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Optimization of the development and location of agricultural clusters of regions

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Abstract: This article talks about the optimization of development, placement and economic efficiency of agro-industrial clusters of enterprises in the current conditions. The authors also share their thoughts on the issues of increasing the profits of agro-industrial clusters in the region.

Keywords: optimization, strategy, efficiency, cluster, agro-industrial, digital management, development planning model, specialization, complex coefficient.

Introduction.

In the materials, the Development Strategy of New Uzbekistan for 2030 is defined as a priority - the accelerated development of the national economy and ensuring high growth rates [1]. To ensure this task, one of the main ways is to optimize the development and placement of agro-industrial clusters in all regions of New Uzbekistan and they must be managed by modern methods.

To study the object of study, we chose the Andijan region. Andijan region is a region of New Uzbekistan, located in the eastern part of the Ferghana Valley in the far east of Uzbekistan. Andijan region is the smallest area, but the most densely populated in the Republic of New Uzbekistan. Andijan region consists of fourteen districts (regions), which include 11 cities, 79 urban settlements and 455 rural settlements. The population density among the regions of New Uzbekistan ranks first and amounts to 751 people per square kilometer as of January 1, 2022 (751 people / km2). Almost 10% of the population of the whole of Uzbekistan lives in the Andijan region, its area is less than one percent of the Republic.

Methods and materials.

The purpose of this research article is to identify opportunities for further improvement of the placement and development of agro-industrial clusters in the zone of intensive cotton growing.

In accordance with this goal, the following main tasks are set in this study:

-develop methodological foundations for intra-regional placement and specialize agro-industrial clusters;

- to study the existing location and specialization of agro-industrial clusters in the Andijan region;

-develop an economic and mathematical planning model

development and placement of agro-industrial clusters of the region and carry out practical calculations;

-provide a justification for the choice of those cotton farmers who are expedient to respecialize in the development of other sectors of the clusters;

-organize digital management of agro-industrial clusters of the region;

-determine the cost-effectiveness of improvement

placement and specialization of agro-industrial clusters

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Table 1.
2011-2021 analysis of the socio-economic indicators of agriculture in the Andijan region.

Indicators	Years											2021 compared to 2011 (+, -)
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Sown area of agriculture in the region, thousand hectare	230,1	230,2	229,6	229,9	229,9	230,0	230,0	230,1	230,2	230,2	230,1	100,0
The share of this indicator compared to the Republic,%	6,2	6,4	6,3	6,3	6,2	6,2	6,2	6,6	6,8	6,9	6,8	+0,6
Number of workers (employed) in agriculture of the region, thousand people	301,3	313,8	315,0	324,3	334,4	342,8	348,4	349,1	339,5	341,0	325,4	24,1
The share of this indicator compared to the Republic,%	22,2	22,4	22,3	22,4	22,6	22,7	22,5	22,4	22,1	22,0	22,0	-0,2
The share of people employed in agriculture compared to the total number of employees in the region, %	25,9	26,7	26,3	27,2	27,9	28,1	27,7	27,3	25,5	24,9	24,4	-1,0

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The problem of development, placement and specialization of agro-industrial clusters is very complex, multifaceted and belongs to the class of optimization.

The optimal solution to the problem of specialization of the agro-industrial clusters of the region can be most effectively implemented on the basis of the allocation of micro-zones by production types of farms. This approach allows you to realize the following advantages:

- develop consolidated standards for material and labor costs by types of industrial specialization of clusters;

- to accept an agricultural micro zone as an object (block) of the model, which reduces the number of modeling objects by 15-20 times, and, consequently, the amount of work on the calculation of technical and economic indicators using modern information technologies;

-provide solutions to the problem and linkage of planning levels, scientific validity of the development of plans for the economic and social development of agro-industrial clusters.

The allocation of groups of production types of farms for the future, as objects of modeling, is the main problem in the placement and specialization of clusters. Currently, there is no single methodological approach to solving this issue. It is customary to refer to one production type agricultural enterprises that are close in their socio-economic and natural conditions, as well as in the goals and specialization of clusters, the level of intensity, composition and proportions of the main elements of production. In most publications, a typical farm is taken to be one in which the main parameters deviate least from their average values for a given set of enterprises.

Discussion.

To design the placement and specialization of clusters within the areas of cotton-growing type of farmers, the study proposed to group farms into agricultural micro-zones.

Groups were distinguished according to two main features: soil types and complex coefficient of production efficiency.

To determine the complex coefficient of production efficiency, we used the index method, the essence of which is as follows:

For $X_{i,j}$ - the original variable is taken, where the index j is denotes the serial number of farms, and through i – denotes type of crop (cotton). When j = 0, the corresponding indices take average values over the region. Where i = 1.2…n; j = 1.2...m. The value $a_{k,j}$ is defined as the ratio:

$$a_{k,j} = \frac{X_{i,j}}{X_{i,0}} \qquad (1)$$

The complex coefficient of production efficiency is determined as the product of indices of yield, cost, labor productivity, net income, profitability and is calculated by the expression:

$$A_j = \prod_{k=1}^{5} a_{k,j} \quad (2)$$

Where k is the serial number of the coefficient;

$a_{(1,j)}$ – coefficient of production per 1000 sums. costs;

$a_{(2,j)}$ – yield factor;

$a_{(3,j)}$ is the coefficient of production per 1000 man-hours. labor costs;

$a_{(4,j)}$ is the coefficient for the output of net income from one hectare of arable land;

$a_{(5,j)}$ – profitability ratio.

In the final assignment of a farm to a particular microzone, the following factors were additionally taken into account: water availability, farm belonging to the soil-climatic zone, the sum of effective temperatures, and average transportation distances.

An automated data bank was used in the implementation of a complex of necessary calculations for the allocation of micro zones of agricultural production in the region. Algorithms and a computer program for determining the complex efficiency factor for modern information technologies have been developed.

As a result of automated calculations, 10 microzones were identified, which formed the basis for modeling the problem of development, location and specialization of the agricultural sectors of the agro-industrial complex of the region (table 2).

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Table 2.
Agricultural microzones of the Andijan region and their natural and economic characteristics.

Micro zone	Number of farms	Complex coefficient of efficiency	Cotton yield (c/hectare)	Soil score	Water availability (thousand m3/hectare)	Sum of effective temperatures in degrees
1.	6	0,28	17,85	42,09	11,03	2421
2.	11	0,49	28,07	66,39	18,32	2316
3.	9	1,58	34,41	82,42	11,66	2317
4.	14	0,41	29,92	70,76	12,45	2308
5.	15	0,83	31,68	75,99	11,48	2294
6.	18	1,45	34,47	80,98	12,70	2322
7.	9	0,80	27,62	64,56	10,82	2125
8.	23	0,72	29,71	70,25	9,85	2223
9.	9	1,09	33,26	78,67	13,41	2090
10.	32	2,43	34,67	82,00	10,63	2338

In the context of selected agricultural micro-zones, an economic and mathematical model for the location of agro-industrial clusters of the region was developed. The allocated micro zones made it possible to scientifically substantiate the technical and economic indicators of the development of individual sectors of the clusters, which made it possible to optimize the placement of clusters based on an assessment of the objective conditions of production. As a result of solving the problem, the types and volumes of agricultural production of clusters are determined.

The final stage of the study consisted in the selection of specific farms for specialization in additional sectors of the clusters.

In the present work, it is proposed to single out production types of farms for specialization in additional sectors of clusters according to the following criteria:

The maximum coefficient of specialization in relation to the volume of gross production for this type of specialization;

Maximum yield (productivity) by type of specialization;

The maximum complex coefficient of efficiency for this type of specialization;

Minimum coefficient of specialization in relation to the regional volume of cotton production;

Minimum cotton yield;

Minimum composite efficiency ratio for cotton production.

Conclusion.

As a result of the calculations, farms with the best complex of production factors for this type of product and with the worst complex of factors for cotton production were selected as the base ones.

In the Andijan region, it is advisable to develop the following types of specialized clusters:

- cotton-growing and textile clusters with an additional industry - dairy cattle breeding;
- grain clusters;
- vegetable clusters;
- horticultural and viticultural clusters;
- melon-growing clusters;
- potato clusters and others.

It is necessary to ensure the sustainable and continuous development of agro-industrial clusters. These agro-industrial clusters using modern information and communication technologies, each structural unit and operation needs to organize digital management. When defining digital management, there is no consensus among scientists and specialists. Therefore, during 2017-2021, as a result of the study of this issue, we propose the following definition. Digital management is the goals set using electronic devices, marketing, information

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technology, staff motivation, process automation and innovation to obtain optimal solution results. We have developed an algorithm for this definition:

$$DC = I_m \cdot I_{IT} \cdot I_p \cdot I_a \cdot I_{in} \qquad (3)$$

Where:
ЦУ – Digital Control;
$I_м$ –Index of Marketing;
$I_{ИТ}$ – Index of Information Technology;
I_n – Index of Personal;
I_a – Index of automation;
$I_{ин}$ – Index of Innovation.

After the introduction of digital management in agro-industrial clusters, it was determined that the higher the level of digital management in agro-industrial clusters, the higher the level of profitability they receive.

As a result of this study, we propose the following:

- in all regions of the Andijan region to create agro-industrial - cotton-textile, grain, vegetable, horticultural, viticultural, melon-growing, potato-growing clusters;
- to introduce digital management in all objects of agro-industrial clusters;
- for agro-industrial clusters will prepare competent specialists and organize continuous professional development of personnel.

The continuous implementation of the above stated proposal contributes to the socio-economic and technological development of New Uzbekistan.

References.

1. Mirziyoev Sh. M. Strategy of New Uzbekistan, Tashkent, 2021, 458 p.
2. Kuldashev E., Ikromov H. Computer design. Andijan 2021.
3. Chaffee D. - Digital business and e-commerce management. London, 2019.
4. Kuldashev E., Khudaiberdiev M. DIGITAL MANAGEMENT IN MACHINE-BUILDING ENTERPRISES // Universum: technical sciences. - 2021. - No. 7-1 (72).
5. E.H.Butayev. (2021 йил 7-12). ALGORITMLAR TIZIMLI TAHLILI VA ULARNING TAKOMILLASHTIRISH. (Ф. П. ИНСТИТУТИ, Ed.) *ФАРҒОНА ПОЛИТЕХНИКА ИНСТИТУТИ И Л М И Й – Т Е Х Н И К А ЖУРНАЛИ, Том 25.*(спец. вып. № 1), 36-41.
6. Х, И. Х. (2021). СОЗДАНИЕ ИНФОРМАЦИОННОЙ СИСТЕМЫ. *№. 2-1 (83).*(83).
7. Хомитжонович, Б. Э. (- 2021 г.. -). ЧЕГАРАЛАНМАГАН ТОР ТЕБРАНИШ ТЕНГЛАМАСИ УЧУН БОШЛАНҒИЧ МАСАЛАНИ MAPLE ДАСТУРИДА ЕЧИШ. *Volume: 1*(ISSUE: 5стр. pp. 422-427.).
8. Official data of the State Statistics Committee of the Republic of Uzbekistan (http://web.stat.uz/open_data/uz/).