Elaboration of conceptual framework of providing competitiveness of production with use of forecasting techniques

V.L. Semenov
Chuvash state University
Cheboksary, Russia
wlad21@mail.ru

V.N. Chaynikov
Chuvash state University
Cheboksary, Russia
chvn66r@mail.ru

A.N. Zakharova
Chuvash state University
Cheboksary, Russia

A.O. Patianova
Chuvash state University
Cheboksary, Russia
alisa.patyanova@yandex.ru

G.S. Dulina
Chuvash state University
Cheboksary, Russia

Abstract—Now quality is the most important tool and a prerequisite for ensuring competitiveness of products. It is an economic, social, technical, philosophical category, which suggests that in the assessment and formation of product quality it is necessary to consider all these elements. Prediction of improvement of quality as a factor of competitiveness of production should receive high priority for effective management of modern enterprise. Despite the fact that the products before entering into the market has a total initial potential of competitiveness, it must be always remembered about the possibility of a deeper and long-term competitiveness of these products. In connection with this, the problems of production of competitive products in the multifaceted activities of the enterprise have a strategic nature. The conceptual scheme of the competitiveness of products with using quality tools and forecasting techniques was suggested. This scheme takes into account features of development of regional economy, where the organization is positioned. The article will be useful for regional organizations that are focused on the elaboration of the basic strategy of development based on enhancement and competitiveness of products.

Keywords—competitiveness; quality; conceptual scheme; region; forecasting; organization; products

I. INTRODUCTION

Currently, when in the external and domestic markets increases the degree of competition between enterprises, the issues of ensuring competitiveness of products come to the fore. Indeed, a competitive product is one of the effective performance indicator of the company, as the attractiveness of consumers to these products; the degree of attraction of investments depends on its level. Any activity in this area begins with the formation of the goals and objectives of competitiveness. In the context of this question is determined: why is it necessary to assess the competitiveness, who needs an assessment of competitiveness, why it is necessary to evaluate it now and not later, etc.

The quantity and quality of the formation of goals and tasks depend on complex interrelated factors such as external environment, enterprise policy, which reflect the degree of effectiveness of the existing quality system, the policy of the region, materialized in a regional quality system and the principles and scientific approaches to management of competitiveness.

The notion of competitiveness as an economic category is studied by such foreign and domestic scientists as McConnell Campbell R., L. Brue Stanley, M. Porter, O.S. Bogdanova, R.B. Nozdrayova, A.I. Tsygichko, A.N. Litvienko, A.M. Tatyianenko, R.M. Tikhonov, G.G. Azgaldov, P.S. Zavialov, R. A. Fatkhutdinov [1-6 and etc.]. It indicates complexity, complexity of the concept of competitiveness and, therefore, the absence of a generally accepted universal concept.

The concept of forecasting as a tool of improvement of the competitiveness of products was studied by such foreign and domestic scientists as M.H. Meskon, M. Albert, F. Hedouri, N.M. Gromova, N.A. Gromov, V.G. Sazonov, I.V. Antonova, L.P. Kurakov, V.L. Kurakov, A.P. Kohno [7-12] etc. The difficulty of forecasting is that the notion of content in different ways is considered by a mathematician, an economist, a geologist, a meteorologist, a sociologist.
II. MATERIALS AND METHODS

Based on the analysis of foreign and domestic sources, on the concept of competitiveness of products, one can offer the conceptual scheme of providing competitiveness of production with the use of forecasting techniques in the mechanism of formation of factors of improvement of quality, represented in Fig. 1.

Quality is a priority measure of competitiveness. However, the formation mechanism of quality assurance must consider other elements to achieve a systemic effect. The unwise policy of the enterprise aimed only at increasing products quality provides the effect only in the short term, then the company will lose its position in the market, when the competitors due to the more advanced techniques ensuring a system to promote competitiveness, they will win new segments.

The policy of quality formation in the process of ensuring competitiveness is determined by concept, built on the dual approach which, on the one hand, determines the quality of the product as a subjective characteristic, reflecting the market demands on the basis of the analysis of product competitiveness, and on other hand as the objective characteristics that reflects the potential of production and regional policy in the field of quality, defining the technical level and parameters of products [7-8].

The purpose of the concept is a formation quality on the basis of coordination of the parameters of the demand generated by the market, outstripping the production of goods, their parameters meet the requirements of the market. The structure and logic of the mechanism of formation of product quality is determined with the use forecasting methods.

The use of forecasting methods are due to following main reasons:
- the need to develop a forecast of market demand in each particular form of use value in accordance with the results of marketing research;
- the need to identify the main economic, social and technological trends influencing the demand for various kinds of useful effect;
- the need to select indicators that significantly affect the value of the useful effect of the predicted products in the market;
- the need to predict quality indicators of new products in time taking into account the factors influencing them, of its price, costs in the exploitation, quality, parameters of the market;
- the need to forecast organizational and technical level of production at all stages of the product life cycle;
- the need to optimize the forecast of indicators of quality according to the criterion of maximum useful effect with a minimum total cost over the life cycle of the product;
- the need to substantiate the economic feasibility of developing new or improving the quality and efficiency of products, based on available resources and priorities.

Forecasting should be based on principles that reveal the basic rules of forming and justifying predictions. In the framework of the proposed scheme of the competitiveness of products, the use of such principles as consistency, scientific validity, purposefulness, adequacy, alternative, historicity, observability, continuity and profitability is offered.

The principle of consistency implies the consideration of the object in its relationship and dependency with other processes and phenomena, a quantitative and qualitative study of patterns, a logical chain of the research. According to which the formulations and justifications of any decision start from the definition of the overall objective of the system and of subordination to the achievement of this objective activities of all its subsystems. Furthermore, this system is considered as a part of a larger system, consisting of a certain number of subsystems. Thus, the principle requires considering the subject of prediction as a system of interrelated characteristics of the object and predicted background in accordance with the purposes and objectives of the study.

The principle of scientific justification is based on: the requirements of economic laws, the use of scientific tools, the study of achievements of domestic and foreign experience of formation of the projections, using techniques and models as a scientific system formation of forecasts of their validity, effectiveness and timelines. The implementation of this principle in practical research is ensured by appropriate quality forecast and assessment of the reliability and accuracy of the result.

The principle of purposefulness implies the deliberate nature of forecasting, i.e. the content of the forecast should not be reduced only to foresee, but to enable and objectives that you want to achieve.

The principle of adequacy of the forecast to the objective regularities characterizes not only the process of identifying trends in the development and assessment of sustainability trends and relationships, as well as the creation of the theoretical counterpart of the real economic processes. The implementation of this principle involves consideration of the probabilistic nature of economic and social processes, in connection with the presence of a diversity of disturbing factors. This means the need to assess the prevailing trends and current deviations, to identify possible areas of their differences, as well as an assessment of the probability of their realization in the future.

The principle of alternativeness involves the selection of development options in different trajectories, with different relationships and structural relationships. The transition from the imitation of existing processes and trends to predict their future development is based on the construction of alternatives. It means we need to define multiple possible, and often opposing, mutually exclusive paths of development. In modern conditions the diversity of the alternativeness begins from the possibility of quality implementation of various variants of development of the economy.

The historicity principle involves consideration of the predicted phenomena and processes in relationship to their historical forms. In other words, the forecasting process must be based on the fact that the state of the object is the natural result of his prior development, and the future is a natural result of its development in past and present.

The principle of observability involves the need to collect sufficient statistical information for further qualitative selecting the particular forecasting method. Practical experience of management shows that when making decisions on development operational and short-term forecasts, monitoring necessary and reliable statistics becomes relevant.
This principle is spelled out in the international standards ISO 9000 series in the form of a principle, as "decision-making based on facts".

The principle of continuity requires adjustments of the forecast as new information becomes available about the object of prediction or about the forecasting background. Correction of forecasts should have a discrete character, and the optimal timing of updates of the forecasts can only be revealed by the results of practical use (roughly two times in five years). It means the results of the predictions, clarifying requirements, changing trends of development of the object or forecast background should periodically be sent to the developer of the forecast.

The principle of profitability involves exceeding the economic effect from the use of the forecast over the cost of its development. The development of a prediction in modern conditions requires a significant investment in resources, which determines the need for economy and more effective use. On the other hand, most of the projections assume the development; the developer of the forecast.

The main tasks of the forecasting are:
• accumulation of scientific material for a reasonable choice of the forecasting decisions;
• assessment of the status of the object of forecasting;
• scientific analysis of the economic, social, scientific and technical processes and tendencies;
• study of the objective interrelations of socio-economic phenomena of the development of the national economy in a given place and time;
• identification of alternatives for economic and social development;
• selection and justification of the variant of the forecast.

In the practical solution task of forecasting of indicators of production quality it is necessary to choose forecasting method. The choice of method is a crucial decision, which on the one hand it must satisfy the functional completeness and accuracy of the forecast, and on the another hand to reduce the amount of time and funds for its development. The accuracy and reliability of forecasts is largely determined by how well the selected prediction method is. This choice is determined by: the objectives of forecasting; the nature of the object of forecasting; information array showing the evolution of the object; lead time; the accuracy of the developed forecasts at the required accuracy of their implementation for the specified lead time; the economic feasibility of using either method.

Under the methods of forecasting should be understood a set of techniques and ways of thinking, allowing on the basis of historical data analysis, exogenous (external) and endogenous (internal) relations of the object of forecasting, as well as their measurements within a given phenomenon or process to bring a judgment of certain confidence regarding for future development.

The scheme of competitiveness on the basis of the mechanism of formation of factors of improvement of quality consists of three parts: 1) the policy definition of competitiveness of industrial and regional levels reveals and predicts the policy of providing competitiveness of products on the industrial and regional levels with the simultaneous formation of goals and objectives for its maintenance.

2) analysis of competitiveness developed or upgraded products reveals the mechanism of estimation of competitiveness of production, determining the influence of factors of improvement of quality of products on its competitiveness; 3) formation of product quality determines the formation mechanism of the factors of improving product quality with the use of forecasting techniques, which allow to translate subjective parameters the needs of consumers in the target objective indicators of product quality.

The mechanism of formation of factors of improvement of products quality is a main concept of improving its competitiveness. Competitive product catalyzes a chain reaction, providing competitiveness of the enterprise. In total competitive enterprises form an effective regional economy with regional quality system, aimed at supporting the most effective emerging industries, shaping further the mechanisms of the development of other industries. The result of this chain reaction will be a systematic increase of competitiveness of the region.

The mechanism of formation of factors of improvement of quality of products is the translation of the subjective parameters of consumers' needs for objective measures of product quality using methods of system analysis, tools of quality management and forecasting techniques.

III. RESULTS

In a market economy where the consumer is constantly upgrading their product requirements, there is a need for targeted analysis of changes in market needs and competitors’ activities to meet these needs. Active competitors makes us constantly analyze the competitiveness of products manufactured by the enterprise on the basis of which we need to improve the mechanism of formation of factors of improvement of quality, because of in a free market and pure competition the improvement of the product quality is one of the methods of non-price competition.

Analysis of methods of action of the external environment on the formation of goals and objectives of ensuring the
competitiveness of the products shows that they are divided into the following three groups [15]:

- managed and unmanaged;
- predictable and unpredictable;
- negative and positive.

A great influence the formation of goals and objectives to ensure competitiveness and product quality provides a company policy that transforms the quality system of the enterprise. The need for such records arises, first, because of the need of laying the competitiveness of future products, based on a systematic approach. Second, the policy of the enterprise on the basis of the existing quality system determines its capabilities related to the use of resources (material, informational, financial etc.) that allows to choose a really ongoing goals and objectives and to predict the future competitiveness of the enterprise.

Scientific approaches and principles [16-17 etc] allow optimally to choose the main directions for improving of competitiveness of products (the carried out analysis shows the priority of quality), to improve the performance of calculations and to minimize follow-up costs. All these scientific approaches and principles influence the formation of the goals and objectives of competitiveness.

Therefore, the material considered above is a policy of providing competitiveness of products on the industrial and regional levels, forming the first unit scheme of the concept of competitiveness of products (Fig. 1). At this level, one deals with the formation of goals and objectives for ensuring competitiveness of products on the basis of a synthesis of regional and industrial policies aimed at improving product quality.

One of the conditions of effective management of competitiveness is its estimation [18-21 etc].

Nowadays, to succeed in business, one has to produce a wide range of products due to constant expansion of consumers’ requirements. That is why almost all enterprises from mass production is gradually moving to serial or even individual one. Wide assortment and nomenclature of goods determine the need to split them in groups of similar indicators, which allow identifying the main markets, and the main consumers. As practice shows, these markets can greatly differ from each other and have completely opposite settings. Accounting of only really necessary for the market parameters provides the opportunity to greatly reduce production costs and increase the attractiveness of the products.

One of the effective methods of formation of groups of products according to the established parameters of needs is cluster analysis. It is a mathematical procedure of multidimensional analysis allowed on the basis of a set of indicators characterizing the number of objects to group them into classes (clusters) so that objects in one class were more homogeneous, similar compared with objects belonging to other classes [22-24]. On the basis of the numerically expressed parameters of the objects are calculated by the distances between them, which can be expressed in the Euclidean metric (the most used), and other metrics.

There are various quantitative and qualitative parameters in the structure of the elements of competitiveness of products, so their rating is a daunting task that determines the participation of the expert group in this area. The expert, being an expert in a particular field, can efficiently and with high probability to correctly determine the identity of the goods to one or another group, class, ensuring that the goods comply with the requirements of consumers. In addition, the structural complexity of the products associated with the surge of science and technology, requires the use of methods of expert evaluation, especially in cases when the parameters of product quality and its competitiveness cannot be assessed with the help of certain formulas, mathematical calculations.

The tasks of the expert group in this case include: the determination of weighting factors of competitiveness and individual elementary particles taking into account their influence on each other; the identify the limits of competitiveness; the determination of level of competitiveness of products.

Definition of acceptable zones of competitiveness (the definition of the lower and upper levels of competitiveness of products) with the imposition of the real level of competitiveness for each group of products is an important point for assessing the competitiveness of products. There is formed of an n-dimensional space, where n defines the number of axes given by certain elements of the tuple. Each axis is determined by the parameter, which has limits of variation of the parameters of competitiveness for each product group. The definition of these zones is based on two main principles of competitiveness: the adequacy and optimality [13].

An expert group determines the zone of quality of factors by analyzing the existing market, by comparing between the leading analogues or by examining competitors, recognized in the society. The values on the basic elements of competitiveness are calculated depending on the nature of the unique indicators, which are determined by using specific mathematical formulas or by the setting of scores. To cast the obtained results into a single system we use corrective (or leading) coefficients that indicate the degree of importance of a single or a baseline with respect to each other.

Thus, there is formed the unit of estimation of competitiveness of products as detailed sequence of actions of the expert group. There are objectives of this level: firstly, the influence factors of competitiveness on quality and, secondly, estimation of level of competitiveness of products with the direct participation of the expert group.

The analysis of competitiveness of products is a result of conducted measures, on the basis of what defines the main directions of activity of the enterprise competitiveness, in particular the mechanism of formation of factors of improvement of quality of products, which represents the third block diagram of the concept of competitiveness of products.

IV. DISCUSSIONS

Different schemes, models and algorithms of providing of competitiveness of products [25-29] are reviewed in foreign and domestic literature that affect the certain aspects of theoretical and methodological approach to the study of the topic and determine the lack of unity of views. It can be explained by complexity, unstructured reporting direction because of the presence of a large number of controversial issues. Overall, it should be noted that many studies the competitiveness of products address some particular issues.
Despite their considerable number the problem at the regional level remains unresolved and requires further study.

According to M. Porter, competitiveness of products is achieved either through cost leadership or through differentiation of the product [25]. Low costs reflect the management efficiency of the organization, and differentiation – providing the buyer with unique and valuable indicators of the quality of the product.

V.V. Kurannaya, S.V. Livanova [26] consider the competitiveness of products in the context of the use of internal competitive advantages of the organization, which implies more efficient use of internal resources.

R.A. Fatkhutdinov [27] associates providing of competitiveness with the process of increasing the competitiveness of the country, industry, region, organization, which leads to the improvement of the quality of the integral and partial indicators of the product.

According to I.I. Mazur [28] the competitiveness of products integrates issues of image of the producer and of the product, so the mechanism for its implementation involves the processes of planning, organization and control according to the degree of attractiveness of the product to the requirements of the real customer.

T.G. Filosofova, V.A. Bykov [29] consider the process of ensuring competitiveness of products in the context of consumer reactions to different groups of factors impacting on the motives of consumers. So, price, quality, uniqueness, brand can be factors which ensure the competitiveness of products.

Scientists gave the variety of definitions which associate forecasting process with research, in which is given a reasonable forecast of the future state of the object prediction. In general, the prediction has two different planes of specificity: in fact predictive (descriptive, narrative) and conjugated with it category of management. It is predictive one (prescriptive, predominately).

V.G. Sazonov [9] considers the prediction as a "research process qualitative and quantitative nature, aimed at ascertaining trends in the development of the national economy or its republics, areas, regions, as well as the search for optimal ways to achieve the objectives of this development. The forecast system is the end result of the forecasting process". Thus, the author tries to give a more extensive definition of a prediction including all its sides.

I.V. Antohonova revealing the essence of the prediction determines that it is "a scientifically based prediction of the most probable state, trends and characteristics of the managed object in the prospective period based on the detection and correct evaluation of sustainable linkages and dependencies between past, present and future. A distinctive feature of predict is that it justifies the occurrence of such processes and forms of material and spiritual life of society, which are currently inaccessible to direct perception and verification in practice" [10].

L.P. Kurakov, V.I. Kurakov consider forecasting from the point of view of economy [11] and introduce the concept of "economic forecasting" which means "the development of evidence-based judgments about the prospects of economic development based on economic and socio-political patterns of development."

The known prognostic A.P. Kohno points out that "forecasting is a method in which is described possible future situations based on available empirical data. The method focuses on current assumptions about the dynamics of the development of object and process. The task of prediction is to give an objective, fair representation of what will happen in different conditions" [12].

M.H. Meskon, M. Albert, F. Hedouri give the following definition: "forecasting is a method, which uses past experience and current assumptions about the future with the goal of determining" [7].

A distinctive feature of the proposed conceptual scheme for competitiveness of products (Fig. 1) is its adaptation and integration into the quality management system of organization with the using the system-process approach which is based on the peculiarities of development of regional economy, regional policy, applying forecasting techniques. It involves the implementation of the law of synergy.

V. CONCLUSIONS

The role of quality in the organization is important. The organization's ability to meet the needs of the end customer depends on quality, which is achieved through the formation of intra-firm hierarchy of quality, which is clearly demonstrating the relationship of quality general performance of the organization. Companies producing and implementing effective methods of high quality products get an undeniable competitive edge and improve the overall results of its activities. The advantages of guarantees of observance of requirements of consumers the organization is huge: they lead to reduction of costs, increase of productivity and decrease of marriage, and grow competitiveness with a subsequent increase the share of the market. So, quality is a tangible competitive advantage.

Thus, the proposed conceptual scheme of providing competitiveness of products, as a three-tiered management system focuses the organization on strategic development with recorded in her goals and objectives, reasoned action and methods of implementation. This scheme is aimed at creating long-term competitive success. The main provisions, recommendations and conclusions can be used by regional economic entities, which have set the task of systematic development and production of market oriented products, where quality parameters will be ahead of current needs.

The mechanism of formation of factors of improvement of quality of products allows to translate customer requirements into quantitative characteristics of the product, taking into account certain factors of quality improvement with the use of forecasting techniques. It is an integral part of the concept of competitiveness of products.

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