Monitoring the effectiveness of the quality management system in production enterprises

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Abstract. In this article, the scientific concept, phrases and obtained scientific research results related to the formation, implementation and management of the quality management system in production enterprises are analyzed and recommendations for the evaluation of the effectiveness are developed. The quality management system is a system that summarizes many years of experience of production enterprises and adopts all the positive world practices forcing enterprises to form certain quality practices and integrates all quality concepts into its philosophy.

1 Introduction

In the context of intensifying global competition, the imminent prospects of the Republic of Uzbekistan's accession to the World Trade Organization, and the intensification of market relations, local manufacturing enterprises are paying special attention to ensuring the quality and safety of products, improving production and management processes, and organizing operational management processes on a scientific basis. Such a scientific basis increases the need to produce a new development strategy aimed at achieving success by constantly improving the quality of management activities of enterprises. In this regard, it is important to form and implement quality management systems that meet the requirements of international standards. Such a management system allows simultaneous analysis of production-technical, socio-economic and organizational-economic problems on a unified basis and modernization of the management processes of the organization on a scientific basis [17-25].

In order to effectively solve the problem of management modernization, the upper level of the enterprise's production system must have an effective tool for monitoring and evaluating the strategic capabilities of the current quality management system. The need to develop a comprehensive methodology based on the results of the analysis to assess the effectiveness of the enterprise's quality management system, to make and implement high-quality management decisions determines the relevance of the research [26-35].

In our republic, as a result of economic reforms, the competition has become more complicated, as well as due to the sharp acceleration of the processes of changes in the environment, production enterprises have to create effective management systems by forming the ability to adapt to the external environment, which not only takes into account

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the unique characteristics of the enterprise, but also attaches great importance to the interaction with the external environment [1-8].

The key to increasing the efficiency of the enterprise is to change the management paradigm and constantly improve the management system. Among countless tools for increasing the efficiency of activity, it is possible to single out a number of the most promising directions used in production enterprises. These are strategic management, budgeting, control, innovation management and process-oriented management [9-16].

World practice proves that the introduction of a quality management system in accordance with the requirements of international standards ISO 9001:2015 in enterprises is a powerful tool for increasing the efficiency and competitiveness of activities. Therefore, in the production of high-quality, safe and competitive products in our country, a number of important measures are being implemented to reduce the dangerous factors that affect product quality, and to increase the effectiveness and efficiency of activity results [1-5].

2 Materials and Methods

Analytical methods, process approach, multidimensional data analysis, statistical methods of process management, information models of quality management were used in the research process.

3 Results and Discussion

The current edition of the ISO 9000 family of standards reflects fundamental changes in approaches to management and facilitates the implementation and operation of quality management systems for organizations regardless of the type of activity, scope, legal form. The ISO 9000 series of international standards includes the following interrelated standards:

1. ISO 9000:2015 standards describe the basic rules of quality management systems and define the terminology for quality management systems aimed primarily at the successful management of the enterprise and its operation.

2. ISO 9001:2015 defines the requirements for quality management systems for the organization to demonstrate its ability to provide products that meet customer and regulatory requirements, and to improve customer satisfaction. The requirements of this standard are related to certification and cover most aspects of company management.

3. ISO 9004:2015 includes guidelines that address the effectiveness and efficiency of the quality management system. The purpose of the standard is to improve the performance of the organization, to satisfy consumers and other interested parties.

Thus, the ISO 9000 family of standards is the basis of a management system that provides a minimum level of quality for the entire management system (as well as products and services within this system) that must meet the requirements of all interested parties. The formation of a set of agreed standards for quality management systems, which help to develop, implement and maintain a quality management system, and also recognize the need for continuous improvement of the enterprise, taking into account the needs of all interested parties.

Evaluation of the effectiveness and efficiency of the quality management system is one of its main parts. ISO 9001:2015 clearly defines the need to evaluate the effectiveness of quality management systems and defines the requirements for it: "The organization must define, plan and implement measurement, monitoring, review and improvement processes to ensure confidence in the quality management system, processes, products and / or services. meets the specified requirements. The effectiveness of practical measures should

be periodically evaluated. The organization shall define and establish processes for measuring the progress of the quality management system. At the same time, the issue of performance evaluation and its implementation technology remains open.

The above considerations allow us to conclude that the expansion of the conceptual apparatus of efficiency has made it possible to reflect the interdependence of various aspects of enterprise activity: results and costs, results and goals, results and needs, results and values. As a multidimensional concept, efficiency is determined by different criteria, which requires special methods of matching these criteria together and methods of compromise.

The problem of determining the effectiveness of quality management systems has been relevant since their implementation and has become especially relevant with the wide application of ISO 9000 standards in the management practice of industrial enterprises.

The selected criteria and sub-criteria cover all elements of the quality management system and comprehensively reflect the innovative nature of its activity and development. Monitoring their changes allows to analyze the effectiveness of the quality management system in a short time, to determine the causes of the problems, to quickly take measures to eliminate them, and to determine the directions for improving the system itself and the entire operation of the enterprise.

The source of information for monitoring changes in indicators is the internal report of the enterprise, and the most effective way to collect information is a systematic review of all aspects of activity.

Let's take a closer look at some of the groups of indicators formed within the criterion "Balance of stakeholders' requirements" and its sub-criteria.

The analysis of the effectiveness of the quality management system according to the sub-criterion "satisfaction of owners and shareholders" includes a comprehensive assessment of the activity within the system under consideration in accordance with the existing strategy of the enterprise.

This group includes quantitative financial and non-economic indicators that are necessary to understand the features of operation and forecasting of the improvement of the system and the company's activity as a whole. These indicators are presented in Table 1.

Table 1. Indicators on the sub-criterion "Satisfaction of owners and shareholders".

№	Indicator	Signs	Formula for calculation
1	Profitability of sales by main product types	R_{sale}	$R_{sale} = \frac{SF_{sale}}{D}$
2	Net return on assets	R_{pure}^{act}	$R_{pure}^{act} = \frac{SF_{pure}}{AKT}$
3	The share of quality costs in the cost of production	$\mathrm{X}_{quality}^{\mathrm{TH}}$	$\mathrm{X}_{quality}^{\mathrm{TH}} = \frac{\mathrm{X}_{quality}}{\mathrm{TH}}$
4	The share of compliance costs in total quality costs	$\mathrm{X}_{suitable}^{quality}$	$\mathrm{X}_{suitable}^{quality} = \frac{\mathrm{X}_{suitable}}{\mathrm{X}_{quality}}$
5	Return of capital on products sold	K_0	$\mathrm{K}_0 = \frac{D}{\mathrm{AB}_{ur}}$
6	Turnover ratio of current assets of the enterprise	K_{ay}^{JA}	$\mathrm{K}_{ay}^{Ja} = \frac{D}{JA_{ur}}$
7	Labor productivity	MU	$\mathrm{МУ} = \frac{Д}{\mathrm{X}_{number}^{ur}}$

8	The level of utilization of production capacity for the production of the main types of products	$К_{power.profit}$	$К_{chase.profit} = \frac{М_{b.ch.}}{Q}$
9	Percentage of product delivery from first presentation	$К_{odd}$	$К_{taq} = \frac{М_{one\ odd}}{М_{i.ch.}}$
10	The ratio of overdue payables to sales volume	$К_{QQ}^{Mu}$	$К_{KQ}^{mu} = \frac{KQ_{mo\prime}}{Д}$

The analysis of the effectiveness of the quality management system according to the sub-criterion "Employee satisfaction" includes a comprehensive assessment of working with employees to a certain degree of satisfaction and involvement in the enterprise's activities. A list of quantitative and qualitative indicators is presented in Table 2.

Table 2. Indicators on the sub-criterion "Employee satisfaction".

№	Indicator	Signs	Formula for calculation
1	Employee satisfaction	$Q_{employee}$	*Questionnaire questionnaire*
2	Lack of personnel in the enterprise	$Х_q$	$Х_q = \frac{Х_{empty}}{Х_{common}}$
3	Excessive loss of working time	$D_{no}^{\%}$	$D_{no}^{\%} = \frac{D_{no}}{D_{plan}}$
4	Costs of personnel training and professional development in the total sales volume	$Х_{bullet}^{D}$	$Х_{bullet}^{D} = \frac{Х_{bullet}}{D}$
5	The amount of social benefits paid per employee	$Х_{ijt}^{employee}$	$Х_{ijt}^{employee} = \frac{Х_{ijt}}{Х_{\text{number}}^{\text{seat}}}$
6	The percentage of defects caused by the fault of employees	$Н_{ich.nuq}^{rod}$	$Н_{ich.nuq}^{rod} = \frac{Х_{ich.nuq}^{employee}}{Х_{ich.nuq}}$
7	Average salary for an employee of the enterprise	$IH_{medium}^{employee}$	$IH_{medium}^{employee} = \frac{IFH}{Х_{\text{the number}}^{\text{seat}}}$
8	The ratio of trained managers and specialists to the total number of employees	$Х_{\text{rax.mut}}^{Teaching}$	$Х_{\text{rax.mut}}^{Teaching} = \frac{Х_{\text{rax.mut}}^{Teaching}}{Х_{\text{rax.mut}}^{Teaching}}$

9	Costs of measures to improve labor protection and safety for each employee	$X_{mex.mux}^{employee}$	$X_{mex.mux}^{employee} = \frac{X_{mex.mux}}{X_{the\ number}^{seat.}}$
10	Production for one worker	$I/CH_{employee}$	$I/CH_{employee} = \frac{M_{i.ch}}{X_{the\ number}^{seat.}}$

Note: The survey of the company's employees was carried out with the help of a specially designed questionnaire that reflects the main factors of employee satisfaction, taking into account the characteristics of each company.

Since the enterprise's activity is multi-functional and the goal expected by many interested parties, the effectiveness of the quality management system should be evaluated in a multi-criteria manner using strategic indicators.

Based on a hierarchical system of criteria, subcriteria and indicators, monitoring, analysis and evaluation of the effectiveness of the quality management system covers the main processes that ensure the improvement and modernization of the management of production enterprises.

4 Conclusion

The scientific and practical importance of studying the effectiveness of the quality management system in manufacturing enterprises is that the implemented quality management systems should be considered not only as a subsystem of quality management, but as a whole system, in the environment of market relations aimed at meeting the requirements of consumers and other interested parties. enables to provide and sustain competitive advantages.

Currently, in many enterprises that have implemented a quality management system, top management does not have the opportunity to study its features in detail and fully use its unique potential. Practical solutions and recommendations for monitoring the effectiveness of the quality management system and analyzing real data obtained as a result of evaluating its capabilities serve as a basis for choosing a strategic direction for the modernization of management and the development of the enterprise's activities within the framework of quality.

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