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CONTENT

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PROBLEMS OF DIGITALIZATION AND WAYS TO SOLVE THEM IN THE INDUSTRY CONTEXT

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Abstract. *Accelerated introduction of information technologies and digitalization of all spheres of industrial production and life of society are rightfully among the key directions for the development of the world economy in the XXI century. This circumstance indicates the relevance of conducting research in terms of identifying promising areas for the use of information technologies and products of the digital economy in various sectors of industrial production. The main purpose of this study is to justify the need to expand the areas of use of modern information technologies and products of the digital economy in various sectors of industrial production. In addition, the identification of promising areas of their application will contribute to the expansion of the production of new innovative types of industrial products. The new results of the study include an analysis of the main directions of the influence of modern information technologies on the development of industrial enterprises. The leading industries have also been identified in terms of promoting informatization, digitalization of production and the implementation of IT solutions used in the activities of industrial enterprises.*

Keywords: *industrial enterprises, industries, information technology, digital economy products, IT solutions.*

Introduction

Modern information technologies (IT), products of the digital economy and complex information and analytical management systems (CIAMS) are becoming an important tool in achieving strategic goals and solving the problems of the stra-

tegic development of industrial enterprises. They are used at all levels of management of industrial enterprises of the widest profile and serve as an indispensable source of obtaining various kinds of information. A key feature of the functioning of modern IT, digital economy products and CIAMS is to significantly speed up the search for the required information, its processing and making management decisions on this basis. In addition, they have a fairly developed functional content. It is by expanding the range of functional characteristics of information support that modern IT and digital economy products allow industrial enterprises to increase the efficiency of their activities. These features of modern IT and digital economy products contribute to the successful implementation of production plans, the development of new types of products, the introduction of innovative technologies in production processes, entering new sales markets, improving interaction with counterparties, and reducing the cost of manufactured products.

Modern IT, digital economy products and CIAMS used at industrial enterprises support the implementation of operational plans and tasks in terms of developing sound management decisions. At the same time, the continuous development and improvement of their functional characteristics imposes specific requirements and conditions on the production activities of industrial enterprises. The need to take them into account leads to a change in the parameters of the functioning of the enterprises themselves.

Thus, the further development of modern IT, digital economy products and CIAMS entails, on the one hand, the transformation of the production activities of enterprises up to the creation of new industries. On the other hand, the development of the production activities of enterprises necessitates the timely processing of increasing amounts of various kinds of information. At present, this is no longer possible without the use of modern IT and digital economy products. Thus, the key factor in the successful operation of industrial enterprises is the symbiosis of the organization of the production process with the introduction of modern IT into it. Moreover, with a high degree of probability it can be argued that without the use of modern IT, digital economy products and CIAMS, the main branches of industrial production will inevitably rapidly degrade. This conclusion is quite obvious, since at modern industrial enterprises most of the production processes are implemented through the use of modern IT and digital economy products.

Purpose of the study

The main purpose of this study is to substantiate the need to expand the use of IT and digital economy products in various sectors of industrial production, as well as to identify promising areas of their application for the production of new types of industrial products.

Main part

Currently, the management of most industrial enterprises in various industries

is aware of the need to rethink the role of modern IT and digital economy products in organizing the entire complex of production processes. This is due to the expansion of the functionality of modern IT and digital economy products and their presentation as a key production resource. If in the early stages of use they performed mainly a service function. And today, modern IT and products of the digital economy directly affect the introduction of innovations and the choice of strategies for the development of industrial enterprises in the near future. The use of a wide range of IT solutions based on cloud technologies, artificial intelligence technologies, Big Data, blockchain, the Internet of Things and others open up new opportunities for improving the efficiency of industrial enterprise production models. These models use a new computing and information processing infrastructure. It involves the digital transformation of all production processes, starting with the formation of production plans, their implementation, optimization of the consumption of all types of resources, increasing labor productivity and ending with financial accounting systems, workflow automation and interaction with the company's counterparties.

The need for the accelerated introduction of modern IT and digital economy products into the activities of industrial enterprises in all sectors of the economy is also supported by the state. In July 2017, the government approved the program "Digital Economy of the Russian Federation", which defines the main directions of the strategic development of the Russian economy until 2025 [4]. The main provisions of this document are aimed at the development of digitalization processes both on the scale of the Russian economy as a whole and at individual industrial enterprises in the context of its industries.

Materials and methods

As the analyzed materials in this study, publications on the main directions of the development of modern IT and the use of digital economy products in the activities of industrial enterprises in the sectoral context, widely presented in the open press, were used. Also, materials from the current legislative and regulatory documents regulating the introduction of modern IT and digital economy products into the activities of industrial enterprises were used in the work. In addition, the study used data from one of the consulting structures in terms of assessing the constraints for the development of modern IT and the use of digital economy products.

The methodological basis for the study was the methods of an integrated approach, system analysis, processing and generalization of information.

By modern IT we mean a set of methods and software and technological tools that combine production and technological processes through the collection, storage, processing and presentation of information. The use of IT helps to reduce the complexity of production processes through the use of information resources.

The main goal of introducing modern IT into the production sector is to create favorable conditions for its development. It is implemented by intensifying the exchange of information, increasing the efficiency of its processing and use for making managerial decisions at the level of all structural divisions of industrial enterprises.

Results and discussion

Many experts admit that the speed of implementation of modern IT and digital economy products is rapidly increasing. Even now, the dynamics of its development can be compared with an exponential dependence. In a very short period of time, IT has revolutionized fundamental aspects of modern manufacturing. The irreversibility of the information transformation and digitalization of production processes forces the management structures and personnel of industrial enterprises in all sectors of the economy to adapt as quickly as possible to the new conditions of their activities. We specify the key areas of influence of modern IT on the development of industrial enterprises.

The emergence of mobile solutions has led to the fact that such products of the digital economy as a tablet and even a smartphone are used to organize modern production. With the advent of mobile communications and broadband Internet, it became possible to concentrate all production management functions on wearable devices: from organizing the production process itself to providing it with the necessary resources; from personnel management to improving its competencies; from conducting marketing campaigns to finding new counterparties; from the sale of products to the improvement of methods of its delivery; from financial accounting to assessing the effectiveness of production activities [2]. At the same time, it turns out that mobile solutions can be used not only to manage the production activities of industrial enterprises, but also to create demand for manufactured products from consumers.

With the advent of cloud computing, industrial enterprises have the opportunity to transfer the functions of processing large arrays of semi-structured information and variable data packages to third-party organizations through cloud services on the Internet. This allows the enterprises themselves to focus on optimizing production processes without worrying about the possible loss of important information. The availability of cloud computing resources provides industrial enterprises with new opportunities to develop and maintain the competitiveness of their products. Meanwhile, just a few years ago, the use of these resources was not acceptable for most enterprises due to their high cost.

The expansion of the analytical capabilities of modern IT allows enterprises to analyze increasingly large amounts of information in a short time. The result of this is a deeper understanding of consumer needs and their structuring into more specific groups, which greatly facilitates the choice of development prospects for

industrial enterprises. The emergence of more and more advanced analytical services as part of digital economy products and CIAMS allow enterprises to more accurately segment product markets and gain additional competitive advantages.

Modern IT and digital economy products have made it possible to combine the information, hardware and software necessary for the formation of CIAMS. As part of CIAMS, every day new software solutions appear to optimize the production activities of industrial enterprises. As a rule, these solutions are easy to implement, and their cost is quite affordable, which, ultimately, greatly facilitates the activities of industrial enterprises.

Industrial enterprises use modern IT and digital economy products to integrate intra-production communications. The functioning of CIAMS allows you to combine the interests of different structures of industrial enterprises into one network, ranging from production units and financial services to personnel management and security services. With the growth in the number of online transactions, the importance of working together between the financial management service and the security service in order to increase the security of such transactions is increasing. Through the use of encryption and individual passwords, modern IT provides reliable protection of digital information for industrial enterprises. Access to information can only be obtained by persons endowed with the appropriate authority. With the development of modern IT, the standards for ensuring information security are also rising [5]. The introduction of biometric security systems allows you to completely abandon the use of passwords. The choice of specific IT solutions to ensure reliable protection of digital information remains with the management structures of industrial enterprises.

In the sectoral context, the greatest success in connection with the use of modern IT, digital economy products and CIAMS was achieved by enterprises of the military-industrial complex and the aviation industry. As a rule, new IT solutions are introduced for the first time at enterprises in these industries, and elements of the digital economy paradigm are also used. This allows enterprises of the two industries to quickly change and reconfigure production processes, modernize their products, improve production technologies, and master the production of new types of products. The enterprises of these industries are not only provided with orders, but also receive financial support from the state for their successful implementation. The main goal of introducing new IT solutions and elements of the digital economy paradigm at the enterprises of the military-industrial complex and the aviation industry is to reduce the cost of manufactured products, provided that the appropriate level of its quality characteristics is ensured. This explains the priority introduction of information systems of the MES and ERP class into their production activities. They allow you to record and control all production costs with great accuracy, organize operational planning and manage the utilization of

production capacities, track the progress of sales of manufactured products in the context of individual types, for each order and for the enterprise as a whole.

Enterprises of the metallurgical, oil and gas and mining industries, when introducing new IT solutions and elements of the digital economy paradigm, are focused on creating innovative value chains to increase the competitiveness of their products. To solve this problem, they actively use Data Mining, Process Mining, BigData, Blockchain technologies, as well as virtual, augmented and mixed reality (VR - virtual reality, AR - augmented reality, MR - mixed reality). On this basis, we can conclude that enterprises in these industries use a more in-depth approach to solve the problem of informatization and digitalization of their production activities.

Modern IT is also used in the mechanical engineering industry. Enterprises in this industry receive additional competitive advantages from the use of digital information as an important production resource. Information systems for design and technological preparation of production, machine learning, increasing production efficiency, industrial Internet of Things technologies, big data analysis platforms and a number of other information resources are actively introduced into the production activities of enterprises in the engineering industry.

Today, an ever wider range of IT solutions is gradually being introduced into the production activities of industrial enterprises in almost all industries within the concept of "Digital Enterprise" [1, 6]. As part of these solutions, it is necessary to single out information systems of the CRM, ERP, PLM class, as well as systems for preparing and managing production. A distinctive feature of the functioning of these systems is the formation of a single information space. This circumstance ensures complete digital continuity of the entire production process, starting from the moment an order is received and ending with the release and sale of finished products. The use of this kind of information systems provides a comprehensive integration of production processes throughout the entire life cycle of manufactured products.

At the same time, the introduction of modern IT into the activities of industrial enterprises in Russia is constrained by a number of factors. This was shown by a recent study jointly conducted by the "Deloitte" CIS Representative Office and the "Center for Strategic Research" (CSR) in 2019. Its result was the "Overview of the manufacturing sector in Russia - 2019" [3]. In this review, the factors that have the greatest deterrence on the introduction of modern IT and digitalization in enterprises in the manufacturing sector were identified. The survey of respondents made it possible to single out such significant deterrents as the incompatibility of modern IT with existing equipment (56%) and lack of funding (54%). These factors were followed by personnel problems, namely: lack of qualified personnel (33%) and lack of motivation among senior managers (29%) [3].

Conclusion

The results obtained in the course of the studies made it possible to form the following conclusions.

1. In modern economic conditions, the use of modern IT in the production process is becoming an important factor in the successful operation of industrial enterprises.

2. The expansion of the functionality of modern IT and digital economy products makes information the most important production resource. The introduction of innovations at industrial enterprises and the choice of strategies for their development directly depend on it.

3. A brief analysis of the main directions of the influence of modern IT on the development of industrial enterprises showed that it is realized through: mobile solutions; cloud computing; expanding analytical capabilities; association of information, hardware and software; integration of intra-production communications.

4. In the sectoral context, the leading positions in informatization and digitalization of production are held by enterprises of the military-industrial complex, aviation, metallurgical, oil and gas, mining and machine-building industries. In their production activities, enterprises of these industries use different IT solutions. At the same time, an ever wider range of IT solutions are gradually being introduced into the production activities of industrial enterprises in almost all industries within the framework of the Digital Enterprise concept.

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