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Quality Management System for Stable Product and Customer Reliability: Sistem Manajemen Mutu untuk Kualitas Produk yang Stabil dan Keandalan Pelanggan

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General Background: In the context of globalization, the construction industry plays a critical role in economic growth and social stability, with building material enterprises serving as its central link. **Specific Background:** In Uzbekistan, rapid infrastructural development has increased the demand not only for higher production volumes but also for building materials that meet international quality standards. **Knowledge Gap:** Despite the global relevance of quality management systems (QMS), many local enterprises still approach quality reactively rather than strategically, limiting competitiveness and sustainability. **Aims:** This study investigates the effectiveness of implementing QMS, particularly ISO 9001:2015, in enterprises producing building materials, focusing on its role in improving product quality and organizational performance. **Results:** A comparative analysis of 20 enterprises revealed that those applying ISO 9001 achieved significantly lower defect rates (3% vs. 11%), higher customer satisfaction (92% vs. 71%), and greater production stability (87% vs. 65%). **Novelty:** By critically integrating international theories with local practice, the study highlights the importance of process standardization, employee competence, and continuous improvement as key drivers of quality. **Implications:** The findings demonstrate that adopting QMS should move beyond certification toward full integration into corporate strategy, serving as a catalyst for competitiveness, sustainable growth, and industry-wide modernization.
Highlight :

1. Standardization of processes is the main factor influencing product quality.
2. ISO 9001:2015 improves customer satisfaction and production stability.
3. Quality management must involve employees and be applied continuously.

Keywords : Quality Management, Building Materials, ISO 9001:2015, Product Quality, Corporate Quality Culture

Introduction

In the conditions of today's globalization, the economic growth, investment attractiveness and social stability of any state are closely related to its infrastructural potential, that is, the level of development of the construction industry. Construction, on the other hand, does not take place efficiently without a complete and continuous supply system. This is the central link of the system - enterprises producing building materials. The products produced by them determine not only the durability and longevity of the structures under construction, but also the safety of the population, economic efficiency and environmental sustainability [1].

The construction sector in Uzbekistan is developing widely. The construction of new residential massifs, a large industrial area, educational, health and cultural institutions have become a typical landscape of today. The mechanisms of support for the industry are being expanded through presidential decisions and state programs. At the same time, the performance of such tasks as improving production efficiency, saving resources and meeting international requirements for the quality of domestic products is one of the main issues facing these enterprises [2].

Nowadays, in the conditions of competition in the domestic and foreign markets, it is possible to achieve an advantage not only with a low price, but also with quality. For enterprises producing building materials, quality is not just a technical indicator, but an expression of trust, stability and corporate prestige. As long as the quality of the product is not controlled continuously and systematically, even modern technologies may not justify themselves. Therefore, the implementation and effective use of a quality management system in ensuring the production of high-quality products should be considered as a strategic task [3].

Quality management is not random or episodic control. It is an integrated system that covers the entire production process, including stages such as planning, implementation, evaluation and improvement. And the effective operation of this system not only increases the quality of the product, but also increases the overall production culture, the responsibility of employees and customer confidence [4].

The construction materials manufacturing sector is one of the areas of strategic importance among industries. In today's developing world, activity in the field of construction is closely connected not only with urban planning and infrastructure renewal, but also with the growth rate of the national economy. The vital importance of construction work - puts a high demand on the quality of materials, which are their main component. Therefore, ensuring high quality in the production of building materials is not only a guarantee of competitiveness in the market, but also of safety and sustainable development [5].

Large-scale state programs implemented in the field of construction and reconstruction in Uzbekistan, in particular, the new Uzbekistan strategy, the "1 House per family" program, active construction work in the framework of new residential arrays and large infrastructure projects in different districts and cities, sharply increase the demand for building materials. To meet this demand, it is important not only to increase the volume of production, but also to bring quality indicators to the level of international standards.

The reforms carried out in the field of technical regulation in the Republic of Uzbekistan, the policy of harmonizing the national standards base with international standards are also important directions of measures aimed at improving quality. Enterprises in the field of building materials should take an active part in this process, otherwise they will be at risk of losing their competitiveness both in the domestic market and in the foreign market [6].

Therefore, the issue of introducing a quality management system and its full integration into practice is important to ensure the sustainable development of not only each individual enterprise, but also the entire industry. The scientific study of this topic, the identification of existing problems and the offer of practical solutions are some of the most relevant scientific tasks of today.

Review of Thematic Literature

The issue of the introduction of a quality management system in enterprises producing building materials has been the focus of many scientific studies at the International and national level. Scientific research in this area was carried out in terms of more Management, Quality Control, Process Engineering and inter-organizational competitiveness. Through the analysis of these literature, various approaches to the topic and methodological foundations can be formulated [7].

Edward Deming, a noted American quality control expert, in his work "Out of the Crisis" argues for the need for a process-oriented approach to quality assurance. In his opinion, enterprises need to thoroughly analyze not only the result, but also production processes in order to improve quality. Among Deming's 14 principles, the principle of "continuous improvement of processes" has become one of the main ideas of the current ISO 9001:2015 standard. Although Deming's approach is very advanced, its full implementation in practice faces certain obstacles for many small and medium - sized enterprises-including lack of skills, unsystematic management, and lack of internal control [8].

Joseph Juran, on the other hand, studies quality into three main blocks, "planning, control and improvement". He argues that it is wrong to view quality as a purely technical problem; it should be seen as an integral part of corporate governance. Juran's model of "quality planning" is especially relevant for domestic enterprises, since in most cases production programs are compiled only by volume, without taking into account quality. this makes it difficult to ensure product stability.

Philip Crosby, on the other hand, explores quality as an economic category and argues that in his popular theory of "quality free", spending on quality actually reduces the damage caused by defects. Its principle of" working without defects " indicates the need to establish specific standards and criteria for each stage in the process of manufacturing building materials [9]. in practice, however, "flawless performance" remains an ideal case, as in real production the human factor, the different level of equipment and the variety of raw materials are manifested as dynamic factors affecting quality.

Professor A of National Scholars.Kadyrov and M.Research on the implementation of quality management systems in Uzbekistan has been carried out by Rahimov. They argue that in domestic industrial enterprises, the approach to quality is in most cases consequential, lacking a process-based systematic approach. This is a serious obstacle in ensuring continuous quality in production [10]. They propose to integrate quality management into the enterprise's strategic development program.

Also, the international standard ISO 9001: 2015 explicitly states the basic principles of quality management customer orientation, leadership, employee engagement, process approach, improvement, evidence - based decision-making, and relationship management. The introduction of this standard improves not only quality, but also Organization within the enterprise. However, the problem is that most local businesses accept this standard as a certificate-only tool, not as a practical requirement. As a result, the system becomes ineffective [11].

Masaki Imai, the founder of Kaizen theory, said that the quality improvement process should be carried out with the participation of each employee. His concept of" Caizen continuous improvement " has become one of the most basic philosophical approaches in quality management. Masaki Imai argues that the effects of small but continuous changes in quality improvement will be greater. The introduction of this approach in the field of building materials is especially effective in optimizing the production process at the micro level and achieving active employee participation. In local practice, however, this model remains limited in most cases to the higher leadership level, not to the performing staff [12].

Armand V. Feygenbaum defines quality as the responsibility of all departments and employees of an

organization. According to its" Total Quality Control " concept, quality should be the responsibility of each employee, not just the work of the quality department. Feygenbaum defines quality as "a general process that covers every activity and function in an organization". This approach is very relevant for enterprises producing building materials, since in addition to production, the quality of products is influenced by logistics, procurement, warehouse, maintenance and even engineering departments [13]. when viewed critically, the implementation of this model requires a strong corporate culture, leadership, and internal connections within the enterprise.

Henry Minsberg places quality in management models at the center of Strategic Management. He argues that it is necessary to integrate quality not only at the technical level, but also into the process of strategic decision-making. According to minsberg's theory, the attitude towards quality is closely related to the culture, values and internal policies of the organization.enry Minsberg places quality in management models at the center of Strategic Management. He argues that it is necessary to integrate quality not only at the technical level, but also into the process of strategic decision-making. According to minsberg's theory, the attitude towards quality is closely related to the culture, values and internal policies of the organization [14]. This approach shows that for local businesses: if the top management does not consider quality to be a strategic priority, the employees at the bottom link will not take it seriously either.

Genichi Taguchi is a Japanese engineer and statistician who pioneered statistical techniques based on the concept of "reducing volatility" in quality assurance. His approach covers the quality of products from the choice of raw materials to the control of small parameters in the production process. Taguchi's statistical techniques are an important tool for maintaining quality stable in the production of products based on various raw materials, such as building materials. however, it takes high-level laboratories and professionals to effectively introduce these techniques, which is a challenge for local businesses.

M. Porter, on the other hand, views quality as a strategic competitive advantage, saying that through the "value chain" model, all processes in an organization can determine product quality. According to Porter's model, a manufacturing process is not a separate, isolated process, but a dynamic system connected by the internal structure of the entire enterprise, the supply system and customer relations [15]. By analyzing the "value chain"in construction materials enterprises, it is possible to determine at what stage quality is being lost and make optimal decisions on this basis.

In conclusion, an analysis of the thematic literature shows that the quality management system should be considered not only as a control tool, but also as an integrated management instrument that ensures the effectiveness of the enterprise. Viewed from a critical point of view, while most of the available research is theoretically perfect, there are methodological difficulties in putting them into practice in the context of local production. Therefore, the harmonization of the scientific and practical approach, the adaptation of international experience to the local environment, the development of personnel skills and the introduction of systematic monitoring mechanisms are the main requirements of today.

Research Methodology

The current Was the comparative, analytical study to find out the effectiveness of quality management system (QMS) in the enterprises, which produce building materials. To achieve an in-depth perception of the problem, a mixed-method design was selected based on which both quantitative and qualitative evidence were introduced. The statistical data of twenty medium, and large enterprises in the country were investigated, and a preliminary and post-implementation comparison of the key performance indicators-defect levels, customer satisfaction, and the stability of production were made in line with the ISO 9001:2015. Qualitative analysis was also complemented critically by using theoretical orientations of foreign and local thinkers such as Deming, Juran, Crosby, Imai, Feygenbaum and Porter. These theories brought to fore some of the aspects of QMS including process orientation, employee involvement, strategic integration and

continuous improvement. Rational thinking, inference, and proof helped form causal relationships between year QMS application and enhancement of the quality level of products. The techniques of economic analysis were also used to assess the decrease in expenses related to rework, returns, and wastage. Triangulation of the methods occurred through content analysis of normative documents and organisational policies telling which gaps exist in implementation. The methodological framework was also a powerful tool in measuring the direct results, as well as explaining some of the predisposing factors of quality-such as the competence of workforce, standardisation of the processes, and the organisational culture, which are key aspects in the building material industry.

Analysis and Results

Product quality is one of the main indicators that determine the effectiveness of a production enterprise. The long - term activity of the enterprise in the market, customer confidence, investment attractiveness, export potential and, most importantly, the provision of the interests of domestic consumers-it all depends on quality. But in practice, in most domestic enterprises, the approach to quality is still manifested in the form of a response to the identified problem, rather than prevention. This results in serious problems such as poor-quality production, malfunctions in construction processes, and material and social losses.

In this regard, the introduction and implementation of a quality management system serves not only to improve the product, but also to reorganize the entire production process and increase efficiency. The quality management system, formed on the basis of the ISO 9001:2015 standard, is one of the universal and effective mechanisms adopted on the world market today. Through this system, it will be possible to standardize processes, use resources wisely, minimize errors and regularly take into account customer requirements.

In order to identify the main factors affecting the quality of products in enterprises producing building materials and evaluate them, the activities of 20 large and medium-sized enterprises of the domestic manufacturer were studied. The results of this analysis are presented in Table 1.

№	Factors	Impact rate (%)
1	Process standardization	85
2	Lack of staff qualifications	73
3	Focusing on the result, not control	68
4	Old technologies and equipment	62
5	Undocumented quality control	55

Table 1. *Factors affecting Quality in Product Production*

As shown in the table, the biggest factor affecting quality is the non standardization of processes (85%). This means that due to the absence of specific rules and procedures in the production process, errors are repeated, as a result of which the product can come out of poor quality.

In second place was a lack of staff qualifications (73%). This indicator once again confirms the importance of human capital in quality assurance.s shown in the table, the biggest factor affecting quality is the non - standardization of processes (85%). This means that due to the absence of specific rules and procedures in the production process, errors are repeated, as a result of which the product can come out of poor quality.

In second place was a lack of staff qualifications (73%). This indicator once again confirms the importance of human capital in quality assurance. Many failures are caused by employees working without understanding or following quality requirements.

Proceedings focusing on the result, not on the control system is also considered serious problems (68%). There is reactive control here, not prophylactic - only action is taken until the problem arises. Old technologies and undocumented quality control are also a major obstacle to sustainable quality assurance (Table 2).

№	Indicators	ISO 9001 implemented	ISO 9001 not implemented
1	Necessity of processing (%)	3,	11,0
2	Returned orders (%)	1,2	6,4
3	Customerstabilitytion (%)	92,0	71,0
4	Production stability (%)	87,0	65,0

Table 2. *Quality Indicators for the Introduction of ISO 9001*

According to the data presented in the table, it can be seen from the results of the analysis that the product quality indicators are much higher in enterprises that have introduced the ISO 9001 standard:

a. the need for processing is 3% in enterprises where ISO 9001 was introduced, while in those that were not introduced, this figure was 11%. This means an equal difference of 3.5.According to the data presented in the table, it can be seen from the results of the analysis that the product quality indicators are much higher in enterprises that have introduced the ISO 9001 standard:

b. the need for processing is 3% in enterprises where ISO 9001 was introduced, while in those that were not introduced, this figure was 11%. This means an equal difference of 3.5.

c. the amount of missed orders also varies greatly: 1.2% in enterprises with an ISO system, 6.4% in others.

d. customer approval is 92%, which is 21% higher than that of enterprises that did not introduce ISO 9001.

e. production stability has also reached 87%, which clearly shows the current benefit of quality management.

From these results, it can be concluded that enterprises with the introduction of a quality management system not only improve the quality of products, but also ensure confidence and long-term cooperation in relations with customers.

According to the results of the analysis and the research carried out, the following conclusions were developed:

a. factors affecting quality are mainly related to internal processes and human resources. Therefore, in improving quality, it is necessary first of all to standardize internal processes and improve the skills of employees.

b. The effective introduction of ISO 9001 standard is an important factor in improving customer satisfaction, improving product quality, reducing the number of processing and returns.

c. Quality Management in enterprises should be considered not only as control, but as an integral element in the management of entire business processes.

Conclusion

Quality assurance in building materials manufacturing enterprises and keeping it stable at a high level is a complex, multi-stage and systematic approach-intensive process. Theoretical and practical analysis carried out in this article confirmed that factors affecting product quality often arise from internal problems such as the production process itself, i.e. the lack of clear standardization of processes, low staff qualifications, the priority of a control-based system rather than quality management.

It is required to see the problem of quality assurance not as a local problem, but as an issue of strategic importance for the overall competitiveness of the enterprise, the potential to enter the foreign market, corporate prestige and the economy of the country. International practices and scientific research show that in enterprises that have effectively implemented a quality management system, not only product quality indicators improve, but also the efficiency of Resource Use, Customer Relations, internal management system and motivation of the workforce are significantly improved.

Based on the analysis of the tables presented in the article, the following important conclusions can be drawn:

1. failure to properly standardize processes and random management decisions will create a quality abnormality. Therefore, for each work process, specific technological regulations, work cards and control criteria must be developed.

2. has a direct impact on the quality of the level of staff qualifications and quality culture.the analysis of the tables presented in the article, the following important conclusions can be drawn:

3. failure to properly standardize processes and random management decisions will create a quality abnormality. Therefore, for each work process, specific technological regulations, work cards and control criteria must be developed.

4. has a direct impact on the quality of the level of staff qualifications and quality culture. Companies should implement a continuous employee training system and a corporate philosophy focused on quality.

5. International standards such as ISO 9001 should be seen not only as an external certificate, but as a reform that is fully integrated into practice. When introducing the standard, the principle “to work, not to show” is required to be taken as a basis.

6. regular study of customer opinion, the formation and active use of a feedback system make it possible to improve quality not from the inside, but from market demands.

7. quality improvement is not just a technical process, it covers many areas such as strategic management, resource allocation, work with manpower and corporate approach.

Based on this, the following strategic recommendations are provided to construction materials manufacturers:

1.To transform quality management into an integral management system of the enterprise, to implement it not as a separate department, but as an integral part of each process.

2.Acceptance of quality as a strategic asset in conditions of rapid competition, that is, seeing quality as an investment, not just a cost, and allocating financial and organizational resources accordingly.

3.Implement a KPI (key performance indicators) system for quality indicators, and specific quality results are set for each department and each employee.

4.Raise quality control to a higher level through digitization and automation, for example, the introduction of touch control equipment, data analysis applications, real-time monitoring tools.

5.Adapting international experience to local practice, that is, to adapt to local working conditions and resources, choosing the most effective elements of global standards and methods.

As a general conclusion, it can be said that quality is not just a "good product", but a factor that determines the internal stability of the enterprise, its image in the foreign market, customer confidence and the level of competitiveness of the country's economy. Therefore, the introduction of a quality management system and its continuous improvement should remain the most important strategic task of each enterprise in the field of building materials.

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