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APPLICATION OF MATHEMATICAL METHODS AND MODELS IN ECONOMICS

The financial success of an enterprise and its place in the market largely depend on the correct strategy of behaviour. In order to choose rational options for managing an enterprise, it is necessary to predict possible situations, influence them, directing its economic activity towards achieving the set goal. It is impossible to carry out rational management of the entire economic and production system, taking into account changes in each type of element, and resolve conflict situations without the use of economic and mathematical tools. A significant contribution to the development of the practical application of mathematical modelling methods in economics and finance was made by scientists such as: B. Burkinsky, V. Vitlinsky, B. Grabovetsky, V. Zdrok, N. Lepa, V. Osipov and others. With the help of economic and mathematical methods, they built their theories, carried out practical calculations, gave reasonable conclusions, made forecasts and assessed the risks of many economic phenomena and processes.

The main purpose of the work is to study the application of mathematical methods in economics and finance, to substantiate the need for mathematical modelling to solve complex economic problems, and to develop proposals for mathematical modelling of financial activities of an enterprise.

Economic and mathematical modelling is a universal tool for analysing and researching production, financial and economic processes and phenomena. The widespread use of mathematical methods is an important area for improving economic analysis, which increases the efficiency of enterprises and their divisions. The main reasons for the rapid spread of economic and mathematical modelling methods are the sharp complication of modern economic practice caused by the high level of production development, the growing pace of scientific and technological progress, and the requirements to improve the efficiency of natural resources. Modelling is a scientific theory of building and implementing models that study phenomena and processes in nature and social life [4]. Building economic and mathematical models is a complex process that requires in-depth knowledge of economic theory, the subject of research and mathematical tools [2]. A model is a simplified representation or abstraction of reality, a conditional image of an object that is created for a deeper study of reality [3]. A mathematical model makes it possible to find the optimal variant of a management decision that makes it possible to ensure the development of the situation for the effective achievement of the goal. Economic and mathematical methods and models provide such opportunities:

- accurately and compactly present the provisions of economic theory;
- formally describe the relationships between economic variables;
- solve planning and management optimisation problems, reflecting the specifics of production processes;
- respond in a timely manner to changes in goals, resource constraints, dependencies between parameters and adequately adjust plans and management decisions;
- obtain information about the object and its functioning;

● predict the object and its behaviour in the future.

For example, methods of elementary mathematics are used in economic calculations to justify resource requirements, account for production costs, develop plans and projects, and in balance sheet calculations.

Methods of mathematical statistics are widely used in economic analysis. These methods are used in cases where the change in the analysed indicators can be represented as a random process. Statistical methods are the main means of studying massive, repeated phenomena and play an important role in forecasting the behaviour of economic indicators. Econometric methods are a unique combination of three areas of knowledge: economics, mathematics and statistics. The basis of econometrics is an economic model, which is a schematic representation of an economic phenomenon or process using scientific abstraction. One of the main branches of econometrics is correlation and regression analysis, a set of mathematical methods that investigate the relationships of correlated variables [3].

Matrix methods and models are used to study complex and large-scale economic structures.

They allow us to present the relationship between costs and production results in the most compact form. Convenience of calculations and clarity of economic interpretation are the main features of matrix models. This is important when creating systems for mechanised data processing and when planning production using computers. Mathematical programming methods are designed to optimise production and business activities. At their core, they are a means of planning calculations. Their value for economic analysis lies in the fact that they make it possible to assess the achievement of potential, the intensity of planned tasks, determine the condition of equipment, limited types of raw materials, the degree of competition and shortages. To make management decisions in the face of risk and uncertainty, companies should use game theory. Game theory is a set of mathematical methods and models related to rational decision-making in the face of conflict and uncertainty [1]. The theory of queuing explores, on the basis of probability theory, mathematical methods for quantifying queuing processes.

Thus, each of the structural units of an industrial enterprise can be represented as an object of the service system. Operations research methods are used in the analysis to obtain a comparative assessment of alternative solutions. The implementation of these methods should cover the following stages: formalisation of the initial problem; construction of a mathematical model; solution of the model; verification of the model's adequacy; implementation of the solution. In recent years, expert evaluation methods have been increasingly used to make management decisions. These methods are based on the use of professional experience and intuition of specialists in solving analytical problems, especially in forecasting the development of economic situations. As for the use of mathematical tools in solving practical problems, there are at least four aspects:

1. Improvement of the economic information system. Mathematical tools make it possible to organise the system of economic information, identify shortcomings of the available information and develop requirements for the preparation of new information or its correction. The development and application of economic and mathematical models indicate ways to improve economic information that is focused on solving a certain system of planning and management tasks.

2. Intensification and improvement of the accuracy of economic calculations. The formalisation of economic tasks and the use of computers speed up typical, mass

calculations many times over, increase their accuracy and reduce labour intensity, and allow for multifaceted economic justifications of complex measures.

3. Deepening the analysis of economic problems. The use of modelling techniques significantly improves the quality of a specific quantitative analysis of the links between the elements of the economic system, creates conditions for studying many factors that affect economic processes, and allows for a qualitative assessment of the consequences of changes in the conditions for the development of economic objects.

4. Solving fundamentally new economic problems. Mathematical modelling helps to solve economic problems that are virtually impossible to solve by other means.

Depending on the type of tasks that are solved at a manufacturing enterprise, the following main areas of economic and mathematical modelling can be identified:

- quantitative analysis of own production and use of production capacities based on balance sheet matrix mathematical models;
- selection of promising production areas and financial activity strategy using predictive mathematical models;
- optimisation of technical and economic planning with different time detail;
- forecasting the choice of an optimal credit mechanism;
- forecasting optimal behaviour in the markets of production resources and products.

Conclusions. Mathematical modelling of financial activity of an enterprise can be presented as a set of tasks, the solution of which should be carried out in three stages. The first stage involves determining the purpose and specificity of the models, the mathematical apparatus and information support to be used in the study, the main directions and trends in the development and use of models, directions and methods of the study. The second stage involves researching models, identifying and evaluating the capabilities of economic and mathematical tools for analysing the financial performance of an enterprise. At the third stage, the possibility and necessity of creating a system of financial models are investigated, the consistency of their functioning is ensured, and a draft model of the system under study is developed.

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