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PLANNING AND FORECASTING OF QUALITY MANAGEMENT

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ABSTRACT
Quality management should be carried out on the basis of a set of scientifically based principles. All of them can be divided into general, system-wide and special. Among all the system-wide principles of quality management it is necessary to pay attention to the implementation of general management functions. The structure of general management functions includes in the following functions: planning and forecasting, organization, motivation, control. The planning of product quality is the establishment of reasonable tasks for its production with the required values of quality indicators at a given moment or within a specified time interval. The planning for quality improvement should be based on scientifically based forecasting of needs of the internal and external market. The subjects of product quality planning are ultimately various measures and indicators that reflect both the individual properties of the products and the various characteristics of the system and quality management processes. The product quality management receives a lot of attention in all countries. In recent years, a new approach, a new strategy has emerged in quality management, which is implemented through strategic and long-term planning. Recently, one of the important areas of improving the quality of products in an enterprise has been the planning of the preparation of manufactured products (works, services), quality systems and production for certification. Quality forecasting is the process of determining the possible values of quality indicators in the future period of time based on the analysis of quality data obtained in the previous time interval. The main methods of forecasting quality are research and normative. The implementation of research and normative forecasting is carried out by the following main methods: extrapolation; multivariate prediction; expert; mixed. For solving of complicated problems of quality management, should be used complex prediction methods.

Keywords: general functions, quality planning, quality prediction, quality management, quality systems, motivation, organization

1. INTRODUCTION
Quality management should be carried out on the basis of scientifically based principles which can be divided into general, system-wide and special. Taking into account of the system-wide principles of quality management, it should be noted that the main principle is that the quality management system should only be an integral part of the system management of the entire enterprise. The quality management system cannot function separately, without interconnection with all other management systems. Therefore, in quality management, the objective general management principles can be used. Among all system-wide principles of quality management it is necessary to pay attention to the implementation of general management functions. The general functions of management include the following functions: planning and forecasting, organization, motivation, control.

2. CHAPTER 1
Under the planning of the product quality is the establishment of reasonable tasks for its production with the required values of quality indicators at the given moment or within a specified time interval. The quality improvement planning should be based on scientifically
based forecasting of the needs of the internal and external market [1]. At the same time, the usage of data on the operation of products and the analysis of information on the actual level of its quality acquire a large role in substantiating plans for improving quality. The effectiveness of quality improvement planning should be ensured by the fact that it is carried out at different levels of management and stages of the product life cycle, including design, production and operation. Quality improvement plans should be supported by the necessary material, financial and labor resources. The planned measures to improve the quality should be justified by calculations of the economic efficiency. The list of the main tasks of planning the improvement of product quality includes:

- ensuring output with the maximum compliance of its properties with existing and future market needs;
- achieving and exceeding the quality of the best domestic and foreign samples;
- establishment of economically optimal tasks to improve product quality;
- improving the structure of products;
- an increase in the production of certified products;
- improvement of individual consumer properties of already manufactured products;
- timely replacement, removal from production of obsolete products;
- ensuring strict compliance with the requirements of standards, technical conditions and other regulatory documents;
- timely implementation of newly developed and revision of outdated standards;
- development and implementation of specific measures that ensure the achievement of the given level of quality;
- an increase in the economic efficiency of production and the use of products of improved quality.

The subjects of product quality planning are ultimately various measures and indicators that reflect both individual product properties and various characteristics of the quality management system. These indicators are reflected in the specific tasks to improve product quality, in plans for standardization and metrological support, the introduction of the quality management systems [4]. Planning for improving product quality is based on the general principles of the planning and application of the planning methods. The general principles of planning include:

- a combination of centralized management with unit independence;
- balanced accounting of resources and opportunities of the enterprise;
- complexity;
- drill down - the degree of planning depth;
- accuracy - the degree of tolerances and deviations of the plan parameters;
- simplicity and clarity;
- continuity;
- the possibility of using reserves and accounting for alternatives;
- taking into account in the planning of the achievements of science and technology, the requirements of promising standards, market needs;
- profitability.

Planning methods include:

- analytical, based on the performed work and the dividing into the used resources, and the analysis of the conditions for their most effective interaction;
- experimental - design standards, regulations and models of enterprise management subsystems on the basis of conducting and studying experiments, as well as taking into account the experience of managers;
• statistical - development of the draft plans based on reports, statistics and other factual information characterizing the real state and changes in the characteristics of the control subsystems.

In the planned activities to ensure the required level of quality, specific types of work are also used:
• analysis of customer requirements;
• study of demand;
• complaint analysis;
• consideration of the requirements of prospective standards;
• study of patent information;
• consideration of the changes in product certification requirements;
• implementation of planned calculations;
• the relationship of planned activities.

The planning links the plans of the company's divisions with its overall strategy and operational objectives. The planning tasks are the formation of the system of plans and indicators for evaluating their implementation. In order to ensure the improvement in the quality of products in the plans, enterprises must require from their suppliers the corresponding improvement in the quality of the raw materials, materials and other components of the products supplied by them. The presentation of increased quality requirements for supplies should be accompanied by assistance to suppliers to improve the quality of their products [1,3]. The forms of such assistance and the cost of its assistance should be the subject of planning for improving the quality of the enterprise. Mostly, the basis of the plan for improving the quality of products in an enterprise is:
• tasks to achieve and exceed the quality level of the best domestic and foreign samples;
• tasks to increase the production of certified products;
• tasks to improve the individual indicators of the quality of products;
• tasks for the development and implementation of specific measures to achieve the given level of quality and etc.

As independent directions of planning for improving the quality of products in the enterprise usually distinguish:
• in-house product quality planning;
• planning the implementation of a quality management system in the enterprise;
• planning of staffing to improve the quality of products;
• planning to reduce the expense of the enterprise for spoilages;
• product quality planning in contracts.

In recent years, the standards of the ISO 9000 series have become widespread, reflecting the international experience of product quality management in an enterprise. In accordance with these documents, a quality policy is defined, including the improvement of product quality management and its provision. The quality policy should include:
• improving the economic situation of the enterprise;
• expansion or conquest of new markets;
• achieving a level of product quality that exceeds the level of leading enterprises and firms;
• focus on customer satisfaction;
• development of products, the possibilities realized on the basis of new principles;
• improvement of the most important indicators of product quality;
• reducing the level of defectiveness of manufactured products;
• extension of warranty periods for products;
• service development.

Product quality management in all countries receives a lot of attention. In recent years, a new quality management strategy has been formed, which is implemented through strategic and long-term planning. It is characterized by:
• quality assurance is understood as a systematic process that permeates the entire organizational structure of a firm;
• quality issues are relevant not only in the production cycle, but also in the process of development, design, marketing and after-sales service;
• quality should be focused on meeting the requirements of the consumer, not the manufacturer;
• improvement of product quality requires the use of new production technology, automation in the process of quality control;
• a comprehensive quality improvement is achieved only by the interested participation of all employees.

The above is feasible only with the action of a well-organized quality management system aimed at the interests of consumers, affecting all divisions. For the structural units of the enterprise, depending on their specifics, it is necessary to set specific targets for improving the quality of production and quality of work. These tasks should be clearly linked to the subsequent assessment and stimulation of production activities of structural units. For the assembly shops of enterprises it is advisable to plan: the main indicators of product quality; the level of delivery of products from the first presentation; reduction of expense for spoilages and complaints. For these workshops, it is also advisable to plan to reduce the number of returns of parts from consumers. For auxiliary workshops, it is advisable to plan both indicators and activities, the implementation of which should ensure the high quality of products in the main workshops. If the quality of products and the quality of the works cannot be expressed by a small number of indicators, then it is advisable to use quality factors. The level of quality factors depends on the implementation of a large number of measures to improve the quality of manufactured products. Based on their specificity, their own criteria for quality improvement and the corresponding standards for changes in indicators are established [3]. It should be noted that the quality of production and the quality of work can be the object of internal production planning. In shops, this is the share of products delivered from the first presentation, reduction of expense for spoilages and complaints and return of products from consumer shops. The required level of product quality can be jointly established by its manufacturer and the consumer in the contract. When planning the required level of product quality in contracts, it is necessary to take into account that its determination can be carried out in the following ways: by standards; on samples, catalogs and projects of the seller, which is an integral part of the contract. For complex technical products and products for which there are no standards, quality is determined by technical conditions. In this case, the technical conditions are usually given in the annex to the contract themselves. The quality of the food products is confirmed by the presence of an appropriate certificate, a veterinary certificate issued by the veterinary service, as well as a sanitary certificate issued for each consignment of goods. In determining the quality of the sample supplier provides the consumer with a sample of products. After confirmation by the consumer of this sample, it becomes a benchmark. In contractual relationships between suppliers and consumers, conflicts often arise, so the selected samples are stored not only from the parties to the contract, but also in a neutral firm set forth in the contract. Among the requirements for the quality of products, the production of which is organized simultaneously
in a few enterprises, the parties to the contract may indicate in the contract text the specific manufacturer of the product. A serious problem that arises when planning product quality in contracts is a clear definition of all the conditions for checking the quality of the goods. Checking the quality of goods always depends on its nature and purpose. If the product is a technically complex product, then it must be checked in the work. To do this, the consumer should be granted the right to make claims for a sufficiently long period of time. If the goods are food products, its quality acceptance usually consists of an external examination and examination. Such an acceptance is carried out on the basis of documents confirming the quality of the goods, the date and place of its production, the shelf life, etc. Product quality guarantees are usually highlighted in a separate article of the contract.

3. CHAPTER 2
When creating a new product, it is often necessary to forecast it first, and then develop the complex basic quality indicators to optimize the numerical value of the complex quality indicator which the quality level of the production is evaluated on its basis. Only after this, they proceed to the development of the design and technology of manufacturing a new product with a corresponding quality level. Quality forecasting is the process of determining the possible values of quality indicators in the future period of time based on the analysis of quality data obtained in the previous time interval. Predicting product quality is a probabilistic assessment of the movement and change over time of the combination of indicators characterizing quality [2]. The main methodological methods of forecasting quality are research and regulatory. Research forecasting is focused on existing and potential opportunities. It involves the analysis of existing trends in indicators of the quality of similar products over time. The purpose of the research forecast is to determine alternative values of quality indicators based on the achieved level of knowledge about the predicted quality of products. Regulatory forecasting is aimed at solving problems arising both now and in the future. It allows you to formulate goals and objectives that must be solved. In this case, particular tasks are considered in stages and in the direction from the future to the present. For regulatory forecasting, you must have a regulatory framework for quality indicators. These standard indicators are the quantitative requirements of the relevant standards. The use of standards, reflecting the achievements of scientific and technological progress, and the consideration of production capabilities allow us to predict the level of quality for the future. The implementation of research and regulatory forecasting is carried out by the following main methods [3]:

- extrapolations;
- multifactor prediction;
- expert;
- mixed.

Expert forecasting methods basically allow us to solve issues of the forward-looking assessment of product quality indicators with the evolutionary nature of the development of science and technology. The possibility of the appearance of a “jump” determines the use of mainly expert methods of forecasting. A promising factographic method, allowing to establish the limiting technical capabilities of this generation of products is the method of enveloping curves.

4. CONCLUSION
Recently, one of the important areas of improving the quality of products in the enterprise has been the planning of the preparation of manufactured products (works, services), quality systems and production for certification. In drawing up quality improvement plans for each structural subdivision, one should proceed from the level of quality indicators approved in the enterprise plan.
The widespread use has a quality prediction method based on the analysis of cycles of fluctuations of their level of quality and cycles of fluctuations in the demand for these products. This method allows you to determine not only the achievable values of a parameter within a given product generation, but also to calculate the time of appearance of a new product, as well as the period of the possible existence of this product generation. To solve complex problems of quality management, the complex forecasting methods should be used.

**LITERATURE:**
