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THE ASSESSMENT METHOD OF PRODUCTS COMPETITIVENESS ON THE DEFENCE MARKET

The article considers an assessment method of products on the defense market. The method is designed for support procurement procedures for Armed Forces of Ukraine.

Keywords: *marketing, competitiveness, products on defence market.*

Introduction

Formulation of the problem in general. Today Armed Forces of Ukraine (AFU) are acting as an active player on the defense market. The competition

on this market allows to improve military and technical cooperation not only for defense-oriented products but also for dual-use products, supplies, military equipment, weapons and arms. One of the main essential issue for support procurement procedures in

AFU is a research of appropriate mathematical method for estimates a products competitiveness on the defense market.

The purpose of the article is to develop an assessment method of product competitiveness on the defense market based on classical methods of qualimetry.

Statement of Materials Research

There are three main approaches for assessment competitiveness of products [1 – 12].

The first approach considers competitive analysis based on SWOT-analysis which allows to determine the strengths (S), weaknesses (W), opportunities (O) and threats (T) of own products and competitor products.

The second approach considers a determination of competitiveness level on the basis of qualimetric methods followed by calculation competitiveness as a function of product quality parameters.

The third approach is based on determining competitiveness assessments by applying qualimetric methods. But this comparison is made with the values of parameters of the so-called "ideal product". The parameters and values of this product carried out according to the results of market research of potential customers needs.

There is a fundamental issue of relations between "competitiveness of product" and "quality of product".

The "quality of product" is a static category that depends on organizational and production conditions. For example, the main quality parameters for technical products are classified by the following groups of parameters: destination, reliability, economics, fuel and energy, technological, transportability, ergonomics, environmental, safety, aesthetic, standardization and harmonization [10].

On the other side the competitiveness is a dynamic category. It can vary widely and depends on the market state, changing consumer's needs and demands, behavior of producers, competitors and competing products, price fluctuations, impacts of marketing communication and especially advertising.

For example, the list of product competitiveness parameters at the time of procurement procedures for the needs of AFU includes price, warranty period, after-sales service, maintenance, quality facilities [11, 12].

So it is determined only by the marketing parameters of products, which have a clear interest to customers and satisfy their needs. And, other parameters of products are not essential. Thus, the products with higher quality can be less competitive than products with lower quality.

The third approach suggests that assessment of competitiveness of products is based on comparison its performance with product that the consumer wants to have. Such product is called "ideal product". A characteristic feature of this product is that its parameters and their values should be the fullest extent (preferably

100%) to meet the consumer needs at the "right" moment in a "right" place.

The procedure for assessment of product competitiveness consists the following stages: goal definition for assessing product competitiveness; selection and justification a quality parameters of product; selection and justification a parameters of product competitiveness; determination of competitiveness parameters values for "ideal product" based on the results of market researches; determination of coefficients of customer satisfaction for every kind of products; determination of coefficients of customer satisfaction for every kind of products as a whole; determination of coefficients of customer satisfaction for each product as a whole; calculation of coefficients of product competitiveness; recommendations development for purchase decision of certain products based on their competitiveness; recommendations development for improvement of products competitiveness; getting a decision to purchase a products based on their competitiveness.

The list of product competitiveness parameters should be define by marketing researches. It includes monitoring and analysis of different kinds of information resources such as advertising materials, professional and expert publications, a set of communications with a market players.

The main methods for marketing surveys are observation as registration of consumer responses to situation changes on the market, interviews with experts and other market participants, panel or regular data collection, experiments as a studies of the influence some parameters on the others. The questionnaires method as a survey is also widely used.

Let's describe a products on the market as a set

$$P = \{p_0, p_1, p_2, \dots, p_{n_p}\},$$

where n_p – the number of different kinds of products; p_0 – the "ideal product".

Product competitiveness parameter is a qualitative characteristic of its property, which is considered under certain conditions of its establishment, operation and usage.

Let's describe a product p_k competitiveness parameters as set $x(p_k)$:

$$x(p_k) = \{x_1(p_k), x_2(p_k), \dots, x_{n_x}(p_k)\},$$

where n_x – the number of competitiveness parameters for the product p_k ; $k \in [0, n_p]$.

Each competitiveness parameter can be considered as a positive or negative depending on its physical content.

A positive parameter $x_i^+(p_k)$ is a parameter x_i that describes a situation where increasing of its values cause an increasing of product p_k competitiveness.

A negative parameter $x_i^-(p_k)$ is a parameter x_i that describes a situation where increasing of its values cause a decreasing of product p_k competitiveness [10].

The set of importance weights $q(x(p_k))$ of product competitiveness parameters determines on the interviews with an experts in the certain domain

$$q(x(p_k)) = \{q(x_1(p_k)), q(x_2(p_k)), \dots, q(x_{n_x}(p_k))\},$$

where $q(x_i(p_k))$ – importance weight of parameter x_i for product p_k ; $i \in [1, n_x]$.

The sum of these weights is equal to one

$$\sum_{i=1}^{n_x} q(x_i(p_k)) = 1.$$

The importance coefficients are defined in points at the time of procurement procedures for the needs of AFU.

Let's assume that the positive parameter of "ideal product" has a maximum value among the studied kinds of products, and negative parameter has minimum value:

$$x_i^+(p_0) = \max(x_i^+(p_k));$$

$$x_i^-(p_0) = \min(x_i^-(p_k)),$$

where $k \in [0, n_p]$, $i \in [1, n_x]$.

The calculation of the normalized values of product competitiveness is based on the so-called "natural normalization". It allows to get a normalized values of various parameters on the basis of bringing them to a common dimensionless scale and a common interval between 0 and 1 [10]

$$\bar{x}_i(p_k) = \frac{x_i(p_k) - \min(x_i(p_k))}{\max(x_i(p_k)) - \min(x_i(p_k))},$$

where $x_i(p_k)$ – the value of parameter x_i ; $\min(x_i(p_k))$ – the minimal value of parameter x_i ; $\max(x_i(p_k))$ – the maximal value of parameter x_i for the product p_k .

The normalized values of positive and negative parameters of product competitiveness defined as follows

$$\begin{aligned} \bar{x}_i^+(p_k) &= \frac{x_i^+(p_k) - \min(x_i^+(p_k))}{\max(x_i^+(p_k)) - \min(x_i^+(p_k))} = \\ &= \frac{x_i^+(p_k) - \min(x_i^+(p_k))}{x_i^+(p_0) - \min(x_i^+(p_k))}, \end{aligned}$$

$$\begin{aligned} \bar{x}_i^-(p_k) &= 1 - \frac{x_i^-(p_k) - \min(x_i^-(p_k))}{\max(x_i^-(p_k)) - \min(x_i^-(p_k))} = \\ &= 1 - \frac{x_i^-(p_k) - x_i^-(p_0)}{\max(x_i^-(p_k)) - x_i^-(p_0)}. \end{aligned}$$

During the time of formalization of competitiveness parameters should be considered separately define normative product parameters and their limit values. It should be determined by international and national standards despite the customer needs and comply with a current regulatory and technical documents.

The violations of this can lead to a dangerous consequences. In general, if the product does not meet any standards requirements, it is uncompetitive regardless of the results of comparison for other parameters.

Note that new standards can be use long-term requirements for a new products that enable a competitive advantage to manufacturers with the opportunity to realize them practically in a future.

The calculation measures of customer satisfaction in terms of parameter \bar{x}_i is based on the calculation of relationships between normalized values of parameter \bar{x}_i of product p_k to normalized values of parameter \bar{x}_i of product p_m , taking into account expert's evaluations of importance weights of these parameters

$$\gamma(\bar{x}_i, p_k, p_m) = \frac{q(x_i(p_k))\bar{x}_i(p_k)}{q(x_i(p_m))\bar{x}_i(p_m)},$$

where $\gamma(\bar{x}_i, p_k, p_m)$ – the measure of customer satisfaction for the parameter \bar{x}_i ; $q(x_i(p_k))$, $q(x_i(p_m))$ – expert's evaluations of importance weights of parameter \bar{x}_i for the products p_k , p_m .

The calculation measures of customer satisfaction in terms of parameter \bar{x}_i to the "ideal product" ($p_m = p_0$) is as follows:

$$\gamma(\bar{x}_i, p_k, p_0) = \frac{q(x_i(p_k))\bar{x}_i(p_k)}{q(x_i(p_0))\bar{x}_i(p_0)} = \frac{q(x_i(p_k))}{q(x_i(p_0))}\bar{x}_i(p_k),$$

where $\bar{x}_i(p_0) = 1$, it means that normalized parameter \bar{x}_i of the "ideal product" is in a maximum to meets the customer needs (100%).

In general, the calculation of measure of customer satisfaction by the product p_k is equal a sum of satisfaction measures by all parameters for a given product

$$\gamma(p_k, p_m) = \sum_{i=1}^{n_x} \gamma(\bar{x}_i, p_k, p_m),$$

where $\gamma(p_k, p_m) \in [0, \infty)$ – a measure of customer satisfaction by product p_k in a general; $k, m \in [0, n_p]$.

In a case when coefficient $\gamma(p_k, p_m) > 1$ it's possible to suggest $\gamma(p_k, p_m) = 1$. This is a description of situation when measure of customer satisfaction can't be more than 100%.

The calculation of summary measure of customer satisfaction by products on given market is as follows:

$$\gamma_{\Sigma}(p_k, p_m) = \sum_{k=1}^{n_p} \gamma(p_k, p_m),$$

where $\gamma_{\Sigma}(p_k, p_m) \in [0, \infty)$.

The product p_k competitiveness coefficient defined as a ratio of measure of customer satisfaction by product p_k to a measure of customer satisfaction by product p_m regarding the product p_j as follows:

$$\kappa(p_k, p_m) = \frac{\gamma(p_k, p_j)}{\gamma(p_m, p_j)},$$

where $\kappa(p_k, p_m) \in [0..1]$ – the competitiveness coefficient of product p_k ; $k, m, j \in [0, n_p]$.

It describes how much the product p_k are more competitive than the product p_m relative to the product p_j .

The product competitiveness coefficient $\kappa(p_k, p_0)$ is a particular case that defined as the ratio of measure of customer satisfaction by product p_k in accordance to the measure of customer satisfaction by the "ideal product" p_0 .

It coincides with a coefficient of measure of customer satisfaction $\gamma(p_k, p_0)$

$$\kappa(p_k, p_0) = \frac{\gamma(p_k, p_0)}{\gamma(p_0, p_0)} = \gamma(p_k, p_0).$$

The total assessment of product p_k competitiveness relative to the product p_m is defined as a sum of all products competitiveness coefficients:

$$\kappa_{\Sigma}(p_k, p_m) = \sum_{k=1}^{n_p} \kappa(p_k, p_m),$$

where $k, m \in [0, n_p]$; $\kappa_{\Sigma}(p_k, p_m) \in [0, \infty)$.

The further researches of the coefficient $\kappa_{\Sigma}(p_k, p_m)$ allows to get a more detailed marketing results about customer's perceptions regarding advantages of given product p_k to the product p_m .

Conclusions

The article considers the assessment method of product competitiveness on the defence market, which is based on a comparison of values for given product parameters with a values of so-called "ideal product".

The method allows to determine the coefficients of customer satisfactions relative to the normalized values of product parameters, the summary measure of customer satisfaction by product in general; the summary measure of customer satisfaction by all products on a

given market and a their competitiveness coefficients.

The results of proposed method application could be used for development marketing recommendations and advices. It can essentially increase positive customer perceptions of product's advantages. The practical application of this method and its components allows to develop much more effective decision support system of procurement procedures for the needs of AFU.

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МЕТОД ОЦІНКИ КОНКУРЕНТОСПРОМОЖНОСТІ ПРОДУКЦІЇ ОБОРОННОГО ПРИЗНАЧЕННЯ

А.О. Феклістов

В статті розглядається метод оцінки конкурентоспроможності продукції оборонного призначення, який може бути використаний під час проведення тендерних процедур в інтересах Збройних Сил України.

Ключові слова: маркетинг, конкурентоспроможність, продукція оборонного призначення.

МЕТОД ОЦЕНКИ КОНКУРЕНТОСПОСОБНОСТИ ПРОДУКЦИИ ОБОРОННОГО НАЗНАЧЕНИЯ

А.А. Феклистов

В статье рассматривается метод оценки конкурентоспособности продукции оборонного назначения, который может быть использован при проведении тендерных процедур в интересах Вооруженных Сил Украины.

Ключевые слова: маркетинг, конкурентно способность, продукция оборонного назначения.