

## DIGITALIZATION OF THE QUALITY MANAGEMENT SYSTEM AS A FACTOR OF COMPETITIVENESS

Product quality is one of the key factors in a company's competitiveness. The transition from outdated methods of selective analysis to digital real-time systems ensures high accuracy of control and predictability of production processes [1, p. 243]. Thus, technological innovations not only automate existing procedures but also form a new paradigm of quality management.

In a modern enterprise, quality management is a complex system of organizational and technical measures that cover the entire product lifecycle. The standards of reliability and sustainable development of sectoral markets are constantly growing and require the implementation of digital solutions in enterprises [2, p. 295]. Basic management concepts, combined with modern analytical tools and intelligent control systems, make it possible to take production quality to a fundamentally new level. This ensures compliance with international requirements and creates long-term competitive advantages in the context of digital transformation.

The main tool for implementing digital solutions in the quality management system is the Quality 4.0 concept. It is based on the use of the Internet of Things (IoT) and Big Data, allowing for continuous data collection on equipment condition and product parameters directly from production lines. Artificial intelligence algorithms enable companies to detect defects and predict their occurrence, transforming the management model from reactive to proactive. Special attention should be paid to the implementation of augmented reality (AR) technologies, which minimize the impact of the "human factor." Visualization of control points and interactive instructions through AR glasses enables employees to perform inspections with maximum accuracy [3, pp. 9–10]. The integration of IoT, AI, and AR technologies transforms the quality management system into an intelligent ecosystem where digital tools ensure error-free operations and high predictability of production results.

A global study by J. Antony, O. McDermott, and M. Sony (2022) demonstrated that the implementation of Quality 4.0 creates a unique potential for the formation of strategic competitive advantages. Based on interviews with leading engineers and managers from companies in Europe and America, it was found that the most important technologies for quality management transformation are predictive analytics, sensor tracking systems, and electronic feedback loops. According to the study, digitalization allows organizations not only to improve customer service but also to increase overall profitability by automating control procedures and minimizing errors [4, pp. 1177–1178]. Despite significant advantages, the implementation of digital QMS is accompanied by several challenges: high equipment costs, cybersecurity risks, and the need for staff retraining to work with AI and analytical platforms [3, p. 12].

Thus, the digitalization of the quality management system within the Quality 4.0 concept enhances the competitiveness of enterprises in the modern market. The introduction of IoT, Big Data, and AR tools makes it possible to transform quality management from a reactive model of control to a proactive defect prevention system. This meets international standards and opens up strategic advantages by increasing profitability, improving service, and ensuring sustainable development in the context of European integration.

### References

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