MATHEMATICAL MODELING OF PROCESSES OF AGRICULTURAL USE OF LAND AND WATER RESOURCES

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Abstract:

In this article, it is said that the use of digital technologies in agriculture today is the main reason for achieving high development results.
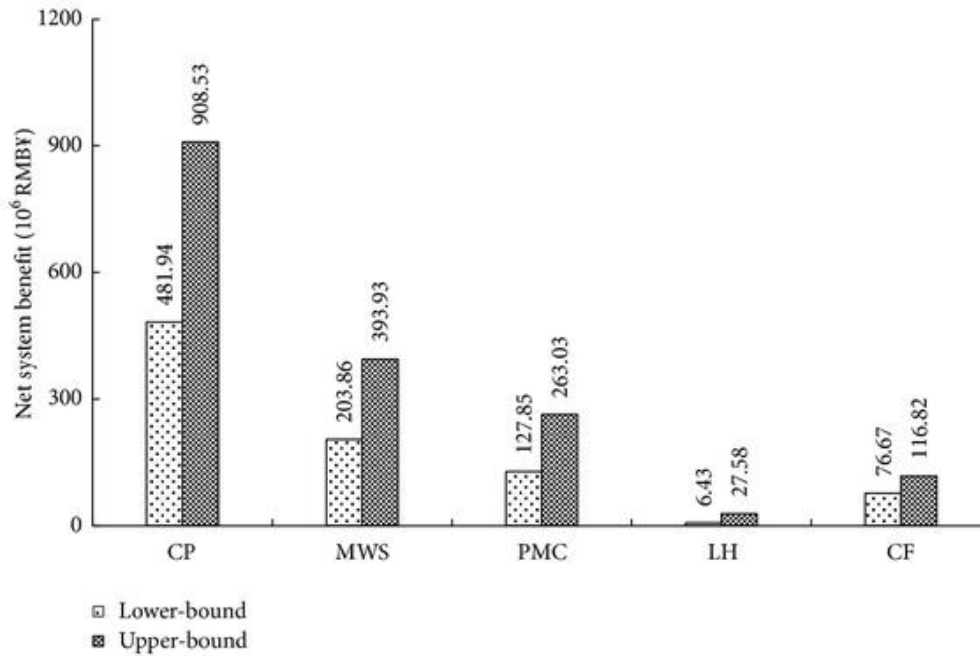
Keywords: agriculture, mathematical modeling, information technology, abstraction, information-consulting service, hypothesis, forecast.

Introduction

Today, agriculture is an independent field in Uzbekistan, and special attention is paid to the use of mathematical modeling methods in the field of agriculture and water management, like in other fields. Modeling methods have been used in agriculture since ancient times. Later, it is developing, and with the development of new information and communication technologies, the possibilities of its use are also expanding. In Uzbekistan, scientific research on mathematical modeling of socio-economic development of agriculture and informatization of management processes began in the 60s of the last century. In the early stages of research, specific issues related to irrigated agriculture, in particular, crop rotation, irrigation, and a number of other models of agricultural development and agricultural management processes, were developed, which were used in their practical application. has not lost its importance [3].

The idea of creating a multi-level information-accounting system of agricultural management and the concept of its implementation was founded by V.V. Qabulov, academician of the Faculty of Arts of the Republic of Uzbekistan. In general, it provides an opportunity to model agro-economic processes based on the laws of the agricultural management system and the information of its constituent elements and subsystems. Large-scale work on the more active application of information technologies to the agricultural sector is being carried out in our republic. Modernization and acceleration of agriculture in the Strategy of Actions on five priority areas of development of the Republic of Uzbekistan in 2017-2021 and the "strategy of development" approved by the Decree of the President of the Republic of Uzbekistan No. PF-60 of January 28, 2022 in the process of development, the issue of further expansion of the modern market services provision infrastructure was determined, which in turn creates the need for agricultural producers to use information and advisory services [1].

Modeling is a universal method of scientific knowledge. In order to achieve high results in agriculture, it is necessary to carry out constant calculations. Mathematical modeling methods are used for this. For example, how much fertilizer to put on the ground, how much water to give, checking the condition of the plant, planning the proportional distribution of water coming from the irrigation source, etc.

Water distribution planning is carried out taking into account the economic indicators of the entire system that optimize economic activity, and a mathematical model is developed. Since agriculture is the sector that provides us with basic food products, it has become necessary to pay serious attention to it. At the same time, it is possible to achieve high quality and productivity by paying special attention to modeling in agriculture. Setting the issue: the development of agriculture requires the effective use of effective technologies and mechanization aggregates; to be able to choose the profitable level of mechanization; to improve technology management; to improve the provision of material and technical resources and credits; to improve service and product processing; to further improve the condition of agricultural products storage, transportation and melioration of irrigated lands, to improve the condition of drainage and irrigation networks; depends on the state's reforms in agrarian policy.

The purpose of the research: to analyze the application of mathematical modeling methods in the field of agriculture.

Tasks of the research: Analysis of information sources on the research topic; determining which mathematical modeling methods are used in agriculture; draw conclusions from the obtained results.Tadqiqotning obyekti: The object of research is mathematical modeling methods used in the field of agriculture.

Research method: The research method is the analysis of mathematical modeling methods used in the field of agriculture. Research results: Not only economic, but also material resources are needed to

work on issues and put them into practice. If the right approach is beneficial, the wrong approach is harmful. For this reason, every work carried out requires careful analysis. The result of recent research has shown that in recent years, in order to achieve high efficiency in agriculture, it is necessary to widely use mathematical and computer modeling. But modeling is a complex process, which is a combination of the process of building, learning and accepting models. Modeling is a process inextricably linked with abstraction, analogy, hypothesis, etc. Modeling as a process should include the construction of abstractions, drawing conclusions by analogy, and as a result, the drafting of scientific hypotheses. Models are divided into the following groups: linear models; abstract models; static models; dynamic models; practical models; deterministic models; optimization models, etc. Economic-mathematical and econometric modeling methods are often used in agriculture. Here, the productivity of agricultural crops, the amount of fertilizer and moisture applied to the land to achieve high productivity, or other quantitative indicators are taken into account [2,6]. Below, the dependence of the yield of agricultural products (u) - on the amount of applied fertilizer (x1) and (x2) - on the quality of seeds is sought in the form of the model $u = a_0 + a_1 x_1 + a_2 x_2 + \varepsilon$. Here, a_0, a_1, a_2 are treated as unknown parameters, and ε is a random variable. In order to increase the efficiency of agriculture, the reduction of the cost of products depends on the expansion of the production of agricultural products and the financial condition of agricultural entities. When the cost is reduced, the wholesale and retail prices of agricultural products will also fall and it will be possible to buy more of them. In addition, the income of employees will increase and the standard of living will be higher. In agriculture, economic-mathematical and econometric modeling methods are used to solve the following issues: • Development of a program for obtaining high yields from agricultural crops; Effective use of agricultural machinery; • Development of a model for creating optimal conditions for agricultural crops; • Development of the field; • Storage and transportation of agricultural products; • Improvement of drainage and irrigation networks; •Further improvement of the reclamation condition of irrigated lands; • Forecasting the expected yield in the future. Summary. The use of various innovative technologies in agriculture is the main reason for achieving high development results. Only on the basis of objective information, it is necessary to organize the effective use of land and water, manpower, mineral fertilizers and other production resources in agriculture, to improve the condition of drainage and irrigation networks, and to determine functional tasks aimed at increasing efficiency. can come to the right conclusion. The use of mathematical modeling methods is certainly useful in giving such conclusions [4,5,6,7].

References

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