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ORGANIZATION OF PRODUCTION IN THE CONDITIONS OF THE DIGITAL ECONOMY

[1]Karrieva Bibijon Karimovna, [2]Karrieva Shahnoza Safarbaevna
Head teacher, Tashkent state technical university[1], Assistant, Tashkent State University of Economics[2]

ANNOTATION

Currently, the issues of improving the organization of production based on the "digitalization" of the production and management process are relevant. The reindustrialization of the domestic industry in line with the innovative development model of Russia is characterized by the creation of digitalized technological platforms, the digitalization of production and management, the creation of high-tech enterprises for the production of products in single technological chains with high added value for the domestic market and for export.

Keywords: organization of production, digital economy, digital production, industrial Internet of things

INTRODUCTION

Current trends in the transition of the economy to a new technological order necessitate the modernization of domestic production systems, the formation of relevant approaches to the organizational and economic support of production processes, as well as systems and management methods. At industrial enterprises, after a period of reindustrialization [1, 2, 3], the processes of automation and robotization of production, improvement of the organization of production and enterprise management, and growth in the level of its digital intellectualization are activated. In order to increase the efficiency and flexibility of production, the equipment must be adapted to quickly adjust to the production of various types of products. The modern paradigm of the organization of production and management is based on the possibility of real-time exchange of information between the means and objects of labor, the implementation of rapid changeover of equipment, the reduction in the number and changes in the competencies of production and maintenance personnel, the transition to the production of new products by replacing control programs in flexible production systems and robotic complexes. To implement this, it is necessary to effectively use and improve human and scientific potential in order to develop innovative, science-intensive, high-tech production that produces competitive products for both domestic and world markets. In the field of digital production, such areas of modern technologies are developing as implementation of rapid changeover of equipment, reduction in the number and changes in the competencies of production and maintenance personnel, transition to the production of new products by replacing control programs in flexible production systems and robotic complexes. To implement this, it is necessary to effectively use and improve human and scientific potential in order to develop innovative, science-intensive, high-tech production that produces competitive products for both domestic and world markets. In the field of digital production, such areas of modern technologies are developing as implementation of rapid changeover of equipment, reduction in the number and changes in the competencies of production and maintenance personnel, transition to the production of new products by replacing control programs in flexible production systems and robotic complexes. To implement this, it is necessary to effectively use and improve human and scientific potential in order to develop innovative, science-intensive, high-tech production that produces competitive products for both domestic and world markets. In the field of digital production, such areas of modern technologies are developing as transition to the production of new products by replacing control programs in flexible production systems and robotic complexes. To implement this, it is necessary to effectively use and improve human and scientific potential in order to develop innovative, science-intensive, high-tech production that produces competitive products for both domestic and world markets. In the field of digital production, such areas of modern technologies are developing as transition to the production of new products by replacing control programs in flexible production systems and robotic complexes. To implement this, it is necessary to effectively use and improve human and scientific potential in order to develop innovative, science-intensive, high-tech production that produces competitive products for both domestic and world markets. In the field of digital production, such areas of modern technologies are developing as

"Industrial Internet of things", "Additive manufacturing technologies", "Cloud technologies for information storage and processing", "Big data analytics", "Artificial intelligence", "Smart robotic production", including CNC machines, machining centers, flexible production modules. The substantiation of the adoption of organizational decisions is possible through the use of simulation and economic-mathematical modeling.

The concept of organizing digital production

The innovative model of industrial development in Russia is characterized by the formation of digital technological platforms, the expansion of the use of the knowledge economy, the digital transformation of production and management systems, which are significant factors in increasing the efficiency of the functioning of industrial enterprises and increasing the competitiveness of products. The emergence and development of new high technologies, digital production is impossible without the improvement of scientific approaches and methods of organizing production.

By high technologies we mean the embodiment of advanced scientific knowledge and design developments into methods and tools for the process of converting production resources into a product that is competitive in the target market, a product that is fundamentally new or better in terms of technical characteristics compared to existing analogues.

High-tech products are improved or fundamentally new, technically complex, competitive products or services in the target market, the production of which is based on the results of R&D implementation, innovative digital technologies, efficient use of resources and competencies of highly qualified personnel of the enterprise.

High-tech production is an innovative process of creating products or services that are competitive in the target market with a high share of added value based on the use of advanced digital technologies, "intellectualized" labor tools and highly skilled labor [4, 5].

The digital economy is an economic activity in which the most important production factor is the rapid processing and analysis of large volumes of digital data to support and automate decisions, which, compared with traditional forms of management, can significantly increase the efficiency of production, technology, equipment, storage, sales, and delivery. goods and services.

The digital transformation of production means revolutionary changes in business models based on the use of digital platforms in order to ensure significant growth in market volumes by increasing the competitiveness of enterprise products.

The digital transformation of production involves the organization of the introduction of modern innovative technologies and products, the adaptation and development of new business models to the conditions of the digital economy and, due to this, a qualitative improvement in business processes, including the production process [6-9].

The digital platform is an integrated information system that is designed to provide multilateral user interactions for the exchange of information in order to optimize business processes, reduce overall transaction costs, and increase the efficiency of supply chains for goods and services.

The digital ecosystem brings together several digital platforms from different industries or market segments that have common customers and provides conditions for the innovative development and distribution of digital devices, digital products, digital services and applications. A rationally organized ecosystem, in which added value is created using digital (information) technologies, makes it possible to increase the positive effect for each component of the sociotechnical system with distributed interaction and mutual use and exchange of knowledge in the conditions of evolutionary self-development. It can be expected that ecosystems of digital platforms in the transport, logistics and manufacturing sectors of the economy will have significant potential.

The organization of production in a digital economy, according to the authors, is a set of methods, techniques and activities that allow for the most effective combination of highly qualified workers with the necessary competence in the labor process with innovative means and objects of labor in space and time to achieve production goals based on digitalization product life cycle management [4, 5]. According to experts, among the reasons hindering digital transformation, the following stand out: outdated technologies in 61% of enterprises, lack of specialists and teams with the necessary competencies and skills - 64%, lack of integration of existing and new technologies and data - 62% [10].

Studies in the field of digital transformation of production show that enterprises that are active in the use of new digital technologies and new management methods are on average 26% more profitable than their competitors, while those that invest heavily in digital technologies, but do not pay enough attention to management, financial performance is 11% lower, conservative organizations that modernize only management receive plus 9% in profits, but through the introduction of digital technologies they can potentially triple the result, for those who have not yet developed a development strategy, they have 24% lower financial performance compared to other enterprises [11].

A significant restructuring of the infrastructure, technology, methods of organizing production management is required. The current economic situation is characterized by the beginning of the fourth industrial revolution, in which digital “smart” enterprises are being created, equipped with cyber-physical systems. Such enterprises allow for personalized "customized" production of products that are competitive in the domestic and world markets. Among the technological trends of the fourth industrial revolution, one can distinguish: vertical and horizontal integration, industrial robotics, unmanned vehicles, the use of CNC machines, machining centers, additive technologies using 3D printers, the industrial Internet of things, artificial intelligence, cloud computing and data storage, analysis of large data,

Multi-axis CNC machining centers allow you to perform turning, drilling and milling work and at the same time control the movement of the working tool and workpieces in the process of complex machining. Such four - six-coordinate equipment allows you to work with a part of any complexity, carry out several processes simultaneously without stopping, significantly reducing the time, realizing the processes from turning the workpiece to the full-fledged manufacture of the product. Machining centers and CNC machines allow automatic control and monitoring of production processes using a control panel and a computer, to which the data necessary for performing production operations can be remotely transmitted. Machining centers have tool magazines with a capacity of 5 to 100 or more tools and devices for their automatic change. The working head of CNC production equipment can accommodate multiple tools and perform multiple operations at the same time, which makes the production process multi-functional and high-performance. The possibility of mutual movement and change of the angles of rotation of the working tool and the workpiece in many coordinates improves the accuracy of processing, since it eliminates the need to reinstall workpieces and allows you to perform operations on all sides of the part, except for its attachment. Machining centers can be equipped with additional tables (satellite pallets) and devices for automatic workpiece change without interrupting the operation of the equipment, which helps to increase its performance. CNC equipment is equipped with contact and non-contact laser systems for measuring and calibrating tools and parts, which saves time in installing parts and linking them to the coordinate system of production equipment, makes it possible to control tool wear, the relative position of parts and tools, the geometry of machined surfaces, which improves quality and processing accuracy. On average, it is possible to replace from three to five CNC machines to five to ten universal machines with one modern machining center, but such equipment is expensive and is often used in the manufacture of the most technologically complex products. CNC equipment is equipped with contact and non-contact laser systems for measuring and calibrating tools and parts, which saves time in installing parts and linking them to the coordinate system of production equipment, makes it possible to control tool wear, the relative position of parts and tools, the geometry of machined surfaces, which improves quality and processing accuracy. On average, it is possible to replace from three to five CNC machines to five to ten universal machines with one modern machining center, but such equipment is expensive and is often used in the manufacture of the most technologically complex products. CNC equipment is equipped with contact and non-contact laser systems for measuring and calibrating tools and parts, which saves time in installing parts and linking them to the coordinate system of production equipment, makes it possible to control tool wear, the relative position of parts and tools, the geometry of machined surfaces, which improves quality and processing accuracy. On average, it is possible to replace from three to five CNC machines to five to ten universal machines with one modern machining center, but such equipment is expensive and is often used in the manufacture of the most technologically complex products. make it possible to control tool wear, the relative position of parts and tools, the geometry of the machined surfaces, which improves the quality and accuracy of processing. On average, it is possible to replace from three to five CNC machines to five to ten universal machines with one modern machining center, but such equipment is expensive and is often used in the manufacture of the most technologically complex products. make it possible to control tool wear, the relative position of parts and tools, the geometry of the machined surfaces, which improves the quality and accuracy of processing. On average, it is possible to replace from three to five CNC machines to five to ten universal machines with one modern machining center, but such equipment is expensive and is often used in the manufacture of the most technologically complex products.

The digital transformation of industrial enterprises is characterized by fundamentally new high-tech approaches to product design based on a multi-level matrix of targets and resource constraints, a digital automation platform and a system of intelligent assistants designed to develop digital twins (Digital Twin) of products and production, the development of virtual stands and test sites , performing virtual tests in order to provide a significant reduction in field tests and reduce the time to bring competitive products to the market.

Principles of digital transformation.

Interoperability is the ability of sensors, sensors, machines, devices and people to exchange information and interact with each other through the Industrial Internet of Things (IIoT).

- transparency is a condition of such interaction. In a virtual environment, a digital copy of real objects, functions, processes, systems is created, accurately reflecting everything that happens with its physical original. The constant exchange of data between the digital copy and the original makes it possible to accumulate information about all the processes that occur with “smart” products, equipment and production in general. This is required to ensure the possibility of collecting data from sensors and sensors and fixing the situations in which they are generated.

- technical support allows the staff to make informed decisions based on the collection, analysis and visualization of information necessary for the implementation of the production process. Such support in performing dangerous or routine operations can allow the replacement of production personnel with machines endowed with artificial intelligence capabilities.

- decentralization in making and implementing management decisions is carried out on the basis of delegating the relevant powers to cyber-physical systems. In the future, automation should be as complete as possible: where machines can work efficiently without human intervention. At the same time, production personnel, acting as controllers, can connect to the implementation of the necessary operations in emergency and non-standard situations.

CONCLUSION

The organization of production in the digital economy covers a set of methods, techniques and activities that allow for the most effective combination of highly qualified workers with the necessary competence in the labor process with innovative means and objects of labor in space and time to achieve production goals based on the digitalization of product life cycle management. A single information space allows you to support the implementation of processes throughout the life cycle of products, including marketing research, product design, supply, pre-production, production, quality control, packaging, warehouse logistics, sales, transport logistics, operation, maintenance and repair, disposal.

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