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MATHEMATICAL MODELING IN ECONOMICS

Mathematical modeling allows to represent a process or phenomenon in a simplified manner by using a selected specific criteria and systematic characteristics of the object. Representing an object as a model makes it easier to make predictions about its behavior, since unimportant or too complex characteristics are excluded from the model. This approach is widely used in the economy. In this case, the model acts as a simplified system used to simulate certain aspects of the real economy.

In the modern economic science the mathematical modeling is used in the field of business processes organization: to develop ways of consolidating enterprises and improving production efficiency (not only in industry but also in science, education, medicine), for solving problems of resources allocation and other logistic tasks.

The process of creating an economic-mathematical model involves several steps:

1. Goal statement;
2. Identification of the most significant factors affecting the results;
3. Collection and processing of necessary information;
4. Function selection, drafting of the equation;
5. Calculation of the model parameters;

Assessment of the model importance and its applicability for predicting the result.

Let's take a closer look at the final stage, where arises question about the adequacy of the obtained model and the degree of its practical applicability. The main way of checking the compliance of the model to the studied object is practice, during which the model is being implemented and research begins. The received simulation results are analyzed for compliance with the known properties of the object. Based on the results of the model adequacy testing, a decision is made about the possibility of its practical use or adjustment. In the adjustment process, the available information about the object and all parameters of the constructed model are specified. Then changes are made to the model and the adequacy is evaluated again.

Classification of models in economy depends on the simulation objectives and the features of the studied object. Thus, we can distinguish the following types of models:

1. Discrete and continuous models – in discrete models, the change in parameters is associated only with individual points in time. In continuous models, the parameters are changed smoothly in time;

2. Static and dynamic models are changed over time, in contrast to a static ones;

3. Linear and nonlinear models are models in which the relationship between dependent and independent variables can be linear or nonlinear.

4. Optimization models allow you to choose the best option for any attribute from several alternatives.

5. Deterministic models are models that ignore the random nature of changes in parameters;

6. Stochastic models are designed to analyze and predict the economic phenomena under conditions of uncertainty in the source data (based on the methods of mathematical statistics).

A statistically significant model is widely used in predicting outcome. Consider this statement on the example: let the price of the car Y is a function of the variables x1 and x2: y = 1800 - 1000 * x1 - 0,3 * x2, where y is the expected car price, x1 is the car age, x2 – mileage. The constructed model allows to identify the car pricing process and determine the degree of influence of each factor on y. In this case, the price of a new car is equal to 18000 when x1 = 0, x2 = 0. The coefficients of this linear multiple regression at x1 and x2 mean that with an increase the car age by 1 year, its price decreases on average by 1000, and due to an increase in mileage by 1 thousand km - by 0.3. Thus, it will not be difficult for the manager to determine the expected price of the incoming car, even if its parameters have not been previously met in this dealership.