Modern approaches to product competitiveness evaluation for companies of various industries

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Abstract. This study is aimed at forming modern approaches to product competitiveness evaluation for companies of various industries. Relevant task is to obtain a quantitative evaluation parameter for product competitiveness that enables to adequately compare competing products. The study was performed using the methods of systems and structural analysis, strategic modeling and general principles of economic studies. The paper includes review of the existing approaches to product competitiveness evaluation based on its qualitative and quantitative assessment. Key groups of parameters that effect competitiveness of the manufactured product were determined, and an approach based on Harrington desirability function was suggested for its evaluation.

Introduction

Evaluation of product competitiveness for companies of different industries is the key factor for their success on the market. The field of studies is related to industrial management and focuses on competitiveness evaluation for the manufactured product.

The authors note lack of a uniform method that enables to clearly evaluate product competitiveness. V. Faltsman suggests defining product effectiveness through indices that connect import and export parameters [1]. L. Rodionova and O. Kantor offer to introduce a balance criterion for competitiveness parameters [2]. Practically all authors agree on the necessity to obtain adequate quantitative assessments of product competitiveness based on which strategic marketing decisions could be made. The preferable variant of such assessments will be their representation in the form of an index using which general evaluation of competitiveness can be performed [3].

The purpose of this research is related to obtaining quantitative assessments of product competitiveness based on the product's qualitative parameters. Novelty of the research consists in the approach to obtaining a uniform quantitative parameter for competitiveness of product manufactured by companies from various industries.

Efficiency of production activity of a company is defined by multiple factors, one of the key parameters being competitiveness of the manufactured product. In the end of the day, competitive product affects competitive position the company occupies on the market. Traditional approaches to defining this position use the notions of market share or relative market share [4-5]. These parameters to some extent characterize state of a company and its

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competitive practices. An important role in defining a company's state is played by the level of novelty and quality of the competitive product. Distinguishing participants by the occupied market share enables to assign them certain roles. M. Porter's classification of industry market participants includes leaders, companies with about 40% of the market share, challengers having 30% of the market share, followers with 20% and nichers whose market share is about 10% [4].

The key factor of success for all cases is choice of the right marketing strategy and presence of competitive advantage related either to the company or to its product. It shall be noted that such advantage is ideally copyrighted and shouldn't be easy for competitors to copy.

Competitive advantage of a company's product can be represented in many ways, but mostly it consists in characteristics or attributes of the product not noticed by the competitors [5]. Competitiveness is the parameter that indicates presence of such peculiarities and allows forecasting the future success of marketing activities of a company related to the product.

Research methods

The study was performed using the methods of systems and structural analysis, strategic modeling and general principles of economic studies. The conducted research is exploratory and uses secondary information for forming a set of parameters for evaluation of product competitiveness for companies from various industries.

Usually, the notion of product competitiveness is related to consumer and defined as the level of attractiveness of a certain product for an actual consumer [6]. Therefore the customer's requirements to the product are the key ones.

Besides, competitiveness is often related to such notions as quality, cost and quality level [7]. Quality and technical level of the product are to some extent constants related to the product's peculiar characteristics and the the level of scientific and technical development of the studied market. The parameter of competitiveness is a much wider notion, it may significantly vary for the same product quality depending on the market state, competitors' activities, their marketing strategies, appearance of new products in the studied product group [8]. Nevertheless, quality and technical level of the product are inherent parts of competitiveness and shall be accounted in its evaluation; however, the overall product attractiveness is defined by the customer. The main groups of parameters accounted when evaluating competitiveness are given in Figure 1.

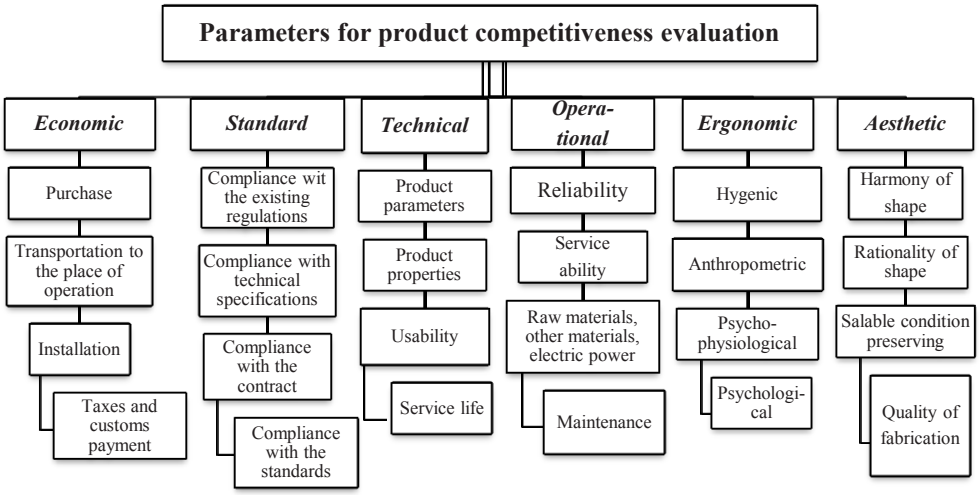

Fig.1. Parameters for product competitiveness evaluation.

Further actions are related to selection of meaningful parameters of the product in question, selection of the reference sample with ideal parameters and comparison of the studied sample with the reference one.

All methods applied for comparing the samples can be categorized by the parameter of qualitative or quantitative evaluation of competitiveness. The so-called mixed or combined evaluation methods are represented by assessments (obtained by means of surveying experts and customers) transformed into quantitative parameters using some mathematical tools. Quantitative assessment is usually performed by calculating single, group and integral indices [9].

Single index is defined by the formula (1)

$$g = \frac{P}{P_{100}} \times 100, \tag{1}$$

where g – single parameter index;
P – parameter level for the studied product;
P_{100} – parameter level for the reference product sample which 100% satisfies the need.

After finding single parameter indices a group parameter G can be calculated by the formula (2) which enables to integrate single indices for a uniform group of parameters – economic, standard, technical, operational, ergonomic and aesthetic (Fig.1). Single indices can be integrated using weight factor set during expert survey.

$$G = \sum a_i \times g_i, \tag{2}$$

where a_i – weight factor;
g_i – single index.

Integral index is usually calculated (formula (3)) in the format "selected group of parameters / economic parameters", which in fact provides the parameter evaluation in relation to its cost characteristics.

$$I = \frac{G_{techn}}{G_{econ}}, \tag{3}$$

where G_{techn} – group index for group of technical parameters;

G_{econ} – group index for group of economic parameters.

Then, the conclusion is made: if $I < 1$, then the studied product is inferior to the reference sample, in case of $I > 1$, the reference sample has higher competitiveness.

Significant drawback of such approach consists in the fact that only those parameters can be used for comparison, which have numerical value, i.e. physical parameters of a product.

Results

Optimized product competitiveness index is the most accurate one. This index shall account qualitative parameters of competitiveness, such as harmony of a product's shape, serviceability and other parameters relevant for the studied product.

Such optimized index can be obtained using generalized Harrington desirability function [10] which allows transforming several qualitative attributes into a single quantitative parameter. Application of Harrington desirability function for search of optimum conditions is proved in the study [11]. Harrington desirability function uses transformation of single responses expressed by natural values into a desirability scale, Table 1.

Table 1. Transition from quantitative to qualitative values.

Desirability	Scale marks
Very good	1.00 - 080
Good	0.80 - 0.63
Satisfactory	0.63 - 0.37
Bad	0.37 - 0.20
Very bad	0.20 - 0.00

The scale marks given in the Table 1 correspond to the curve presented in Figure 2 which is conditioned by the equation (4)

$$k = exp[-exp(-y)], \tag{4}$$

The y axis contains desirability values k which vary from 0 to 1. The k axis contains response values in the form of coded scale. The k axis contains response values in the form of coded scale. They are selected in the range from 3 to 6 and the number of intervals defines the curve steepness in the middle zone.

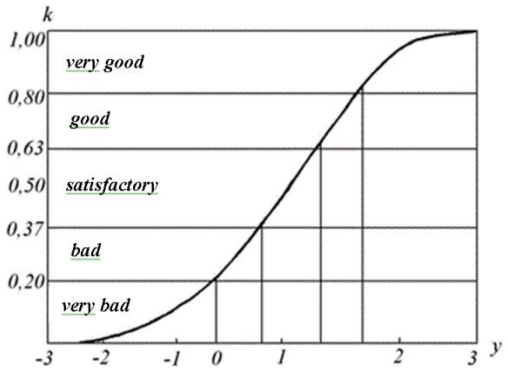

Fig. 2. Desirability function.

The 0.37 mark on the desirability scale is critical, as below this value the studied factor has unsatisfactory value. The desirability scale can be used as a quite simple and handy tool for obtaining quantitative expression of any parameters, including qualitative ones. It is enough to match responses with a coded scale. The possibility of applying such approach to assess communication strategy and competitiveness of a company was proved in the studies [12-13].

Then, either groups of competitiveness evaluation parameters or single indices out of these groups, i.e. single responses, are selected. The next step is connected with obtaining qualitative assessments of these parameters on the basis of experts survey. The assessment is given both to the product under study and to that produced by the closest competitor. Based on the qualitative assessment given in the form "very good", "good", "satisfactory", "bad" and "very bad" to each of the parameters, coded scales by the number of parameters are built (k axis).

The number of experts involved in the survey can be equal to the number of assessed parameters [14]. After transforming single responses into particular desirability functions the optimized competitiveness index K_{prod} will be obtained, formula (5):

$$K_{prod} = \sqrt[n]{\prod_{i=1}^{n} k_i}, \tag{5}$$

where k_i – individual desirabilities.

Conclusion

Due to the use of the described approach to product competitiveness evaluation the process of its defining can be unified. It enables to obtain a unified quantitative evaluation of competitiveness based on qualitative assessments of certain parameters. Considering that competitiveness is a multicomponent index influenced by marketing activities of companies, and new competitive advantages that appear, for example, when using unforeseeable marketing strategies, other groups of parameters for product competitiveness evaluation can be introduced for calculating an optimized product competitiveness index. Further research is related to formation of specifications for product competitiveness indices.

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