

The Mechanism of Enterprise Digital Quality Management on Digital Innovation

Ziwei Gao*, Hui Sun, Qiang Liu, Hongshan Liu

School of Economics and Management, Liaoning University of Technology, Jinzhou, Liaoning, China

**Corresponding Author*

Abstract: As a management method that uses digital technology and information system to realize the automation and intelligence of quality management, digital quality management plays an increasingly important role in enterprises. With the rapid development of digital technology, enterprise digital quality management, as an important means of change in the field of quality management, plays an important role in the digital innovation of enterprises. This paper discusses the mechanism of enterprise digital quality management on digital innovation from three aspects: improving data governance capabilities, accelerating feedback and improvement cycles, promoting intelligent decision-making and optimizing processes, including improving data-driven decision-making capabilities, promoting continuous improvement and innovation culture, and optimizing production processes and product design. The implementation path and key influencing factors were analyzed.

Keywords: Enterprise Digital Quality Management; Digital Innovation; Data Governance; Feedback and Improvements; Intelligent Decision-making; Process Optimization

1. Introduction

With the continuous development and application of information technology, digitalization has become an important way for enterprises to transform and upgrade. In this process, digital quality management, as a key link to ensure the quality of products and services, not only needs to realize the effective implementation of traditional quality management, but also needs to give full play to the role of digital technology in quality management to promote the realization of

digital innovation[1]. The mechanism of enterprise digital quality management in digital innovation is a research field that attracts attention in the current digital transformation context. With the rapid development and application of information technology, enterprise digital quality management is not only related to product quality and production efficiency, but also becomes an important support for promoting enterprise digital innovation.

The purpose of this study is to deeply explore the mechanism of enterprise digital quality management on digital innovation, and analyze its influence path and correlation from theoretical and practical perspectives. By analyzing the intrinsic relationship between digital quality management and digital innovation, it can help enterprises better grasp the opportunities of digital transformation and realize the organic combination of quality management and innovation.

This paper will adopt a comprehensive research approach, including literature review, case analysis, field research and statistical analysis, to comprehensively reveal the impact mechanism of enterprise digital quality management on digital innovation. We will pay attention to the construction of the organization's internal quality management system, the interaction between technological innovation and quality improvement, and the role of leadership in promoting innovation, in order to provide effective management strategies and practical suggestions for enterprises.

Through an in-depth study of the mechanism of enterprise digital quality management in digital innovation, this study aims to provide business leaders, managers and researchers with an in-depth understanding and enlightenment on how to promote enterprise innovation with the help of digital quality

management. We believe that the results of this study will provide useful reference and guidance for promoting the digital transformation of enterprises and enhancing their innovation capabilities and competitiveness.

2. The Functional Structure of Digital Quality Management

Digital quality management is a management concept driven by information technology and quality management, and it has become an inevitable choice for enterprise operation and development in the current digital revolution and market competition environment. The core of digital quality management is to continuously promote the continuous development and quality improvement of information construction, enhance the comprehensive utilization value of data, reduce costs, increase efficiency, and increase customer satisfaction based on data-centric.

Many companies are implementing digital quality management at varying degrees, combining quality management methods (TQM, lean manufacturing, etc.) and information technology (product lifecycle management (PLM), continuous information support for supply and product lifecycle (CALS), enterprise resource planning, product data management systems, etc.), especially in the construction industry. Understanding where you are and continuously improving it can help you effectively and efficiently manage your digital quality work in relation to objectives, external requirements (such as customer requirements, legislation or guidelines), or benchmarks.

2.1 It Helps to Realize the Timeliness of Product Customization and Quality Control.

Through digital means, the production data of the main process can be entered into the system in real time, and the system calculates and obtains the quality of the process level in real time. In addition, the timeliness of digitalization is reflected in the fact that the quality data can be fed back to the upper managers in real time, which directly eliminates the original statistical cycle, so that the managers can grasp the quality situation in a timely manner and respond quickly to the production situation[2].

2.2 Enhancement of Transparency and Standardization of Quality Management

Digital technology can help enterprises achieve standardized operations, and every step is standardized through a human-computer interaction process. Enterprises with a good information foundation can consolidate the production process and quality inspection process of the information system, and guide the production site to strictly implement it, and the implementation of all processes has been recorded in the system[3]. In addition, with the gradual adaptation of on-site information systems, the production and operation activities of personnel will become more and more standardized, which will lay a solid foundation for the efficient and transparent management and control of enterprises.

2.3 Achieving Traceability and Sustainability of Product Quality

The digital means can record the quality data of each major process of the production process, to establish an effective quality information tracking system, so that the product certificate can be set up for each (batch) product, and customers can automatically obtain the status of the whole production cycle of the product by scanning the barcode, QR code, RFID, etc. of the product[4].

3. Components of Digital Duality Management

Enterprise digital quality management refers to the improvement of quality data (parametric data from product design and process design, quality data from raw materials, semi-finished products, and finished products)[5]; data on the operating parameters of production process machinery and equipment; after-sales related data, etc.), achieve data-driven cost reduction, increased efficiency, and improved customer satisfaction. Based on the existing theoretical results, tools and methods, such as the maturity of quality management in the industry, the maturity of software quality management, and the maturity of quality management capabilities, digital quality management is mainly composed of three dimensions: quality awareness, digital quality

management ability, and quality benefit[6]. Quality perception primarily examines the role and value of "people" (including leaders and employees) in quality management and is more skewed towards qualitative evaluation. Jiang Jiadong and Wen Decheng et al. emphasized the core position of quality consciousness in the factor analysis method of assessing the quality competitiveness of enterprises, and believed that quality consciousness refers to the quality concept, knowledge and culture that can be embodied in the quality resources and quality capabilities of enterprises, without being directly constrained by quality resources and quality capabilities [7,8].

The digital quality management function mainly examines the level of equipment and facilities invested by enterprises to achieve data-driven quality improvement and the ability to control the quality of the entire product life cycle. Instrumentation & Inspection & Testing, Reliability Testing & Verification, and Quality Control Methods & Tools include:[9]:

4. The Mechanism of Enterprise Digital Quality Management on Digital Innovation

4.1 Improve Data Governance Capabilities

Enterprise digital quality management improves data governance capabilities by establishing a sound data collection, storage and analysis system, so that enterprises can better understand and grasp the key indicators of product and service quality. Based on a reliable data foundation, enterprises can achieve early warning and rapid response to quality problems, and make targeted improvements and adjustments, thus providing reliable data support for digital innovation[10].

4.2 Accelerate Feedback and Improvement Loops

The implementation of digital quality management can realize real-time monitoring and feedback of quality information, so that enterprises can find and solve quality problems more quickly. By accelerating the feedback and improvement cycle, companies can continuously accumulate experience and knowledge, continuously optimize products and services in practice, and drive the

continuous evolution and improvement of digital innovation[11].

4.3 Promote Intelligent Decision-Making and Optimize Processes

With the help of artificial intelligence, big data analysis and other technical means, digital quality management can help enterprises achieve intelligent quality decision-making and process optimization. Through the analysis and mining of massive data, enterprises can identify potential quality problems and room for improvement, so as to promote the occurrence and implementation of digital innovation[12].

5. Implementation Path and Key Influencing Factors

In order to realize the role of enterprise digital quality management in digital innovation, enterprises need to establish a sound data management and governance mechanism, strengthen the construction and operation of quality information systems, cultivate professional data analysis and quality management talents, build an intelligent decision support platform, and promote the deep integration of quality management and digital innovation[13].

5.1 Improve Data-driven Decision-making Capabilities

Enterprise digital quality management provides a more accurate and comprehensive information foundation for enterprises by collecting, analyzing, and utilizing a large amount of quality data. This data-driven decision-making can help companies better understand market demand, product quality status, and competitor conditions, which can guide companies to innovate and optimize decisions more effectively[14].

5.2 Promote a Culture of Continuous Improvement and Innovation

Digital quality management emphasizes the concept of continuous improvement and innovation, and promotes enterprises to continuously improve the quality of products and services by establishing quality management systems and processes to continuously find and solve problems[15]. This culture of continuous improvement and innovation is conducive to stimulating

employees' awareness and ability to innovate, and promoting enterprises to continuously innovate in the field of digitalization.

5.3 Optimize the Production Process and Product Design

Through the application of digital quality management system, enterprises can comprehensively monitor and analyze production processes and product design, find and solve problems in a timely manner, and improve production efficiency and product quality. At the same time, digital quality management can also help enterprises optimize product design, meet customer needs, and enhance product competitiveness.

6. Conclusion

Enterprise digital quality management plays an important role in digital innovation, which can provide strong support for enterprise digital innovation by improving data governance capabilities, accelerating feedback and improvement cycles, and promoting intelligent decision-making and optimizing processes. In practice, enterprises need to comprehensively consider various factors such as technology, organization and culture, strengthen the application and practice of digital quality management in the digital transformation of enterprises, and continuously promote the in-depth development of enterprise digital innovation. Enterprise digital quality management has a positive role in promoting digital innovation. Digital quality management can help companies achieve continuous innovation and enhance competitiveness by improving data-driven decision-making, promoting a culture of continuous improvement and innovation, and optimizing production processes and product design. Therefore, enterprises should pay attention to the role mechanism of digital quality management in digital innovation, continuously improve and optimize the quality management system, and promote the digital transformation and innovative development of enterprises.

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