

FORESIGHT FORECASTING AND MANAGEMENT FOR THE COMPETITIVENESS OF AN ENTERPRISE

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In a highly competitive market, it is important to work as efficiently as possible to ensure a high level of profit and improve its position in the market relative to competitors.

The enterprise's competitiveness management system is practically implemented exclusively through its mechanism, which is a set of methods and means of creating a system of integrated management of the enterprise's development and the results of its activities, aimed at ensuring its competitive positions in the market in the long term [1, 2].

Competitive strategy is used in cases where the enterprise's industry is quite attractive, but the external environment of its operation is unstable, which affects its financial potential.

In such conditions, the enterprise must, using its existing competitive advantages, look for opportunities to expand sales and find financial resources and implement a mechanism that would allow assessing and coordinating the relationship between the parameters of production activities and the company's position in the market relative to its competitors and making a forecast of further development dynamics.

When building a mathematical model of an enterprise that would meet the objectives, it is necessary to take into account: the size of the market, taking into account the fluctuating nature of prices; the company's position in the market relative to competitors; the company's assets; the costs of storing products; the company's profit; possible investments.

We can determine the size of the market using a probabilistic interval model, taking into account the fluctuating nature of prices:

$$C = \sum_{j=1}^J W I_j q_j k_j,$$

where C – the market size in value terms; W – the interval for determining the average price on the market; $W = [\underline{w}; \overline{w}]$, $\underline{w}$, $\overline{w}$ – the lower and upper limits of the interval W respectively; I_j – the confidence interval; q_j – the average number of orders for the product in the j -th segment; k_j – the number of enterprises in the j -th segment that consume the product; J – the number of segments on the market.

The confidence interval I_j can be defined as follows:

$$I_j = \left[\frac{p_j^* + \frac{t_\beta^2}{2b_j} - t_\beta \sqrt{\frac{p_j^*(1-p_j^*)}{b_j} + \frac{t_\beta^2}{4b_j^2}}}{1 + \frac{t_\beta^2}{b_j}}; \frac{p_j^* + \frac{t_\beta^2}{2b_j} + t_\beta \sqrt{\frac{p_j^*(1-p_j^*)}{b_j} + \frac{t_\beta^2}{4b_j^2}}}{1 + \frac{t_\beta^2}{b_j}} \right],$$

where $p_j^* = \frac{g_j}{b_j}$ – the probability that the product will be in demand in the j -th segment; b_j – the total number of enterprises under study in the j -th segment; g_j – the number of enterprises that agree to buy the product in the j -th segment; β – the confidence probability that covers the unknown value of the probability characteristic p_j ; $t_\beta = \text{agrF}\left(\frac{1+\beta}{2}\right)$ – the function inverse to the Gaussian distribution function $F\left(\frac{1+\beta}{2}\right)$.

The proposed model for determining the size of the market allows you to make a forecast for future periods, taking into account the fluctuating nature of prices.

To determine the company's position in the market, taking into account competitive interaction, we will use the model:

$$S_i(t) = \frac{\exp f_i(t)}{1 + \sum_{k=1}^N \exp f_k(t)},$$

where $S_i(t)$ – the market share of the enterprise under study; $f_j(t)$ – the utility function of the product of the i -th enterprise; N – the number of companies in the market.

Equation (3) implies that the market share of each firm is affected not only by its own utility function, but also by the utility functions of other competing firms.

In particular, the market share of firm i will increase when its own utility function $f_i(t)$ increases and decrease when the utility function $f_j(t)$ of any competitor increases. Thus, we will take into account the dynamic nature of changing competitive positions over time.

So, having determined the market size and market share, we can introduce an indicator of the company's potential sales volume that will satisfy market demand:

$$R(t) = CS_i(t)$$

where $R(t)$ – the potential sales volume of the company.

In order to take into account the losses from storing goods in the warehouse, we introduce a cost function:

$$L(t) = \left(K + \frac{V(t) - R(t)}{W}\right)h + z$$

where $L(t)$ – costs of storing products; K – safe level of product stock to cover unforeseen demand; $V(t)$ – available demand for products in value terms; h – cost of storing one unit of product; z – fixed storage costs.

In this case, output is defined as:

$$V(t) = \varphi A(t)$$

where φ – capital return coefficient; $A(t)$ – cost of fixed assets.

Let us assume that a company can develop both at the expense of its own funds (assets of the enterprise) and at the expense of external financial support.

The pace of development of the enterprise will depend on its internal resources, that is, its capital, which is formed as a result of the production and economic activity carried out.

Thus, profit is an internal source that forms the enterprise's development funds and determines the strength of the positive feedback.

In this context, development funds will be considered as an internal investment factor for the development of the firm.

Then the change in the company's assets over time can be determined:

$$\frac{dA}{dt} = \varepsilon M(t) + I$$

where ε – the share of profit allocated for reinvestment; $M(t)$ – profit; I – investment in fixed assets of the company.

In order for the company to work effectively, it must bring its production as close as possible to the real demand that will exist in the market. Therefore, when determining profit, first of all, we

must take into account the potential sales volume of the company - exactly the volume that the market can absorb.

We must also take into account the costs of production and storage of products and, in addition, depreciation of fixed assets.

Thus, the company's profit can be expressed as:

$$M(t) = (1 - \tau_r)[(1 - \tau_d)R(t) - cV(t) - FC - \mu A(t) - L(t)]$$

where τ_r – profit tax rate; τ_d – value added tax rate; c – cost price in the product price; FC – fixed costs; μ – depreciation rate.

So, the overall business model will look like:

$$\begin{aligned} R(t) &= CS_i(t) \\ C &= \sum_{j=1}^J W I_j q_j k_j, \\ S_i(t) &= \frac{\exp f_i(t)}{1 + \sum_{k=1}^N \exp f_k(t)}, \\ L(t) &= \left(K + \frac{V(t) - R(t)}{W} \right) h + z, \\ V(t) &= \varphi A(t), \\ \frac{dA}{dt} &= \varepsilon M(t) + I, \end{aligned}$$

$$M(t) = (1 - \tau_r)[(1 - \tau_d)R(t) - cV(t) - FC - \mu A(t) - L(t)].$$

Thus, the proposed model allows us to take into account several important parameters of the enterprise's activities at once: the total size of the market; the fluctuating nature of market prices; the company's position in the market and competitive interaction; the enterprise's profit, taking into account storage costs; and most importantly, the model allows us to build a connection between the parameters of product demand and the real position of the enterprise in the market.

References:

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FEATURES OF FORMATION OF THE VALUE OF KNOWLEDGE IN THE INNOVATION ECOSYSTEM

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Globalization processes significantly influence formation and development of international economic, political, social, and cultural relations, and determine the trends of national economies. Taking into account global transformations, most developed countries are reorienting their economies from scientific and technical to innovation. Since innovation is currently one of the strategic priorities of production and organization of economic activity, which forms the vector of the country's development. It should be noted that innovations contribute to the development of enterprises