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«КӨЛІК ЖӘНЕ ЭНЕРГЕТИКАНЫҢ ӨЗЕКТІ МӘСЕЛЕЛЕРІ: ИННОВАЦИЯЛЫҚ ШЕШУ ТӘСІЛДЕРІ» Х ХАЛЫҚАРАЛЫҚ ҒЫЛЫМИ-ТӘЖІРИБЕЛІК КОНФЕРЕНЦИЯСЫНЫҢ БАЯНДАМАЛАР ЖИНАҒЫ

СБОРНИК МАТЕРИАЛОВ Х МЕЖДУНАРОДНОЙ НАУЧНО – ПРАКТИЧЕСКОЙ КОНФЕРЕНЦИИ: «АКТУАЛЬНЫЕ ПРОБЛЕМЫ ТРАНСПОРТА И ЭНЕРГЕТИКИ: ПУТИ ИХ ИННОВАЦИОННОГО РЕШЕНИЯ»

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В сборник включены материалы X Международной научно – практической конференции на тему: «Актуальные проблемы транспорта и энергетики: пути их инновационного решения», проходившей в г. Нур-Султан 17 марта 2022 года.

Тематика статей и докладов участников конференции посвящена актуальным вопросам организации перевозок, движения и эксплуатации транспорта, стандартизации, метрологии и сертификации, транспорту, транспортной техники и технологии, теплоэнергетики и электроэнергетики.

Материалы конференции дают отражение научной деятельности ведущих ученых дальнего, ближнего зарубежья, Республики Казахстан и могут быть полезными для докторантов, магистрантов и студентов.

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MODERN DIGITAL TECHNOLOGIES IN QUALITY MANAGEMENT SYSTEM

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Trends in the development of the digital economy and the place of the quality management system in it is a large layer for scientific research. The introduction of a quality management system serves as an installation for companies to constantly improve all business processes. In the modern realities of the digital era, the whole country is transformed into an information society thanks to the widespread use of digital platforms and technologies. The improvement of information technologies has a direct impact on the practice of operating companies on the basis of the quality management system ISO 9000.

As a result of a large-scale study of the impact of information technologies on the development of organizations, conducted by the institute of the international consulting company McKinsey, it was concluded that thanks to information technologies it is possible to identify new strategic opportunities for expanding the market, moreover, the operating model of the enterprise itself is changing.

Among the main areas of digitalization of enterprises can be distinguished continuous training of all employees, development of digital leadership, strengthening of human resources, cognitive selection of personnel in the company. Human, technological and innovative aspects of the development of the quality management system are a consequence of the digitalization process of the enterprise.

The introduction of technological innovations, such as robotics, big data systems and artificial intelligence, positively affects the development of the company's quality management system due to increased cost efficiency, transformation of the company's operating model, increased consumer loyalty, production of high-tech products, and increased enterprise competitiveness.

The application of innovations in the HR personnel service, namely the use of digital interviewing, reputation evaluation systems, various virtual collaborations, contributes to the increase of social responsibility of the business, the development of personnel potential, and the development of digital leadership. Digital leadership should be based on the use of the latest tools, expanding the knowledge of the digital world and digital technologies, continuously accelerating and demonstrating the skill of working in a digital environment.

The introduction of innovations in the field of economic security at the enterprise, namely the use of electronic signature methods, current programs with antiviruses, biometric methods of user authentication, leads to an increase in the level of digital security, an increase in the level of reliability of the company for consumers, and a reduction in a number of additional costs.

The result of digitalization of enterprises is transformational processes of the entire quality management system in terms of its basic principles, relations with stakeholders, analysis of target

indicators of quality management system efficiency. Stakeholders in the digital economy take an active part in various areas of the organization's activities when creating its value proposition [1].

At the current stage of development, quality management uses many well-known IT technologies that allow achieving these goals: electronic document management (EDM systems), enterprise resource planning (ERP systems), customer relationship management (CRM) systems, business process management (BPM), etc. The Quality Management project tells about the peculiarities of using these technologies when implementing a quality system. However, these technologies use people, their knowledge and abilities to some extent to ensure normal work.

Digital transformation offers to take the next step - to transfer manual quality management operations to digital form. In quality management, there are many tasks that require significant human resources, for example, collecting and analyzing data on products, processes and systems of the organization, monitoring and managing processes, making decisions based on evidence, scaling the requirements of the quality system to changing processes, identifying and analyzing risks, etc.

The main trends in the "digitalization" of the quality management system (QMS) today are:

• Data recording and analysis. This is one of the most time-consuming tasks of the quality system. Reducing the cost and improving the responsiveness of your storage and processing systems allows you to solve a problem that previously seemed impossible - to measure and record everything that can affect the quality of the product. The Internet of Things and various types of sensors have opened the door to new data sources. Sensors have become possible to place where needed, rather than where technology or product design allows. At the same time, the Big Data system provides an opportunity to analyze these huge, complex, and rapidly growing data sets from multiple sources.

• Confirmation of compliance with requirements (regulatory documents, specifications, etc.). In many processes of the organization's activities, it is necessary to confirm the objectivity of the obtained certificates of compliance with the established requirements (for example, in pharmaceuticals, medicine, laboratory studies, etc.). Blockchain technology allows you to have a safe, decentralized and fully objective system of evidence of fulfilled requirements. The creation of fictitious certificates or their substitution under such a system is excluded.

• Process monitoring and control. Most often, various quality tools (statistical methods or expert assessments of specialists) are used to manage processes in quality management. With the advent of deep learning algorithms for neural networks for these purposes, the use of artificial intelligence has become possible. A trained neural network detects trends and changes in processes much more efficiently and faster than a person or automated complexes based on statistical data processing.

• Decision-making in ambiguous situations. The quality management system requires the creation of "strictly" prescribed process execution algorithms. Algorithms are installed in process maps or operating procedures. If the process is complex and branched, and the execution of operations depends on changing parameters, then you have to either prescribe all possible options for the process or rely on the expert decision of the process performer. Any undefined situation can cause the process to fail or stop. Digital transformation can solve this problem with predictive analytics [2].

Modern organizations increasingly have to face a significant problem - how to condition the level of development of the quality management system to the pace of digitalization of the enterprise and the requirements that the external environment dictates.

Let's consider the problems when digitalizing the quality management system [3]:

1. High implementation costs and, as a result, difficulties in finding funding sources:

- maintenance and maintenance of the digital platform;

- development of automated systems protected against information leakage constituting state or commercial secrets;

- in the formation of a unified system of electronic document management in the conditions of interaction of organizations.

2. Difficulty in providing by specialists:

- lack of personnel with sufficient knowledge in the field of analysis of multilevel systems of varying complexity and experience with tools for processing a large amount of information (structured and not) - Big Data;

- unwillingness of enterprise personnel to adapt and adapt to new conditions. Psychologically, this can manifest itself in sabotage of the creation of "transparent systems".

3. The inevitability of forming a single "digital registry" that provides electronic certificates of conformity.

We will highlight the risk groups that organizations may encounter in the process of digitalization of the quality management system [4].

1. Organizational risks:
- The fragility of the organization's digital development;
- imbalance of interaction between stakeholders within the quality management system itself.

2. Personnel decisions:
- Deterioration of staff skills;
- risks associated with the need for training of personnel.

3. Process Risks:
- Theft and fraud of company data;
- corruption within the company.

In the conditions of digitalization, processes of transformation and changes of the quality management system take place. In this regard, a number of trends in the digitalization of QMS can be identified:

• Data capture and research. The development of the concept of the Internet of Things, the introduction of various types of sensors (sensors) allow the use of new data sources. This allows you to analyze a large number of complex indicators from multiple sources at once, increasing the speed of information storage and processing systems.

• Compliance. The introduction of blockchain technology allows you to obtain and systematize data into a serial chain of blocks, protected using cryptographic ciphers.

• Monitoring and regulation of processes. Effective control of QMS processes is associated with the use of artificial intelligence, which is able to detect trends and transformations in processes faster and more efficiently than a person or automated complexes based on statistical data processing.

• Decision-making in conflicting situations. QMS requires the development of clear algorithms for the execution of processes. Predictive analytics can solve this problem in the context of digital transformation [5].

In order for the quality management system to develop in the conditions of digitalization and bring results, it is necessary to fulfill the corresponding functions [6].

In real time, get all the necessary information from the internal and external environment, then structure the data, developing and putting forward for discussion with managers at all levels of the enterprise all kinds of solutions to problems that arise or may arise. Here, it is important to quickly respond to all changes and propose methods/tools that can affect management's decision-making.

• Optimization of the enterprise structure (functional and organizational) according to the number and composition of personnel, areas of activity depending on the company's goals and policies adopted by management.

• Selection of methods suitable for the digital economy for the production of goods and the provision of services.

• Product creation and service management.

• Ensuring process efficiency, production security, information protection.

• Risk and change management.

In the conditions of digitalization, it is necessary to use the following set of principles, in relation to the company's quality management system:

1. The innovation principle, which assumes that the quality management system should help develop the innovative potential of the organization, attract external resources for the creation and implementation of innovations.

2. The technological principle, which involves using information computer technologies, such as robotics, CRM systems, to reduce company costs, improve service quality, and develop digital competencies of employees.

3. The principle of flexibility, which implies that the quality management system needs to be easily changed and modified if there is potential to improve the quality of services, profitability, efficiency of the organization [1].

In addition, for the effective and continuous development of the quality management system, it is necessary to develop a digital strategic plan for the short and long term for the introduction and wide use of information technologies, to digitally improve the company's human resources.

The process of digitalization of production involves the introduction of analytical systems that make production as profitable as possible. The main indicators of the high level of digitalization are making decisions based on objective business analysis data, using technological tools to increase labor productivity, tools and methods of the quality management system.

The digitalization processes of companies, the widespread use of products, technologies and platforms of the information economy help not only to eliminate many problems of inefficiency of the quality management system, but also serve as a catalyst for its further development and improvement.

The development of digital technologies significantly expands the ability to manage quality at enterprises in various areas of activity by reducing the "human factor." However, digital transformation should not be equated with the reduction of human activity. Digital transformation removes the "routine" from many quality management tasks that the staff of any organization have to perform. With the advent of digital technologies, the challenge is to redesign processes and procedures so that both people and digital devices can contribute to quality improvement.

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