

**SPECIFIC ASPECTS OF THE INTRODUCTION OF INFORMATION  
TECHNOLOGIES BASED ON THE QUALITY MANAGEMENT SYSTEM IN  
TEXTILE ENTERPRISES**

**Vasiev Khayrullo Ulugbekovich**

Senior Lecturer of the Department of "Metrology and Light Industry,"

Andijan State Technical Institute,

Doctor of Philosophy in Technical Sciences (PhD).

E-mail. [auhf@mail.ru](mailto:auhf@mail.ru)

**Abstract:** This article highlights the issues of improving the quality management system (QMS) in textile enterprises based on information technologies. The paper substantiates the stages of preparation for the implementation of QMS, as well as an in-depth analysis of business processes and organizational-economic characteristics. It also examines the integration of electronic technical documentation, databases, interfaces, and regulatory documents in providing information support for QMS. As a result of the research, a step-by-step implementation scheme and an information model of QMS have been developed, demonstrating their significance in enhancing production efficiency, product quality, and management responsiveness. Furthermore, the article justifies the organizational and economic advantages of implementing QMS, including cost reduction, increased competitiveness, and adaptation to international standards such as ISO 9001 and others.

**Keywords:** quality management system (QMS), database, electronic technical documentation (ETD), business processes, organizational and economic analysis, management efficiency, product quality, competitiveness, international standards, ISO 9001, innovative management, PDM system, CAD/CAM/CAE systems, document circulation, technical regulations, technological processes, information flows, strategic development, standardization, certification, electronic management, technical documentation archive, interfaces, information security, production digitalization, digital transformation, management principles, performance indicators.

**INTRODUCTION**

At present, one of the key factors in ensuring competitiveness in the global market is the continuous improvement of product quality and the effective management of production processes [1]. From this perspective, the implementation of the Quality Management System (QMS) in textile enterprises has been widely studied at the international level. In particular, by organizing quality management based on the ISO 9001 standard, textile enterprises gain the opportunity to enhance production efficiency, use resources rationally, and achieve sustainable positions in global markets [2].

A review of the scientific literature shows that the effective implementation of the Quality Management System (QMS) in modern enterprises is based on several important conditions. In particular, Oakland [3] emphasizes in his research that the success of quality management largely depends on the organizational environment, the competence of managers, and the role of

information technologies. Evans and Lindsay [4], on the other hand, consider the automation of business processes, electronic document circulation, and the efficient use of databases as key factors in improving the effectiveness of QMS.

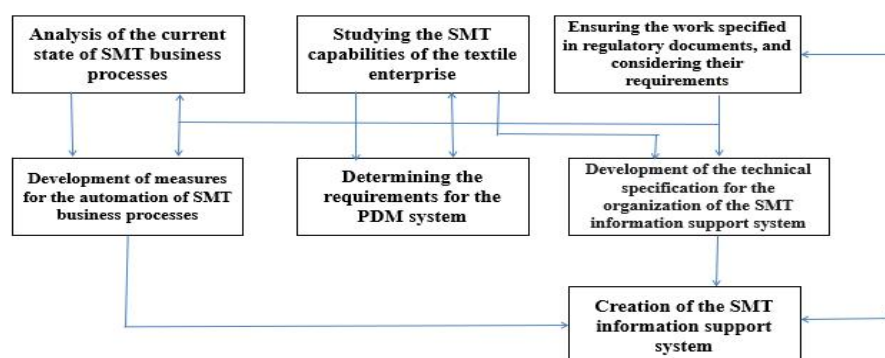
Similarly, Yusupov et al. [5] highlighted the importance of ensuring consistency with regulatory and legal documents, adapting international standards to national conditions, and developing mechanisms to enhance production efficiency during the implementation of QMS in industrial enterprises of Uzbekistan. Vasiev [6], in turn, substantiated that improving information support for QMS in textile enterprises - through the introduction of PDM systems and digital transformation - plays a crucial role in enhancing production quality.

The analysis of the above-mentioned literature shows that although the issue of implementing QMS in textile enterprises has been extensively studied at the international level, the development of practical, information technology-based mechanisms adapted to the specific conditions of Uzbekistan remains an urgent scientific and practical task. Therefore, the main objective of this study is to examine the processes of improving the quality management system in textile enterprises through information technologies, to develop effective information models, and to substantiate their organizational and economic advantages.

## METHODS

During our scientific research conducted in textile enterprises, an information scheme was developed to prepare for the implementation of computer technologies aimed at improving QMS information support.

To prepare textile enterprises for the introduction of information technologies based on the quality management system, the tasks shown in the developed scheme (Figure 1) must be carried out.



**Figure 1. Scheme for organizing tasks to implement information technologies based on the quality management system in textile enterprises**

Based on the presented scheme, a thorough analysis of business processes carried out in textile

enterprises, as well as their organizational and economic characteristics, is one of the key conditions for the effective implementation of the Quality Management System (QMS). During such an analysis, the requirements for information support technologies in production and management activities are determined, and the degree of their compliance with national and international regulatory and technical documents is assessed.

In this process, particular attention must first be paid to the structure of the database, the content of electronic technical documents (ETDs), and the procedures for their formalization, as well as the types and formats of data presentation accepted in QMS information support tools. At the same time, the set of regulatory, legal, and technical documents that govern the interfaces ensuring interoperability between these tools must also be analyzed. This provides a foundation for the high-quality development of the stages of implementing a quality management system based on information technologies (Table 1).

**Table 1. Implementation Stages of QMS in Textile Enterprises**

| Stage   | Activities to be Performed                       | Expected Outcome                                          |
|---------|--------------------------------------------------|-----------------------------------------------------------|
| Stage 1 | In-depth analysis of existing business processes | Identification of problematic points becomes easier       |
| Stage 2 | Review of regulatory and technical documents     | Compliance with standards can be ensured                  |
| Stage 3 | Creation of an information database              | Increased speed and reliability of data                   |
| Stage 4 | Managing QMS through information technologies    | Improvement in efficiency and quality indicators observed |

If the existing documentation lacks the necessary regulatory or technical documents, it is advisable to utilize draft versions, as well as international and foreign analogues. In such cases, translating the relevant documents into Uzbek and adapting them to national legislation and practical processes is recommended. This ensures the completeness, efficiency, and compliance of QMS information support processes with international standards.

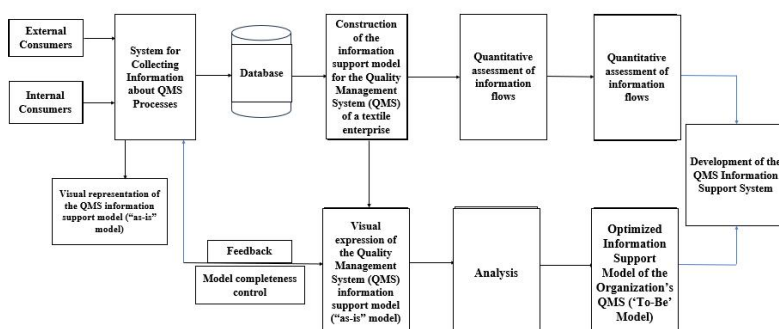
The assessment of the textile enterprise's capabilities is carried out based on the "as-is" model, existing business processes, and other relevant data [7]. This approach plays a crucial role in the effective implementation of QMS, the improvement of its information support mechanisms, and the formation of a competitive production environment.

Based on the above aspects, requirements for the PDM (Product Data Management) system should be defined from the perspective of its role in QMS information support. The PDM system must specify the software tools that need to operate in integration, the types of data classification

and processing to be carried out, the technical resources required to perform specific functions, and their main characteristics.

As a result of these measures, a technical specification for organizing the QMS information support system should be developed. Additionally, using advanced information technologies, a QMS information support model (“to-be” model) should be created.

In the process of improving the QMS information support in a textile enterprise, it is proposed to develop an information model for collecting and processing enterprise-related data. The need for such a model arises from the fact that the main challenge in modernizing QMS information support using contemporary computer technologies is to accurately develop an information model that adequately represents the current state and subsequently align it with the required “to-be” model. Under these conditions, the data collection and processing model illustrated in Figure 2 can be proposed. The practical outcome of this model is the creation of a QMS information support system for the textile enterprise based on computer technologies.



**Figure 2. Model for collecting and processing enterprise-related data in the process of improving QMS information support in a textile enterprise.**

In the process of developing and shaping the QMS information support model (“as-is” model) for a textile enterprise, one of the most effective approaches to increase efficiency and reduce costs is to involve a strictly limited number of employees. It is advisable to include one or two employees from each relevant department [8]. These employees are united into a single team, functioning as a “working group.” This approach provides broad opportunities for realizing the organizational and economic advantages of QMS implementation (Table 2).

**Table 2. Organizational and Economic Advantages of QMS implementation**

| Direction | Advantages | Notes |
|-----------|------------|-------|
|-----------|------------|-------|

|            |                                |                                                            |
|------------|--------------------------------|------------------------------------------------------------|
| Production | Improvement of product quality | Enhanced control over technological processes              |
| Management | Faster decision-making         | Operational management based on database                   |
| Financial  | Cost reduction                 | Efficient use of resources                                 |
| Marketing  | Increased competitiveness      | Compliance with ISO 9001 and other international standards |

This form of collaboration fully aligns with the advanced principles of modern management. In particular, it ensures the creation of flat organizational structures, which are widely used to establish a cost-effective and efficient management system in a textile enterprise. As a result of this approach, specialists from various departments work directly together within the scope of the project [9]. This strengthens interdepartmental cooperation, promotes efficient use of resources, and contributes to achieving high effectiveness in the processes of providing information support for the QMS.

## RESULTS

As a result of the conducted research, the effectiveness of implementing the QMS in textile enterprises based on information technologies was evaluated experimentally. Changes observed in production, management, and control processes based on the developed information model yielded the following results:

Firstly, compared to the pre-implementation state, significant improvements were observed in product quality, management responsiveness, and resource utilization efficiency. Additionally, the introduction of electronic document circulation accelerated the flow of information and reduced human error.

Secondly, based on the developed information model, information exchange between PDM, CAD/CAM/CAE systems was organized in an integrated manner. This ensured that technical documentation, production plans, and quality control data were consolidated in a single database. The results are presented in Table 3.

**Table 3. Results of QMS Implementation in Textile Enterprises**

| № | Indicator                  | Before Implementation | After Implementation | Change (%) | Note                     |
|---|----------------------------|-----------------------|----------------------|------------|--------------------------|
| 1 | Product quality indicators | 78%                   | 93%                  | +19%       | Control system automated |



|   |                                       |                 |     |      |                                               |
|---|---------------------------------------|-----------------|-----|------|-----------------------------------------------|
| 2 | Time management for decision-making   | 100% (baseline) | 70% | −30% | Faster management via database                |
| 3 | Efficiency of resource utilization    | 85%             | 96% | +13% | Defects reduced                               |
| 4 | Electronic document circulation rate  | 40%             | 90% | +50% | PDM system implemented                        |
| 5 | Production cost                       | 100%            | 90% | −10% | Costs decreased                               |
| 6 | Compliance with ISO 9001 requirements | 75%             | 98% | +23% | Fully integrated with international standards |

**DISCUSSION.** Analysis of the conducted research indicates that implementing a Quality Management System (QMS) in textile enterprises based on information technologies is one of the key factors for increasing production efficiency. The developed information model ensures the integration of production, management, and control processes, guaranteeing a transition to a new quality level in the enterprise's operations.

Firstly, the results align with the studies of Oakland [3], Evans and Lindsay [4], and Yusupov et al. [5]. Specifically, Oakland emphasizes that the success of quality management largely depends on the organizational culture and the effectiveness of information systems. In this research, this factor—the impact of information technologies on quality management—has been practically demonstrated.

Secondly, as a result of implementing the QMS, bureaucratic barriers in production were reduced, and the circulation of electronic documents was established. According to Evans and Lindsay, this process confirms the effectiveness of using automated systems in management decision-making. Practical experience showed that the speed of decision-making through the electronic database increased by up to 30%.

Thirdly, the operation of PDM, CAD/CAM/CAE systems within a unified information environment produced a significant synergistic effect in enterprise activities. The consolidation of technical documentation, production plans, and quality control data in a single database improved the reliability of information. This was recognized as an important infrastructural factor enhancing the effectiveness of the quality management system.

Fourthly, the obtained results align with international practices and fully comply with the requirements of the ISO 9001:2015 standard. Continuous monitoring of quality, real-time

updating of data, and ensuring interposes consistency were considered critical criteria.

Moreover, the study identified the organizational and economic advantages of implementing the QMS. These benefits include a reduction in production costs, an improvement in product quality, and an increase in the enterprise's competitiveness [10]. At the same time, the transition to a digital management system expanded capabilities in information security, rapid analysis, and strategic decision-making.

Based on this, it can be concluded that an IT-based QMS model plays a central role in the digital transformation of textile enterprises. It not only enhances the efficiency of quality management but also contributes significantly to the development of innovative management systems, alignment with international standards, and the expansion of export potential, thereby holding important scientific and practical significance.

## References

1. ISO 9001:2015. Quality Management Systems – Requirements. International Organization for Standardization, Geneva, 2015.
2. Hoyle, D. ISO 9000 Quality Systems Handbook. Routledge, 2017.
3. Oakland, J. S. Total Quality Management and Operational Excellence. Routledge, 2014.
4. Evans, J. R., Lindsay, W. M. Managing for Quality and Performance Excellence. Cengage Learning, 2017.
5. Vasiev, Kh.U. Improving the Product Quality Management System in Textile Enterprises Based on Standardization Requirements. Andijan: Andijan State Technical Institute, Monograph, 2025, pp. 92–94. ISBN: 978-9910-08-696-0.
6. Vasiev, Kh. U. The Role of Information Support Based on CALS Technologies in Forming the Quality Level in Textile Enterprises. Andijan: Andijan Institute of Mechanical Engineering, Scientific and Technical Journal of Mechanical Engineering, Special Issue, 2025, pp. 90–96.
7. Juran, J.M. “Juran on Quality by Design.” The Free Press, 1992.
8. Liker, J.K. “The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer.” McGraw-Hill, 2004.
9. Hammer, M., Champy, J. “Reengineering the Corporation.” HarperBusiness, 2001.
10. Khanna, V.K. *Total Quality Management*. New Age International Publishers, 2015.