To Determine the Optimal Size of the Farm with the Help of Economic-Mathematical Model

[1] **Khafizova Zulfiya Kholmuratovna**

[2] **Altiev Abdurashid Sultanovich**

[3] **Dr. Alma Bangayan-Manera**

Abstract

The article substantiates the need to improve the mechanisms of development of farms, considers the implementation of the mechanism of development of farms with an economic and mathematical model. A model is proposed for optimizing the development of farms using a number of indicators. (for example, the Republic of Uzbekistan).

Keywords: the size of land use, area, farming, seeds, fertilizers, various methods, statistical data profitability, output of gross and marketable products.

[1] Senior Lecturer of "Tashkent Institute of Irrigation and Agricultural Mechanization Engineers" National Research University

[2] Doctor of Economic Sciences, Professor Head of Land Use Department of the "Tashkent Institute of Irrigation and Agricultural Mechanization Engineers" National Research University

[3] PhD of Cagayan State University

Introduction. At the present stage, the farming system is developing in the Republic of Uzbekistan. When transitioning to a new management system, it is necessary to take into account the experience of previous farming methods. Farming is based on a free choice of management methods [1]. The main task of the agro-industrial complex is to maximize the standard of living of the population, the growth of employment and incomes of rural residents. That is why the first President of the Republic of Uzbekistan I. A. Karimov and the current President Sh. M. Mirziyoyev set the task of "... implementing a wide range of long-term, deeply interconnected measures aimed at radically improving the quality of life and appearance of the village, accelerated development of social and industrial infrastructure, a radical revision of the status, role and importance of the owner, entrepreneurship and small business, full support for the development of farming" as one of the priorities of further deepening economic reforms [2-4].

World experience suggests that for successful farming it is necessary to ensure its informatization or, more precisely, inform the producers of agricultural products [5].

According to the Law of the Republic of Uzbekistan "On Farming" adopted in a new edition in 2004, "A farm is an independent economic entity that conducts commercial agricultural production using leased land plots. A farm is created by its head, who gives the farm the appropriate separate property and approves its charter".

In order to improve economic relations, strengthen the regulatory framework, optimize unprofitable and low-profit agricultural farms and create conditions for their economic activities, the Cabinet of Ministers of the Republic of Uzbekistan issued a Resolution "On optimization of farms" on October 26, 2018. Tashkent, April 26, 2018, No. PP-3680 according to the law "On Farming" of the Republic of Uzbekistan, a farm is exclusively created on a competitive basis [6-8].

Methodology. The land system, which has radically changed during the reforms, has introduced its own features into the process of functioning of all forms of agricultural enterprises [9]. The management mechanisms that previously provided the organization of agricultural production are outdated and currently requires modernization adequate to the current state of the industry [10]. In this regard, there is a need to revise and improve some provisions of previously developed methodological approaches to determining the optimal size of land use of farms [11]. In 2019, the "Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020 - 2030" was approved, which covers the following strategic priorities:

Ensuring food security of the population;

Creating a favorable agribusiness climate and value chains;

Reducing the role of the state in the management of the sphere and increasing investment attractiveness;

Ensuring the rational use of natural resources and environmental protection;

Development of modern public administration systems;

Gradual diversification of public spending in support of the sector;

Development of science, education, information and consulting services in agriculture;

Rural development; development of a transparent system of industry statistics.

Within its framework, it is expected to achieve the following key indicators by 2030:

the development of 1.1 million hectares of agricultural land, increasing the efficiency of the use of 535.6 thousand hectares of rain-fed, pasture and other lands;

growth of average labor productivity in agriculture by 1.7 times (up to 6.5 thousand US dollars per employee per year);

increase in processed products to 30%;

an increase in exports to $20 billion.

Thanks to the reforms carried out, the gross agricultural output for 2017-2020 increased by 6.8%. The average annual growth rate of production over the analyzed period was about 1.7%.

Significant progress has been achieved in the growth of labor productivity in the industry. In 2017-2019 alone, the value added of agriculture per 1 employed person increased by 7.0%, exceeding the global average by 60% in 2019.

In most of the previously developed methods optimizing the size of the land use of the farm, the planned volumes of agricultural production were the main indicator. The size of land use with a given specialization of the farm had to ensure the production of these volumes. On this basis, calculations were made of the need for labor resources in the fields of crop production and animal husbandry (the number of settlements and production units was established), in fixed and circulating means of production (machinery, seeds, fertilizers), the qualitative condition and structure of land was taken into account. These methods were applicable in a planned economy with state support of the agricultural sector of production, state ownership of land [12].

After the change of landmarks and the establishment of market relations, the introduction of private ownership of land predetermined the redistribution of land between the subjects of land relations. The allocation of land for the development of new forms of management has led to a violation of the structure of land use of agricultural enterprises. The ratio of the three main elements of the production process -labor, land and capital - has been disrupted.

In this regard, there is a need to improve some provisions of the previously developed methodological approaches to determining the optimal parameters of the farm. It is proposed to form an array of farms directly and establish production development options, taking into account specialization, availability of labor resources and capital.

Various methods are used to determine the estimated (initial) optimal sizes of a farm:

Method of analogues;

Economic and statistical ;

Computational and constructive;

Economic and mathematical.

When using the method of analogues, the experience of advanced agricultural enterprises operating in similar natural and economic conditions and having the same specialization with the farm for which the optimal size is set is studied.

To obtain a more reasonable result, it is advisable to use the economic and statistical method. For this purpose, data is sampled based on the results of economic activity of all farms of a certain production type located in the considered zone. With the help of statistical groupings, the influence of the farm area on the relative performance indicators of farms (profitability, output of

gross output and marketable products, gross income and profit per 1 hectare of agricultural land, return on funds and others) is analyzed. Farms in which the above indicators are indicated are recognized as optimal.

Statistical data are also used to construct production functions describing the dependence of productive indicators of production (y) on the size of farms (x). Second-order parabolas are most often used

$$Y = a_0 + a_1x + a_2x^2$$

a_0, a_1, a_2 -coefficients of the equation determined by solving a system of normal equations obtained using the method of naming squares. (1)

The optimal value of the size of the farm ($X_{опт}$) is determined by equating the first derivative

$$\frac{\partial y}{\partial x} = a_1 + 2a_2x_{onm}$$

Where from: $a_1 + 2a_2x_{onm} = 0, \; Xonm = a_1 = -\dfrac{a_1}{2a_2}$

When studying the equation at the optimum point, the experimental value of the result y is found by the formula:

$$y = a_0 - \frac{a^2{}_{1_2}}{4a_2}$$

This value will be the maximum, if $a_2 \prec 0$, and minimal , if $a_2 \succ 0$.

For example , for cotton - growing farms of Navbakhor mist , the following dependence of gross output on the area of agricultural land was determined:

$$Y=10.2+2.4*x$$

Where X- area of farmland, thousand hectares;

Y- The cost of gross output, thousand. Sum per 1 hectare

Maximum ($a_2 \prec 0$) the value of the volume of gross output reaches when $X_{опт}$=41, 2 hectare

The computational and constructive method allows you to balance the resources of the farm and, in combination with variant studies, helps to approach the optimal size of the farm.

Practice has shown that farms have a number of advantages over other forms of ownership. Since the simplicity of registration from the legal side:

The improvement of the activities of farms and ample opportunities for their development gives its positive results. The share of gross agricultural output of farms, their number, acreage, the number of workers in farms are growing at a relatively faster rate than the average indicators of agriculture as a whole. Such features of farms show that they occupy a strong place as one of the most effective forms of management and the agricultural sector of the country.

In general, in the future, farms should become the main factor in the sustainable development of the agricultural sector of Uzbekistan.

REFERENCES

1. KZ KHOLMURATOVNA. The Environmental Protection, the Role of Land Support in Creation of Economic and Legal Mechanisms of Effective Use of Land Resources. JournalNX - a Multidisciplinary Peer Reviewed Journal 2 (2), 84-86

2. Muratovich, MukumovAbdugani and Alikulovich, Usmanov Yusuf and Sobir, Ruziboyev. (2020). the ways to increase the efficiency of dekhan and household plots. *International Journal of Psychosocial Rehabilitation*, 24(03).

3. Avezbayev S. et al. Determination of rational areas of irrigated plots in saline and subjected lands to irrigation erosion //IOP Conference Series: Materials Science and Engineering. – IOP Publishing, 2020. – T. 883. – №. 1. – C. 012059.

4. AR Babajanov, MD Mahsudov. Diversification of land fund in the district. Monograph. LAP Lambert Academic Publishing, 77-78

5. Samosa R. C. et al. Methodology for Determining the Costs of Environmental Protection Measures in Land Management //European Journal of Life Safety and Stability (2660-9630). – 2021. – T. 10. – C. 39-45.

6. Bangayan-Manera A. et al. Problems of Cadastral Evaluation of Land Intended for Non-Agricultural Purposes //European Journal of Life Safety and Stability (2660-9630). – 2021. – T. 10. – C. 34-38.

7. Sayfuddin S., Muhammadbek M. Working Projects of Disturbed Land Recovery-As a Method of Land Protection //Academic Journal of Digital Economics and Stability. – 2021. – T. 9. – C. 80-84.

8. Abdurashid A., Muhammadbek M. Regulation of the Diversification of the Use of the District Land Fund through the General Scheme //Design Engineering. – 2021. – C. 2565-2581.

9. Altiev, A., & Mahsudov, M. (2020). Improvement of the regulation mechanisms of the land use diversification. *International Journal of Pharmaceutical Research. ISSN*, *9752366*.

10. Sultanovich, A. A., & Ugli, M. M. D. (2019). Methods of forecasting and management of land fund diversification in local areas. *International Journal of Recent Technology and Engineering*, *8*(3), 403-411.

11. Altiev, A. S., & Mahsudov, M. D. (2019). REPRODUCTION CYCLE OF LAND. *Central Asian Problems of Modern Science and Education*, *3*(4), 96-102.

12. U Sangirova, Z Khafizova, I Yunusov, B Rakhmankulova, U Kholiyorov. The benefits of development cage fish farming. E3S Web of Conferences 217, 09006