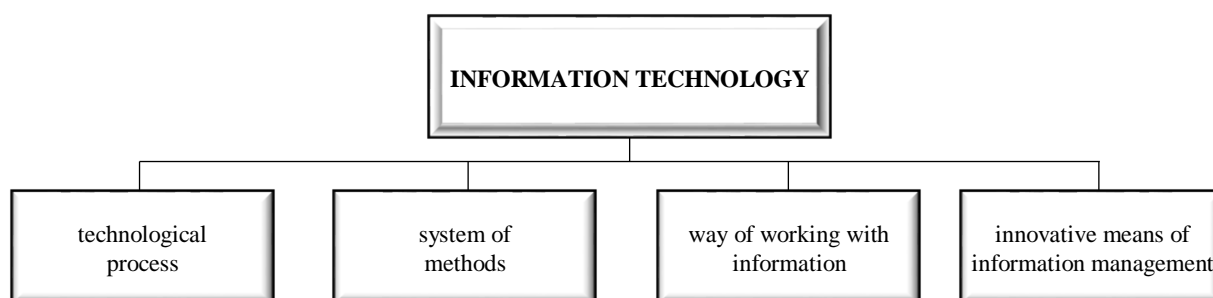
At the current stage of economic development, the process of analyzing existing information technologies, the possibility of their improvement, as well as their formation and application within the enterprises of the national economy, is gaining importance and relevance. Based on the purpose of this study, we consider it appropriate to begin by outlining the essence of the concept of "information technologies".

The study of scientific sources demonstrates the prevalence of the definition of "information technologies". At the same time, the category "technology" should be understood not only as a complex of production and operational processes, but also as the transformation of various resources, such as information, energy, material, etc., and their application in order to regulate and solve the real problems of humanity. Then informatization is a complex of management-organizational, socio-economic, political-legal, production-technical and scientific processes that are interconnected and form conditions for ensuring the information needs of individuals and society as a whole on the basis of development, formation, application and development of information systems and technologies based on the latest possibilities of information, communication and computer technology.

Information technologies, in a general sense, are understood as a set of methodological techniques and means, with the help of which the accumulation and storage of data, their analysis, processing, transfer and acceptance are carried out in order to increase the experience, knowledge and skills of people and the perspective of managing these processes. Information technologies are characterized by the presence and presence of the global Internet network, which is connected to its components that expand modern opportunities,

such as e-mail, telecommunications, etc. Direct communication is inextricably linked with information technologies, and therefore, based on the above, currently information technologies are identified and also called information and communication technologies.

The category "information technologies" is not unambiguous, since on the one hand, it is understood as a complex of various technological tools, as well as resources needed for the purpose of establishing communication processes and managing them. That is, in general, we are talking about the Internet, computers, telephone communication, etc. Also, information technologies are often understood, firstly, as a certain real way of working with information and information resources; secondly, the technological process, the subject of which, as well as the consequence of its implementation, is information; thirdly, a system of methods and means of collecting, analyzing and applying information, while the level of automation of processes, the use of certain technical devices and means, etc., depends on this or that technology; fourthly, an innovative way of managing information that helps users work with data and information (Fig. 2).



**Figure 2.** Approaches to understanding the essence of the definition "information technology"

Source: generated by the authors

The fourth approach, in our opinion, indicates that its leading aspect is the innovativeness of the components of information resources in the process of their application, which requires the provision of characteristics of the main components of the information system, which simultaneously describe the main stages of the implementation of information technologies.

The application of the information technologies is a promising direction on the way to the innovative development of enterprises of the national economy, their effective functioning and increasing the level of competitiveness. In Fig. 3 presents the share of the



number of innovatively active enterprises in the total number of enterprises by types of economic activity for the period 2018-2020. The largest share of the number of innovative enterprises is observed in such activities as: manufacture of basic pharmaceutical products and pharmaceutical preparations (38.3%), scientific research and development (27.4%), manufacture of computer, electronic and optical products (27.2%), manufacture of other transport equipment (24.5%), manufacture of chemicals and chemical products (21.4%), mining of metal ores (21.1%), manufacture of motor vehicles, trailers and semi-trailers (20.8%), extraction of crude petroleum and natural gas (20.0%).

At the same time, clarifying the appropriateness of the application of certain information technologies at enterprises of the national economy becomes of great importance, and therefore, it is necessary to pay attention to the development of the procedure for their introduction at economic entities. The sequence of actions of the application of information technologies in the management of innovative development of enterprises of the national economy is presented in Fig. 4.

This algorithm consists in establishing and understanding the causes, consequences and their interrelationship, clarifying the effectiveness in the context of the implementation of the goals of enterprises of the national economy, which helps to determine the effectiveness and usefulness of the use of information technologies in the management of the innovative development of enterprises of the national economy and the cost-effectiveness level of this process.

Therefore, in order to effectively function and achieve success in the management of innovative development, enterprises of the national economy need to take advantage of the possibility of using information technologies as one of the most promising and relevant in modern conditions.

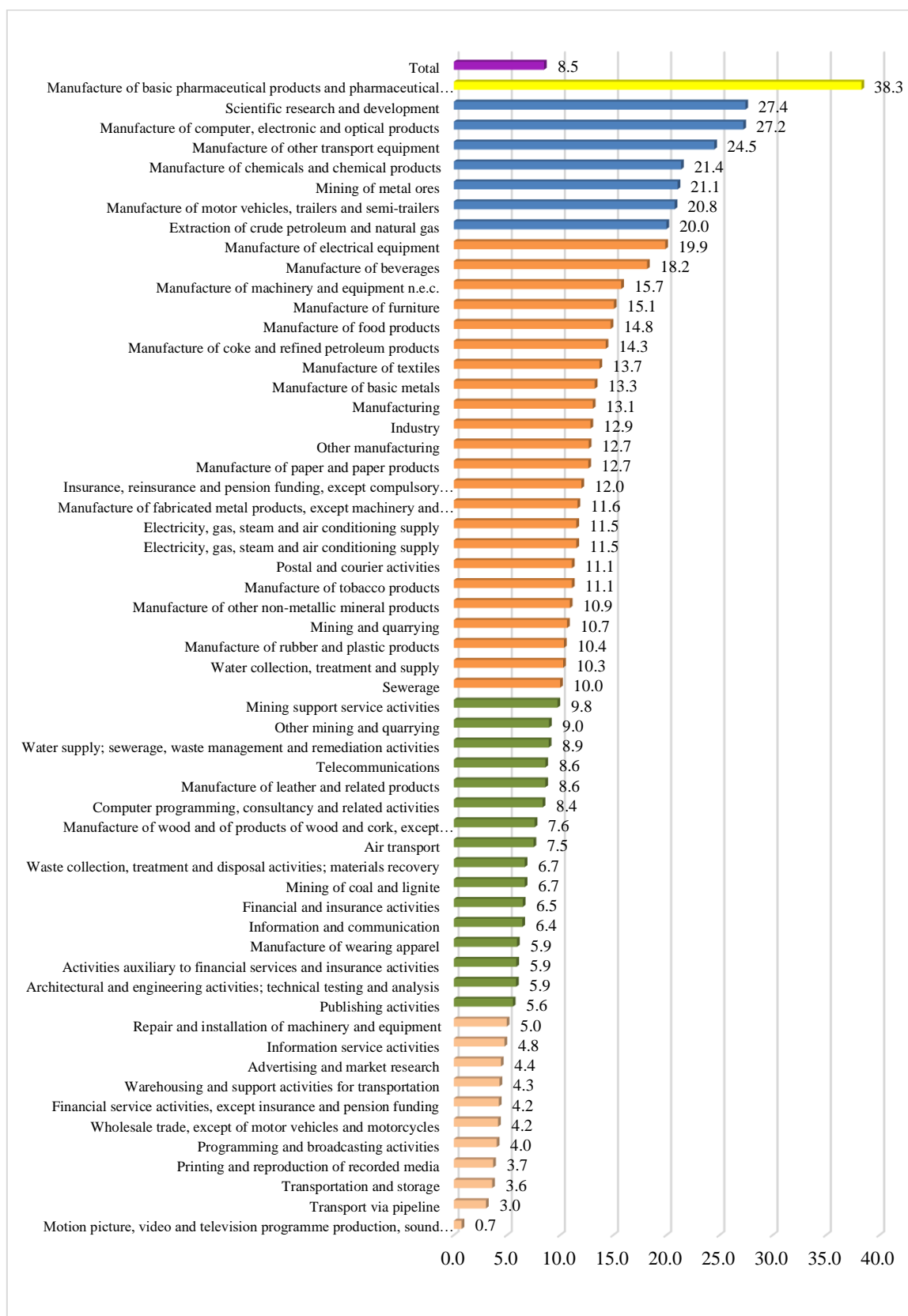


Figure 3. The share of the number of innovatively active enterprises in the total number of enterprises by type of economic activity, 2018-2020

Source: generated by authors based on data State Statistics Service of Ukraine

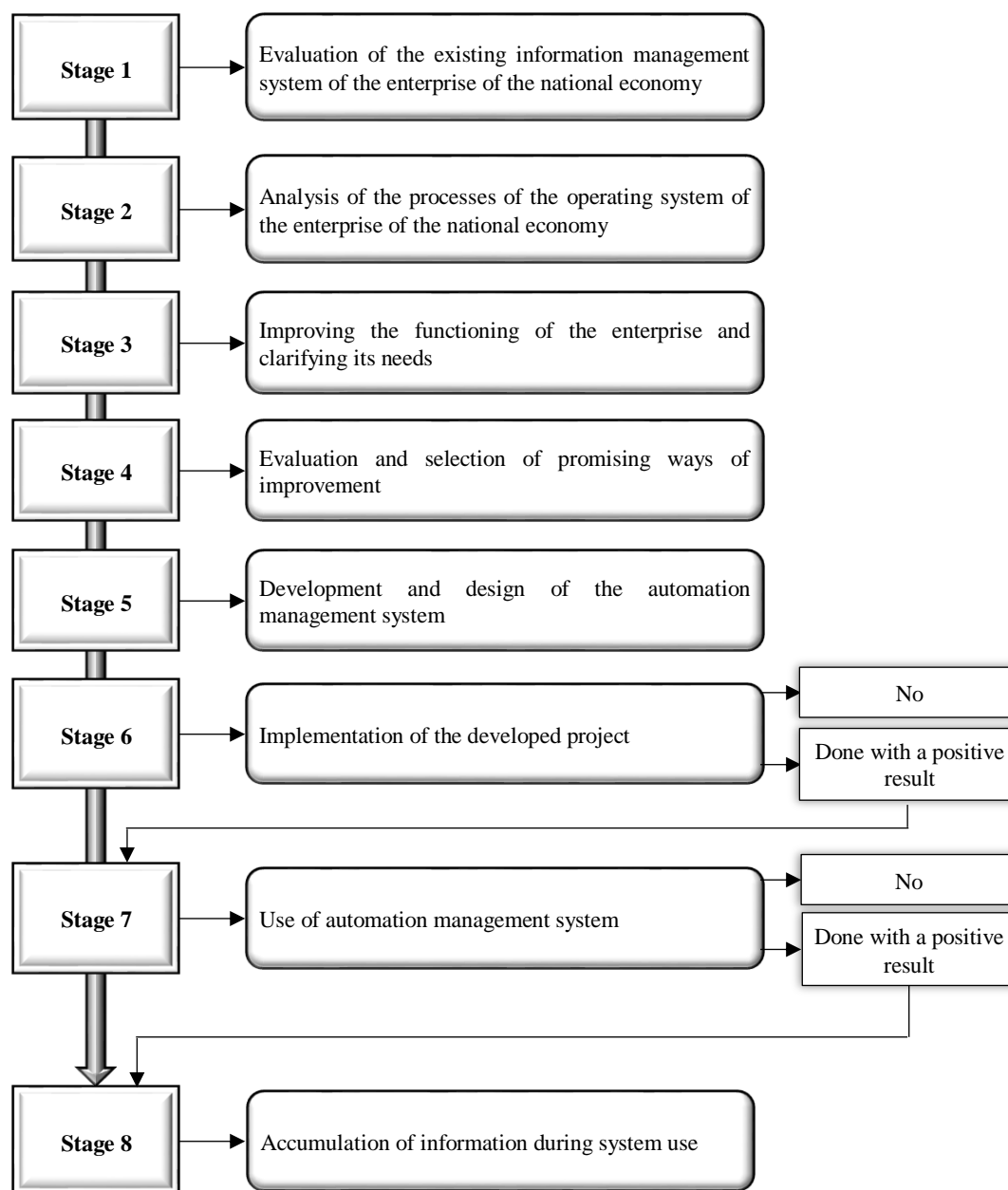


Figure 4. Algorithm for the use of information technologies in the management of innovative development of enterprises of the national economy

Source: generated by the authors

#### 4. Discussion

Supporting the research direction of scientists (Mironova et.al., 2022), it should be noted that the matrix of strategies proposed by the authors, which is based on the aggregate potential of industrial enterprises and the level of its implementation in the innovation sphere, will contribute to the development and justification of strategic directions of enterprises' innovative development. We believe that the scientific developments of the

authors (Korytko et.al., 2021) are of practical use in terms of the expediency of assessing the activities of enterprises, including indicators of the intellectual component, in order to improve the strategy of innovative development. It is on the basis of the quantitative indicators' analysis of structural elements that problematic and promising aspects on the path of innovative development of the enterprise can be determined.

We consider the research of the authors (Novykova et.al., 2022) relevant to the implementation of the need for the distribution of responsibility and authority by management functions in the process of practical implementation of the innovation activity management mechanism, which, in our opinion, will contribute to the introduction of an effective system of management of the innovative activity of enterprises. Also worthy of attention are the studies of scientists (Doroshkevych et.al., 2021), which are devoted to the combination of methods for the selection of approaches in order to rationalize and increase the level of strategic management efficiency, which, in our opinion, will contribute to the activation of innovative activities at enterprises. It is useful to consider the research of the authors (Zalutskaya et.al., 2021), who are convinced that the effective innovative activity of enterprises is facilitated by the implementation of innovative projects that are focused on meeting the needs and requirements of the external and internal environment. Indeed, these aspects can contribute to increasing the importance of strategic management of innovative activities of enterprises.

The above indicates the relevance and necessity of the issues of intensification of the innovative development of enterprises in modern conditions of intensifying competition and determining the role of information technologies in these processes.

## Conclusion

Information technology has a number of characteristics and features that are reflected in the innovation policy, in particular: firstly, permanent activity, mobility and dynamism of this sphere; secondly, the rapid development of this type of activity due to innovative products and services; thirdly, the possibility of achieving strategic advantages for enterprises of the national economy thanks to the application of the latest technologies and innovations in this field of activity.

Information technology is a type of activity characterized by permanent, essential and fundamental transformations. The field of technology today has an impact on the life of an

individual, as well as society, an individual enterprise and activities in general, regional and national economy. Information technologies play a significant role and occupy a central place in the management of innovative development of enterprises of the national economy. Continuous improvement of information technologies should be considered as a strategic direction as an innovative development of the enterprise of the national economy, as well as its modernization as a whole. Enterprises of the national economy that implement information technologies, increase the efficiency of their economic processes, form a positive image and acquire the status of progressive and modern, occupy a significant place in the domestic and world markets.

The perspective of further research consists in the analysis of the impact of digitalization on the innovative development of enterprises in the conditions of increased competition.

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