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A COMPREHENSIVE MODEL FOR MANAGING A COMPANY'S PRODUCT RANGE

Effective assortment management is one of the most important issues for any manufacturing or trading enterprise. It directly impacts business success, competitiveness and financial results. A well-formed and optimised product range enables you to maximise customer satisfaction, boost sales and ensure the efficient use of company resources. Assortment management strikes a balance between product diversity and sales efficiency, contributing to stable development and strengthening the company's position in the market.

A set of models has been proposed consisting of four main blocks: the formation of an initial system of indicators; assessment and analysis; forecasting; and decision-making [1; 2].

Block 1's task is to form an initial system of indicators reflecting the key characteristics of demand, consumer behaviour and product range efficiency. This system of indicators provides the basis for initial data collection, structuring and processing.

The system should include indicators of both the internal environment of the analysed enterprise and the external environment. Internal analysis enables you to identify the characteristics and dynamics of preferences, using data on purchases, repeat orders, customer feedback and responses to marketing activities. Researching the external environment enables you to consider the impact of market trends, competitive offerings and evolving consumer expectations, ensuring the product range is adjusted in a timely manner to meet the current needs of buyers.

The following indicators can be used internally:

– Frequency of repeat purchases;

– Average customer spend;

– Share of positive reviews from own sales channels;

– Average time to purchase decision (from online store or customer surveys);

– Popularity among target segments (based on internal sales data);

– Frequency of returns;

– Level of engagement in advertising campaigns (clicks, views, participation in promotions);

– Share of promotional purchase;

– Degree of purchase diversity (assortment breadth in the customer's basket);

– Share of online/offline purchases;

– Seasonality of preferences (based on own sales);

– Frequency of switching to competitors (based on customer surveys after loss).

As external indicators, it is recommended to select indicators from open sources that provide an overview of the general market situation, such as the consumer preference index, consumer confidence index, household expectations index and business activity index.

The objectives of Block 2 are to:

– classify and rank the current set of goods into homogeneous groups according to various criteria (e.g. sales volume, profit and demand stability);

– classify and rank customers;

– analyse demand elasticity;

– analyse the dependence of demand on a set of influencing factors;

– identify key influencing factors;

– measure the importance of product characteristics for buyers;

– assess consumers' emotional attitudes based on reviews and social networks.

The main model of Block 3 is the consumer preference forecasting model.

Let us assume that the economic system in which the analysed enterprise operates and develops may be in one of several states corresponding to different types or categories of consumer preferences (S_1, S_2, …, Sh). We will also assume that the number of possible states is finite and known, and that the system transitions from state to state at discrete moments in time. At any given moment, the system can only be in one of the known, predefined states. In this case, the process of changing the system's states can be represented as a random process involving discrete states and time.

Block 4: Decision-making. Depending on the decision-making horizon adopted, the use of static and dynamic models is recommended.

This is a static decision-making model.

General view of the model:

$S = (S_1, S_2, \dots, S_n)$ – set of enterprise states

$P = (P_1, P_2, \dots, P_K)$ – set of enterprise strategies

$R = \{R_{ij}\}_{m \times n}$, R_{ij} – estimate of the enterprise's income (profit) if strategy i is implemented in state j.

The model is used in situations involving uncertainty or risk, when a one-time choice of strategy must be made from several options, taking into account the potential states of the external environment. The optimal strategy is selected using one or more decision-making criteria, such as the Wald, Maximax, Savage or Laplace-Bayes criteria.

Dynamic decision-making model.

The model uses a matrix of single-step transition probabilities of the following type:

$$P = \{p_{ij}^k\},$$

where p_{ij}^k – is the probability of the system transitioning from state i to state j when strategy k is used.

Additionally, the model requires a returns (winnings) matrix:

$$D = \{d_{ij}^k\},$$

where d_{ij}^k- the single-step income (gain) from transitioning the system from state i to state j when using strategy k.

The model enables the identification of a conditionally optimal sequence of actions (single-step strategies) within a given planning horizon, given the initial state of the system. The objective function is the cumulative income.

$$F_i(t+1) = \max_k \sum_{j=1}^{n} p_{ij}^k (d_{ij}^k + F_j(t)).$$

Using the proposed set of models creates the prerequisites for improving planning efficiency, reducing uncertainty and increasing management flexibility in response to dynamic market changes.

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