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ANALYSIS OF COST MANAGEMENT MODELS TO ENSURE PRODUCT QUALITY

Kholboyeva Shokhsanam Abdumalik Kizi
Doctoral Student of Namangan Institute of Engineering and Technology, Namangan, Uzbekistan
E-mail: xolboyevas@bk.ru

Kasimov Akhtamhon Akramovych
Associate Professor of Namangan Institute of Engineering and Technology, Namangan, Uzbekistan
E-mail: axtamqosimov@gmail.com

Abstract
This article is about the analysis of cost management models to ensure product quality, the principle of reflecting the quality of the product as a product shows the relativity of division into product objects as the results of processes and processes as the ways to achieve these results.

Keywords: costs, technological processes, organizational factors, technical factors, economic factors, uncertainty, management models, cost, product quality.

Introduction

The principle of reflecting the quality of the process as a product shows the relativity of division into product objects as processes and as results of processes as ways to achieve these results. Processes do not exist outside of products, and products do not appear outside of processes. The quality level of each type of product is created by the technological process. The quality of the technological process requires certain costs to ensure the quality of the product. It is necessary to study the relationship of costs of ensuring product quality, taking into account the uncertainty of organizational, technical and economic factors. If we consider cost management models for quality assurance:

- abstract research models are proposed for cost regulation and optimization to ensure product quality. Thus, IG Leonov and OV Aristov suggested in their work [1]:
- a model reflecting the dependence of quality assurance costs and the resulting beneficial effect on the level of quality of the finished product (Fig. 1);
- cost optimization model (Fig. 2).

Methodology for Integrated Management System Implementation

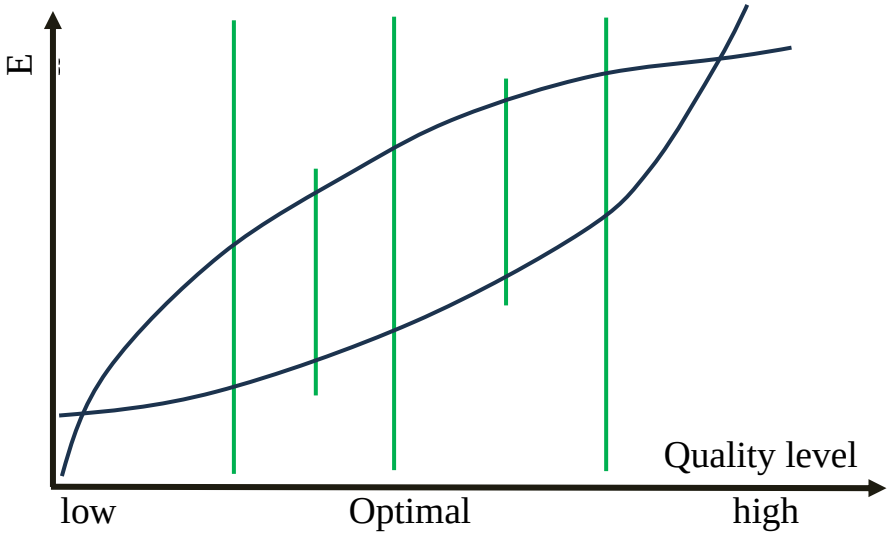
According to them, the optimal quality level is a high or low level at which it is not economically feasible to produce a product. Therefore, in some cases, the quality should be increased, and in others, it should be left unchanged, and thirdly, to reduce production costs, it can be reduced in general or on individual indicators. The model of the relationship between

the costs of quality assurance and the benefit effect on the level of product quality shows the change in cost and the benefit effect from a change in the level of product quality.

With a very low level of quality, you still need to incur certain costs for materials, labor, etc. in production increase sharply. As the quality requirements increase, eventually a limit is reached when neither the equipment nor the workers can maintain the quality, and no matter what we do, it is impossible (unattainable) to reach this level. The costs go up to infinity. If a very low level of quality is indicated, then the value of the product law is close to zero, i.e. The consumer does not need such products. As the quality improves, the impact at work increases. However, at a certain point the effect of product quality reaches a point where further improvement of product quality becomes economically inadvisable.

In Figure 1. The optimal quality level corresponds to level 2. A change from quality level 2 to level 1 causes a corresponding decrease in quality assurance costs by an amount a, but it also causes a decrease in the impact of the operation by an amount b, which is greater than a. A change in quality from level 2 to level 3 causes the cost of quality to increase by an amount c, which is significantly higher than the corresponding value.

Going too high quality leads to excessive cost overruns. Analysis of this model leads to the conclusion that the optimal level of costs for quality assurance is unique. It can be determined (calculated) in relation to a certain type of product, type of activity or technological process that provides them.



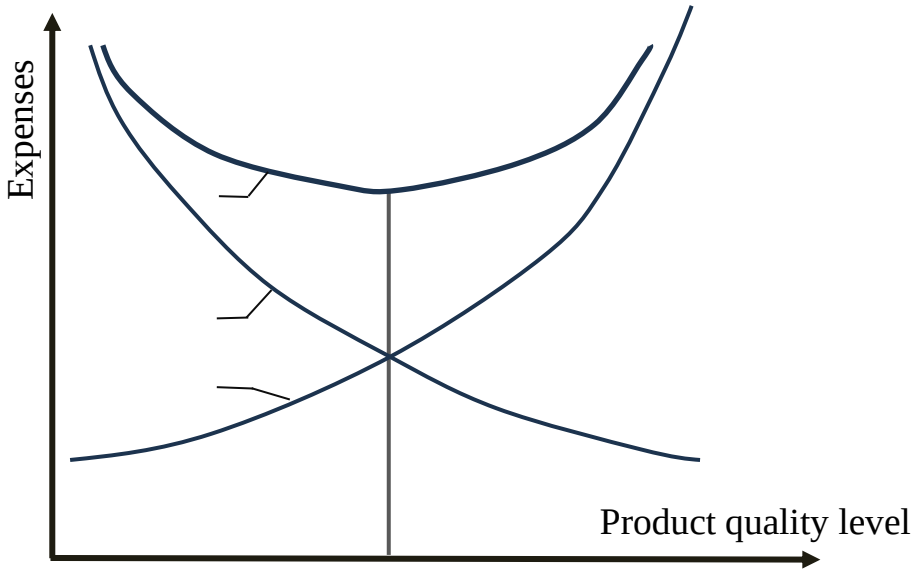
a - product quality assurance costs; b – influence during operation.

Figure 1. Dependence of costs for quality assurance and a beneficial effect on the level of product quality

In the graphical model of optimal costs for quality, costs consist of product production and operating costs (Figure 2). The higher the product quality, the lower the operating costs. The optimal level of quality is the level at which total costs are lowest.

Product quality is visible during consumption. In this case, it is possible that the quality level

of the manufactured products is lower than what is actually required.



1- product production costs;
2- expenses during operation;
3 - general expenses.
Figure 2. An optimal cost model for quality.

In pursuit of cost savings and cost reduction, product manufacturers reduce quality. In this case, losses in consumption increase, because the user is deprived of the opportunity to get the maximum benefit from using the product. (Figure 2 analysis) shows that there are different potential sources of quality costs.

Estimated research models are shown in Figure 1 and served as a prerequisite for determining the characteristics of the classification of quality assurance costs in Figure 2: "evaluation, warning, failures". (RAG model) Works [2, 3, 4] present the results of the study of the dependence of quality assurance costs on the degree of defectiveness of the product W, which makes it possible to clarify. Types (classes) of costs.

In this model, it is generally accepted that absolute, 100% compliance of the product with technical conditions is practically impossible due to infinitely high costs. The money spent by the producer and the consumer per unit of product corresponding to a certain quality is plotted on the ordinate axis. On the x-axis, the probability of non-defective products is P = (N - D) / N, where N is the volume of production (number of finished product units), D is the number of defective product units. If there are no defective products in the finished product, D = 0, and therefore P = 1, which corresponds to 100% quality of the finished product (100% quality). However, all finished products are defective, i.e. D = N, then P = 0 (100% defects).

1) defective cost curve. These costs are zero if all products (100%) are of high quality, and grow to infinity if all products (100%) are defective. But even if the finished product is 100% defective, these are products that the consumer does not use, the manufacturer spends money on its production (the cost of used materials and electricity, depreciation of equipment, wages

of workers, etc.). The manufacturer cannot cover these costs. They constitute the cost of producing low-quality products (3, 4).

2) cost curve for assessment and prevention. These costs are zero when all products are defective and increase when perfection is achieved. An important part of them is assessment, and a small part is warning.

3) total cost curve. These costs are obtained by adding up previous costs.

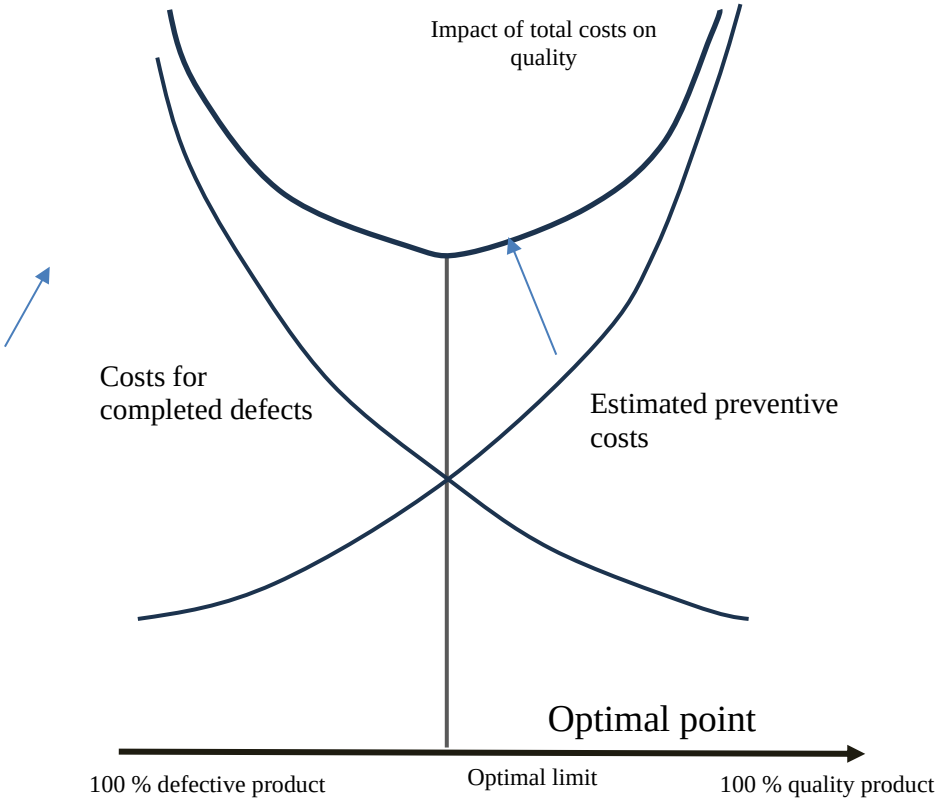


Figure 1.3. Types of costs to ensure product quality.

Discussions and analysis

The optimal point is the level of defects at which the total cost of quality assurance is minimal. As the performance of the enterprise improves, the optimal point will continue to shift continuously to the right and at the same time will shift downward. Increasing the level of conformity leads to lower total quality costs. The minimum total cost of quality is achieved at the point where the costs of prevention and evaluation are equal to the costs of defects.

With the development of market relations, objective conditions appeared, which forced us to reconsider this point of view regarding the price of quality. Over the last 20 years, the development of technology has led to the creation of production facilities that ensure minimal changes in product parameters by introducing new methods of integrated product design, production preparation and quality control. As a result, it was possible to produce a defect-free product. In this case, the manufacturer's costs for inspection and preventive measures become a daily value with absolute, 100% compliance of the product with the technical

conditions [2].

Furthermore, an improvement in quality (an increase in P) as a result of increased technological progress usually means an increase in sales and therefore a higher profit for the producer, which in effect shifts the total cost of quality curve to the right and the cost of quality to the right. At a quality level of 100%, the threshold will be minimal.

The analysis of the optimal cost model for quality assurance made it possible to understand a number of its rules, which are useful for the development of quality management subsystems of technological processes of textile enterprises.

First, these models are conceptual and show the importance of determining the optimal value that matches costs and product quality;

Second, to ensure product quality, a classification of costs is needed, which should be based on the nature of costs and their potential sources, as well as the main directions of cost change trends depending on the quality of the process;

Thirdly, in order to manage the costs of quality assurance, it is necessary to be able to analyze them by individual activities, product types, potential sources of quality costs, and the enterprise as a whole. 1 (the purpose of the analysis of costs for individual types of activities is as follows: to draw the attention of the company's management to the need for a systematic approach to work in the field of quality; to prove to the top management that it is even "prosperous", the company (with a process-oriented and certified quality system) recognizes the quality It is the financial benefit of efforts aimed at ensuring the level of quality assurance for individual products The purpose of analyzing sources is to choose the direction of priority measures in the important areas of production ``shows

Fourthly, to carry out the analysis, documented information support is required, that is, the organization of accounting for quality costs through the documentation system included in the practice of process groups.

1.2. Development of product quality management systems

The BIP system represents a set of interrelated technical, organizational, economic, educational activities that create favorable conditions for defect-free production of products in accordance with the requirements of scientific and technical documents. It is based on the following principles:

- full responsibility of the direct contractor for product quality;
- strict adherence to technological discipline;
- full control of product quality and compliance with applicable documents before submission to the control service;
- focusing technical control not only on registration of marriages, but mainly on measures to eliminate the occurrence of various defects.

It should be noted that before the introduction of BIP, there was a control system in which workers, foremen and enterprise managers were responsible for the execution of the production program and were practically not responsible for product quality. Responsibility for product quality was assigned to the quality control department. This led to the following adverse events:

- workers of the production apparatus transferred parts, units, products with defects and defects to another workshop;

- Employees of OGC enterprises spent time to identify and eliminate deficiencies;
- the quality control department was often unnecessarily expanded at the expense of low-skilled workers.

Consider the following example: the NORM system, which allows you to identify and study not only internal defects, but also costs due to external failures. The quality control department has established complaint investigation bureaus and a network of factory support operation points in areas with the highest concentration of machines. Their main job is to analyze consumer complaints, give instructions and help in the operation and repair of engines.

In Gorky's KANARSPI system, the object of management was the technical preparation of new product production.

The experience of Saratov, Moscow, Leningrad, Sverdlovsk, Gorky, Yaroslavl, Kremenchug industrial enterprises is gathered in the integrated product quality management system (KS UKP). A number of studies were devoted to summarizing the experience of developing product quality management systems, the results of which were published in works [3]. It should be noted that Moldovans - the creators of KS UKP - actively used standardization for the effective operation of product quality management systems.

KS UKP is based on enterprise standards, which are developed in full compliance with state and industry standards. Enterprise standards determined the content and procedure for implementing organizational, technical and economic measures aimed at improving product quality. Methodologically, KS UKP defined the most important principle: All work performed by the enterprise is considered as a set of interrelated processes. Thus, total quality management (administrative management) is implemented by managing the entire set of processes carried out in the organization. It is this approach that is fully developed in the ISO series of international standards.

Conclusion:

In short, real quality systems do not correspond to their abstract, ideal prototypes and models to a greater or lesser extent. A very common situation occurs when an enterprise presenting a quality system for certification distorts and deforms the actual system in accordance with the model presented and described in the regulatory documents, contrary to production needs. The identification of product quality problems should be based on the manufacturer's cost analysis, as well as corrected by marketing research on customer losses due to product quality, which will identify some important high-cost areas.

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