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THE OPTIMIZATION PROBLEM OF MATHEMATICAL PROGRAMMING

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ABSTRACT

This article presents methods of solving economic problems using differential calculus and the ways in which it is applied..

Linear programming (LP) is one of the disciplines widely used in various areas of human activity, and its main focus is the optimization problem. Successes in this field have been achieved as a result of designing and analyzing large technical systems.

In solving all the problems that confront a person, one may arrive at a decision that is either good or bad. The decision-making process can be formalized or non-formalized. Non-formalized decision-making is creativity, an art. It requires nothing from a person. For example, a person sits down, thinks, and makes a decision. In this case there is indeed no guarantee that the decision is correct. In many cases people make decisions based on nothing more than their own thoughts, and in some cases relying on their experience.

As for a formalized decision, it is made on the basis of a clear recommendation. Formalized decision-making is based on two methods:

- logical modeling;
- optimization.

In logical modeling, specialists with advanced knowledge choose a method, and with its help determine what should be done in one situation or another. Mathematical logical functions serve this purpose.

The optimization method of decision-making is based on the following:

- economic-mathematical modeling;
- solving the problem on a computer;
- initial data.

Economic-mathematical modeling offers two possibilities:

- giving a quick answer to the question posed;
- the possibility of conducting extensive experiments.

The decision-making algorithm is quite complex, and especially in the present era of the market economy, it is practically impossible to carry it out without using a computer. Without the software developed for the algorithm that searches for the optimal solution on a computer, and without initial data, the desired result cannot be achieved.

The process of making an acceptable decision can be divided into the following stages:

1. Selecting the problem. At this stage, the requirements that the problem must satisfy are clarified.
2. Formulating the problem. At this stage, the economic-mathematical model of the problem and its elements are determined.
3. Constructing the economic-mathematical model of the problem. At this stage, the task of building an economic-mathematical model that serves as the basis for making an optimal decision is considered.
4. Collecting the initial data for the problem. At this stage, initial data suited to the constructed economic-mathematical model are collected.
5. Solving the problem. At this stage, an appropriate method is selected and the problem is solved.
6. Analyzing the solution. At this stage, the optimal solution obtained is analyzed on the basis of the economic-mathematical model.

7. Adopting the optimal solution. The optimal solution is adopted by a specialist on the basis of the results obtained.

Presenting the solution graphically is an important factor in adopting the optimal solution, as the data are displayed clearly.

Mathematical programming methods are the branch of economic mathematics that helps find the best, most appropriate, i.e. optimal, solution to problems with multiple possible solutions. The course of mathematical programming includes the parts called linear programming, nonlinear programming, dynamic programming, and game theory. Programming is a process in which an initial solution is found first, and then this solution is improved step by step. This process continues until the best program is found, and at each step special instructions indicate how to proceed and how to approach the optimal solution.

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